Reports and Research

Table of Contents

September 16, 2021 Board Meeting

Federal Data and Reports

Other Reports and Research

- *Analysis of Publicly Funded Reinsurance—Government Spending and Insurer Risk Exposure* – ***Journal of the American Medical Association***
  August 13, 2021

- *Individual Health Insurance Market Reinsurance After the Passage of the American Rescue Plan Act* – ***Journal of the American Medical Association***
  August 13, 2021

- *Citizen Children with Noncitizen Parents Experienced Health Insurance Coverage Losses between 2016 and 2019* – ***Urban Institute***
  August 12, 2021

- *The Affordable Care Act After a Decade: Industrial Organization of the Insurance Exchanges* – ***National Bureau of Economic Research***
  August 1, 2021

- *Industrial Organization of Health Care Markets* – ***National Bureau of Economic Research***
  August 1, 2021

Sep 09, 2021

My First 100 Days and Where We Go From Here: A Strategic Vision for CMS

By: Chiquita Brooks-LaSure, Administrator, Centers for Medicare & Medicaid Services

Initiatives Leadership

We've learned a lot during the COVID-19 pandemic on the ways access to comprehensive health care affects our lives and well-being. The availability of COVID-19 tests, vaccines, and treatments have saved millions of Americans from sickness and death – because the federal government stepped up to make sure that every person who needs COVID-related care has access to the care they need. But the challenge of the past 19 months has also put an incredible strain on our country's health care infrastructure and highlighted weaknesses and disparities that cry out for smart and innovative solutions.

I am privileged to lead an organization that is at the forefront not only in the fight against COVID-19, but one that also works tirelessly to ensure the more than 170 million Americans with Marketplace, Medicare or Medicaid coverage know they will be able to get the care they need and deserve.

Our vision is straight forward: "CMS serves the public as a trusted partner and steward, dedicated to advancing health equity, expanding coverage, and improving health outcomes." How we achieve this vision is through the work of thousands of individuals dedicated to improving people's lives through public policy aimed at making the U.S. health care system work better for everyone.

As I mark my first 100 days of leading CMS, I think it's important to lay out my strategy for how the agency will achieve this vision and how we should judge our success. To me, everything we do at CMS should be aligned with one or more of six strategic pillars:

- Advance health equity by addressing the health disparities that underlie our health system

- Build on the Affordable Care Act and expand access to quality, affordable health coverage, and care
- Engage our partners and the communities we serve throughout the policymaking and implementation process
- Drive innovation to tackle our health system challenges and promote value-based, person-centered care
- Protect our programs' sustainability for future generations by serving as a responsible steward of public funds
- Foster a positive and inclusive workplace and workforce, and promote excellence in all aspects of CMS's operations

In the short time I have been CMS Administrator, we have already made significant progress on these pillars, focusing our efforts on improving health equity and access to coverage by working across what I call “the three Ms”: Medicare, Medicaid & CHIP, and the ACA Marketplaces. For example:

- We’ve expanded affordable coverage through HealthCare.gov. Thanks to the Special Enrollment Period instituted by President Biden, more than 2.5 million Americans were able to enroll in federal and state marketplaces this year, and millions of new and returning consumers found coverage for $10 or less per month.

- For every decision being made, we’re asking ourselves “how is this action advancing health equity?” That shift in perspective has resulted in a number of actions including a proposed rule to support home care workers’ access to benefits; encouraging states to educate eligible immigrants about Medicaid coverage; and proposing steps to close health equity gaps by providing persons with Medicare battling End-Stage Renal Disease (ESRD) with greater access to care.

- CMS increased the availability of home-based community services so that seniors and people with disabilities can receive the care they need in their own homes and communities. This included increasing access to COVID-19 vaccinations to 1.6 million Medicare beneficiaries who have difficulty leaving their homes or are otherwise hard-to-reach.

In addition to these policy initiatives, I’ve assembled one of the most experienced and diverse leadership teams in CMS history, bringing decades of federal government, Congressional, advocacy, private-sector, clinical, state-based and previous agency experience together to serve the people who rely on CMS for coverage and care.

We will work tirelessly to address the gaps in the health care system exposed by the

COVD-19 pandemic. On behalf of people who rely on our programs, I and the more than

6,000 dedicated professionals who make up CMS are committed to driving innovative solutions to make comprehensive health care more equitable, more accessible, and more affordable.

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NATIONAL CENTER FOR HEALTH STATISTICS
National Health Interview Survey Early Release Program

Health Insurance Coverage: Early Release of Estimates From the National Health Interview Survey, January–June 2020

by Robin A. Cohen, Ph.D., Emily P. Terlizzi, M.P.H., Amy E. Cha, Ph.D., M.P.H., and Michael E. Martinez, M.P.H., M.H.S.A.
Division of Health Interview Statistics, National Center for Health Statistics

What's New

- Estimates of health insurance coverage based on data from January through June 2020 are provided.

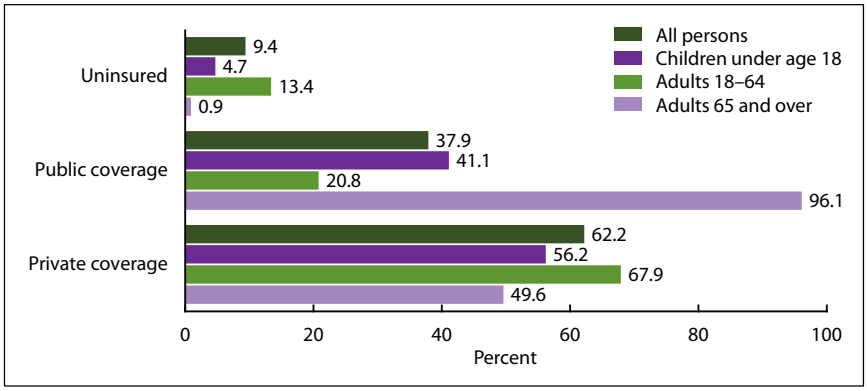
Highlights

- From January through June 2020, 30.4 million persons of all ages (9.4%) were uninsured at the time of interview. This is lower than, but not significantly different from, 2019 where 33.2 million persons of all ages (10.3%) were uninsured.
- From January through June 2020, among adults aged 18–64, 13.4% were uninsured at the time of interview, 20.8% had public coverage, and 67.9% had private health insurance coverage.
- Among children aged 0–17 years, 4.7% were uninsured, 41.1% had public coverage, and 56.2% had private health insurance coverage.
- Among adults aged 18–64, those who were poor (21.8%) and near poor (23.9%) were more likely than those who were not poor (8.8%) to be uninsured.
- Among adults aged 18–64, Hispanic adults (26.5%) were more likely than non-Hispanic black (13.2%), non-Hispanic white (9.7%), and non-Hispanic Asian (9.3%) adults to be uninsured.
- Among adults aged 18–64, 8.4 million (4.3%) were covered by private health insurance plans obtained through the Health Insurance Marketplace or state-based exchanges.

This report presents estimates of health insurance coverage for the civilian noninstitutionalized U.S. population based on data from the January–June 2020 National Health Interview Survey (NHIS). These estimates are being published prior to final editing and final weighting to provide access to the most recent information from NHIS. Estimates are disaggregated by age group, sex, poverty status, race and ethnicity, and state Medicaid expansion status. Estimates of exchange-based coverage by age, sex, poverty status, race and ethnicity, and state Medicaid expansion status also are included. Detailed appendix tables contain all estimates presented in the figures, additional estimates for 2019, 6-month intervals, and estimates for selected population characteristics.

In 2019, the NHIS questionnaire was redesigned to better meet the needs of data users. See Technical Notes for more information on the potential impact of the redesign on insurance estimates. Quarterly estimates for 2020 by age group and poverty status, and more information about NHIS and the Early Release (ER) Program, are available from the NHIS website.

Figure 1. Percentages of persons who were uninsured or had public or private coverage at the time of interview, by age group: United States, January–June 2020

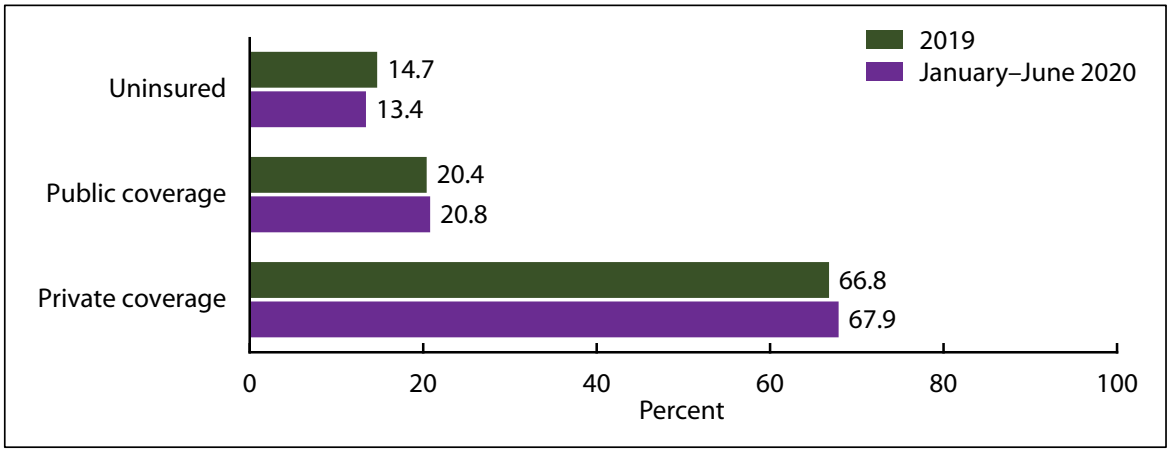


NOTES: Persons were defined as uninsured if they did not have any private health insurance, Medicare, Medicaid, Children's Health Insurance Program (CHIP), state-sponsored or other government plan, or military plan. Persons also were defined as uninsured if they had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care. Public coverage includes Medicaid, CHIP, state-sponsored or other government-sponsored health plan, Medicare, and military plans. Private coverage includes any comprehensive private insurance plan (including health maintenance and preferred provider organizations). These plans include those obtained through an employer, purchased directly, purchased through local or community programs, or purchased through the Health Insurance Marketplace or a state-based exchange. Private coverage excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons were covered by both public and private plans and were included in both categories. Data are based on household interviews of a sample of the civilian noninstitutionalized population.
SOURCE: National Center for Health Statistics, National Health Interview Survey, 2020.

- From January through June 2020, among persons of all ages, 9.4% were uninsured, 37.9% had public coverage, and 62.2% had private coverage at the time of interview (Figure 1).

- Adults aged 18–64 were the most likely to be uninsured (13.4%), followed by children aged 0–17 years (4.7%) and adults aged 65 and over (0.9%).
- Adults aged 65 and over were the most likely to have public coverage (96.1%), followed by children aged 0–17 years (41.1%) and adults aged 18–64 (20.8%).
- Adults aged 18–64 were the most likely to have private coverage (67.9%), followed by children aged 0–17 years (56.2%) and adults aged 65 and over (49.6%).

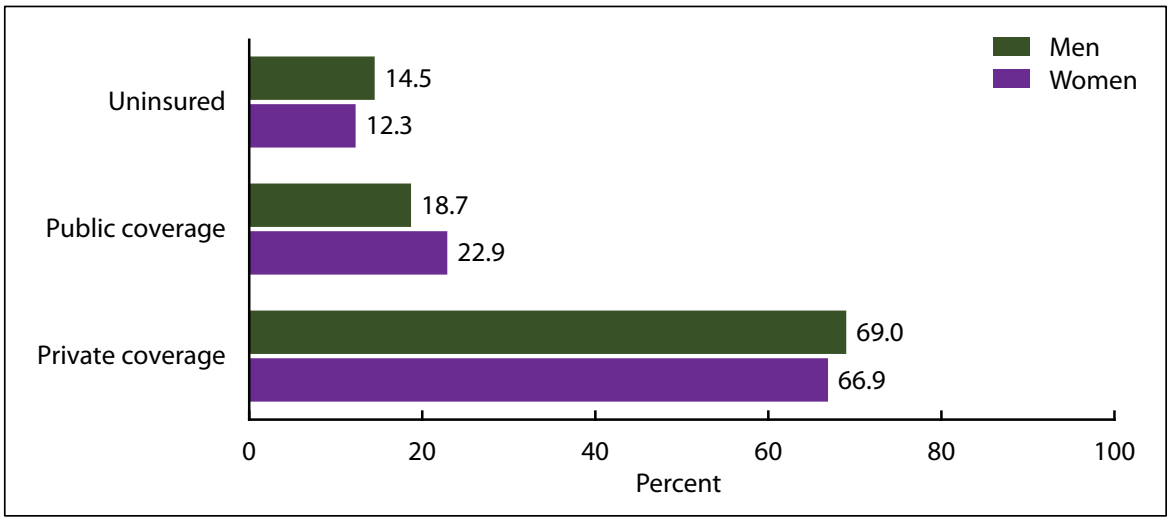
Figure 2. Percentages of adults aged 18–64 who were uninsured or had public or private coverage at the time of interview, by year: United States, 2019–June 2020



NOTES: Persons were defined as uninsured if they did not have any private health insurance, Medicare, Medicaid, Children's Health Insurance Program (CHIP), state-sponsored or other government plan, or military plan. Persons also were defined as uninsured if they had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care. Public coverage includes Medicaid, CHIP, state-sponsored or other government-sponsored health plan, Medicare, and military plans. Private coverage includes any comprehensive private insurance plan (including health maintenance and preferred provider organizations). These plans include those obtained through an employer, purchased directly, purchased through local or community programs, or purchased through the Health Insurance Marketplace or a state-based exchange. Private coverage excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons were covered by both public and private plans and were included in both categories. Due to the COVID-19 pandemic, National Health Interview Survey data collection switched to a telephone-only mode beginning March 19, 2020. This resulted in lower response rates and differences in respondent characteristics for Quarter 2 (April–June). Differences observed in estimates between January–June 2020 and earlier time periods may be partially or fully attributable to these changes. Data are based on household interviews of a sample of the civilian noninstitutionalized population.
SOURCE: National Center for Health Statistics, National Health Interview Surveys, 2019 and 2020.

- Among adults aged 18–64, the percentage who were uninsured at the time of interview from January through June 2020 (13.4%) was lower than, but not statistically different from, the percentage who were uninsured in 2019 (14.7%) (Figure 2).
- Among adults aged 18–64, the percentage who had public coverage at the time of interview did not change significantly between 2019 (20.4%) and January through June 2020 (20.8%).
- Among adults aged 18–64, the percentage who had private coverage at the time of interview from January through June 2020 (67.9%) was higher than, but not statistically different from, the percentage who had private coverage in 2019 (66.8%).

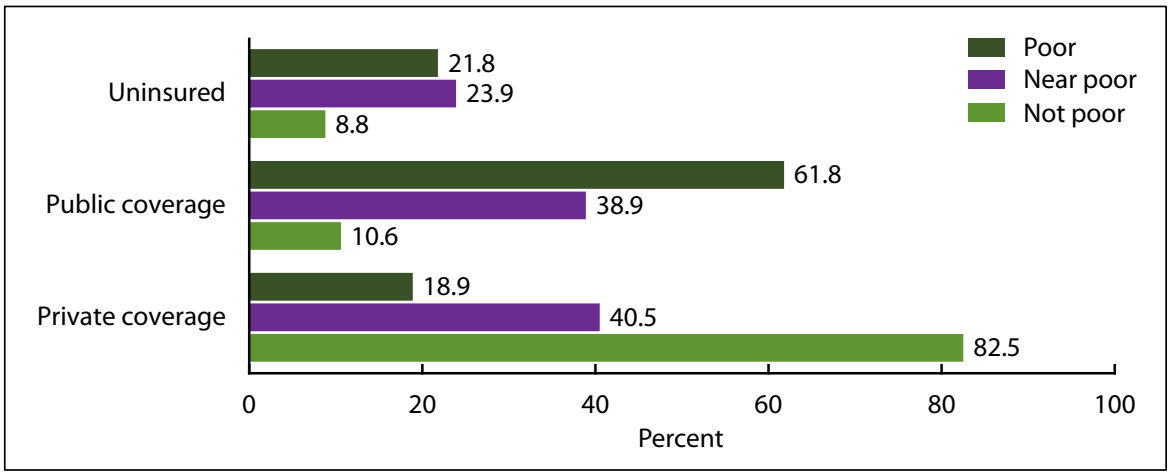
Figure 3. Percentages of adults aged 18–64 who were uninsured or had public or private coverage at the time of interview, by sex: United States, January–June 2020



NOTES: Persons were defined as uninsured if they did not have any private health insurance, Medicare, Medicaid, Children's Health Insurance Program (CHIP), state-sponsored or other government plan or military plan. Persons also were defined as uninsured if they had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care. Public coverage includes Medicaid, CHIP, state-sponsored or other government-sponsored health plan, Medicare, and military plans. Private coverage includes any comprehensive private insurance plan (including health maintenance and preferred provider organizations). These plans include those obtained through an employer, purchased directly, purchased through local or community programs, or purchased through the Health Insurance Marketplace or a state-based exchange. Private coverage excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons were covered by both public and private plans and were included in both categories. Data are based on household interviews of a sample of the civilian noninstitutionalized population.
SOURCE: National Center for Health Statistics, National Health Interview Survey, 2020.

- From January through June 2020, among adults aged 18–64, the percentage of men who were uninsured at the time of interview (14.5%) was higher than, but not significantly different from, the percentage of women who were uninsured at the time of interview (12.3%) (Figure 3).
- Men (18.7%) were less likely than women (22.9%) to have public coverage at the time of interview.
- The observed percentage of men with private coverage at the time of interview (69.0%) was higher than, but not significantly different from, the percentage of women with private coverage at the time of interview (66.9%).

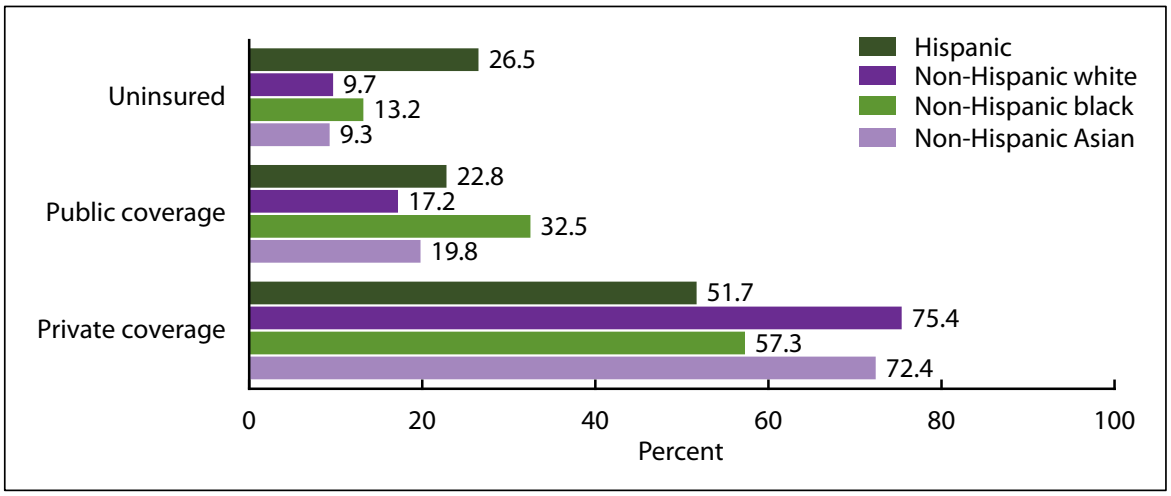
Figure 4. Percentages of adults aged 18–64 who were uninsured or had public or private coverage at the time of interview, by poverty status: United States, January–June 2020



NOTES: Poor persons were defined as those with incomes less than 100% of the federal poverty level (FPL); near-poor persons have incomes 100% to less than 200% of the FPL; not-poor persons have incomes that are 200% of the FPL or greater. Persons were defined as uninsured if they did not have any private health insurance, Medicare, Medicaid, Children's Health Insurance Program (CHIP), state-sponsored or other government plan, or military plan. Persons also were defined as uninsured if they had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care. Public coverage includes Medicaid, CHIP, state-sponsored or other government-sponsored health plan, Medicare, and military plans. Private coverage includes any comprehensive private insurance plan (including health maintenance and preferred provider organizations). These plans include those obtained through an employer, purchased directly, purchased through local or community programs, or purchased through the Health Insurance Marketplace or a state-based exchange. Private coverage excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons were covered by both public and private plans and were included in both categories. Data are based on household interviews of a sample of the civilian noninstitutionalized population.
SOURCE: National Center for Health Statistics, National Health Interview Survey, 2020.

- From January through June 2020, among adults aged 18–64, the percentage who were uninsured at the time of interview was higher among those who were poor (21.8%) and near poor (23.9%) compared with those who were not poor (8.8%) (Figure 4).
- The percentage who had public coverage was highest among those who were poor (61.8), followed by those who were near poor (38.9%) and not poor (10.6%).
- The percentage who had private coverage was lowest among those who were poor (18.9%), followed by those who were near poor (40.5%) and not poor (82.5%).

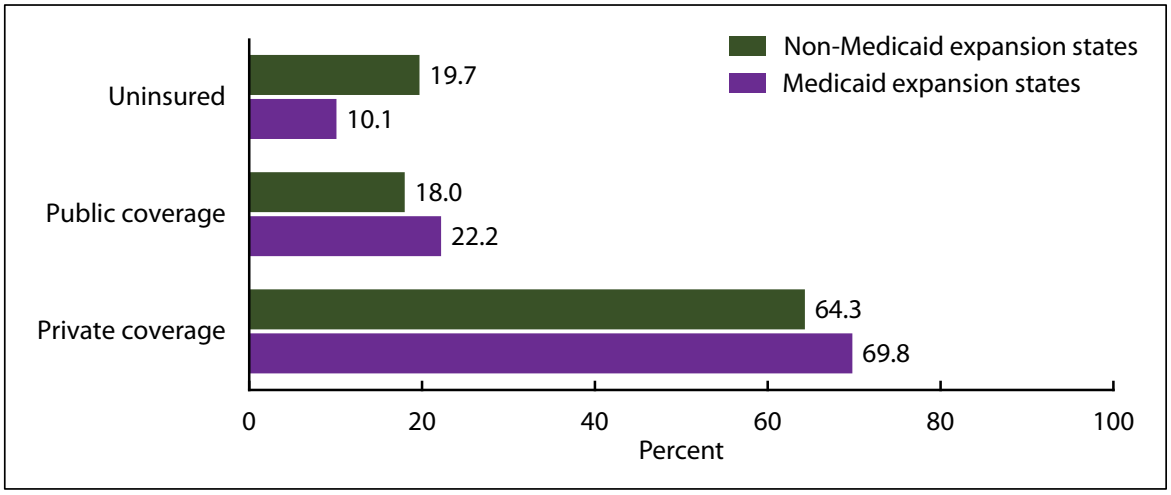
Figure 5. Percentages of adults aged 18–64 who were uninsured or had public or private coverage at the time of interview, by race and ethnicity: United States, January–June 2020



NOTES: Non-Hispanic adults of other races or multiple races were not included in the analysis. Persons were defined as uninsured if they did not have any private health insurance, Medicare, Medicaid, Children's Health Insurance Program (CHIP), state-sponsored or other government plan, or military plan. Persons also were defined as uninsured if they had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care. Public coverage includes Medicaid, CHIP, state-sponsored or other government-sponsored health plan, Medicare, and military plans. Private coverage includes any comprehensive private insurance plan (including health maintenance and preferred provider organizations). These plans include those obtained through an employer, purchased directly, purchased through local or community programs, or purchased through the Health Insurance Marketplace or a state-based exchange. Private coverage excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons were covered by both public and private plans and were included in both categories. Data are based on household interviews of a sample of the civilian noninstitutionalized population.
SOURCE: National Center for Health Statistics, National Health Interview Survey, 2020.

- From January through June 2020, 26.5% of Hispanic, 13.2% of non-Hispanic black, 9.7% of non-Hispanic white, and 9.3% of non-Hispanic Asian adults aged 18–64 were uninsured at the time of interview (Figure 5). Hispanic adults were the most likely to lack health insurance coverage, followed by non-Hispanic black adults. Non-Hispanic white and non-Hispanic Asian adults were least likely to be uninsured.
- Among adults aged 18–64, 32.5% of non-Hispanic black, 22.8% of Hispanic, 19.8% of non-Hispanic Asian, and 17.2% of non-Hispanic white adults had public coverage at the time of interview. Non-Hispanic black adults were more likely to have public coverage than Hispanic, non-Hispanic white, and non-Hispanic Asian adults.
- Non-Hispanic white (75.4%) and non-Hispanic Asian (72.4%) adults were more likely than non-Hispanic black (57.3%) and Hispanic (51.7%) adults to have private coverage at the time of interview. Non-Hispanic black adults were more likely to have private coverage than Hispanic adults.

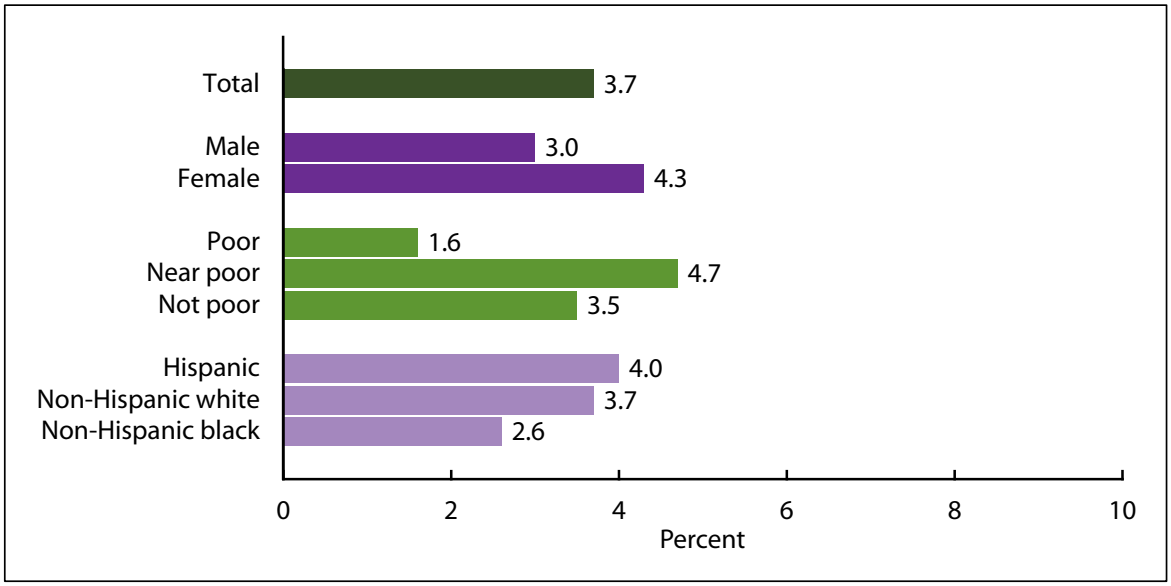
Figure 6. Percentages of adults aged 18–64 who were uninsured or had public or private coverage at the time of interview, by state Medicaid expansion status: United States, January–June 2020



NOTES: Persons were defined as uninsured if they did not have any private health insurance, Medicare, Medicaid, Children's Health Insurance Program (CHIP), state-sponsored or other government plan, or military plan. Persons also were defined as uninsured if they had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care. Public coverage includes Medicaid, CHIP, state-sponsored or other government-sponsored health plan, Medicare, and military plans. Private coverage includes any comprehensive private insurance plan (including health maintenance and preferred provider organizations). These plans include those obtained through an employer, purchased directly, purchased through local or community programs, or purchased through the Health Insurance Marketplace or a state-based exchange. Private coverage excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons were covered by both public and private plans and were included in both categories. Data are based on household interviews of a sample of the civilian noninstitutionalized population.
SOURCE: National Center for Health Statistics, National Health Interview Survey, 2020.

- From January through June 2020, among adults aged 18–64, those living in non-Medicaid expansion states (19.7%) were about twice as likely as those living in Medicaid expansion states (10.1%) to be uninsured at the time of interview (Figure 6).
- For public coverage, among adults aged 18–64, those living in non-Medicaid expansion states (18.0%) were less likely than those living in Medicaid expansion states (22.2%) to have this type of coverage at the time of interview.
- For private coverage, among adults aged 18–64, those living in non-Medicaid expansion states (64.3%) were less likely than those living in Medicaid expansion states (69.8%) to have this type of coverage at the time of interview.

Figure 7. Percentage of persons under age 65 who had exchange-based private health insurance coverage at the time of interview, by selected characteristics: United States, January–June 2020



NOTES: Exchange-based coverage is a private health insurance plan purchased through the Health Insurance Marketplace or state-based exchanges that were established as part of the Affordable Care Act (ACA) of 2010 (P.L. 111–148, P.L. 111–152). Poor persons were defined as those with incomes less than 100% of the federal poverty level (FPL); near-poor persons have incomes 100% to less than 200% of the FPL; not-poor persons have incomes that are 200% of the FPL or greater. Data are based on household interviews of a sample of the civilian noninstitutionalized population.
SOURCE: National Center for Health Statistics, National Health Interview Survey, 2020.

- From January through June 2020, 3.7% of persons under age 65 had exchange-based coverage (Figure 7).
- Males (3.0%) were less likely than females (4.3%) to have exchange-based coverage.
- Exchange-based coverage was higher among those who were near poor (4.7%) compared with those who were poor (1.6%) and not poor (3.5%). Exchange-based coverage was higher among those who were not poor compared with those who were poor.
- Exchange-based coverage was higher among non-Hispanic white adults (3.7%) than non-Hispanic black adults (2.6%). The observed difference in exchange-based coverage between Hispanic adults (4.0%) and non-Hispanic black adults was not statistically significant.

Technical Notes

All estimates in this report are based on preliminary data. The 2020 estimates are being released prior to final data editing and final weighting to provide access to the most recent information from NHIS. Previously, differences between estimates calculated using preliminary data files and final data files were typically less than 0.1 percentage point. In 2019, the NHIS questionnaire was redesigned to better meet the needs of data users. The redesign aimed to improve the measurement of covered health topics, reduce respondent burden by shortening the length of the questionnaire, harmonize overlapping content with other federal surveys, establish a long-term structure of ongoing and periodic topics, and incorporate advances in survey methodology and measurement. For more information about the redesigned NHIS, visit the website: https://www.cdc.gov/nchs/nhis/2019_quest_redesign.htm.

Data source

Data used to produce this ER report were derived from the Sample Adult and Sample Child components from the 2019–June 2020 NHIS. NHIS is a nationally representative household survey conducted throughout the year to collect information on health status, health-related behaviors, and health care access and utilization. The NHIS interview begins by identifying everyone who usually lives or stays in the household. Then, one "sample adult" aged 18 and over and one "sample child" aged 17 years and under (if any children live in the household) are randomly selected. Information about the sample adults is collected from the sample adults themselves unless they are physically or mentally unable to report, in which case a knowledgeable proxy can answer for them. Information about the sample child is collected from a parent or adult who is knowledgeable about and responsible for the health care of the sample child. This respondent may or may not also be the sample adult. Data analysis for the January through June 2020 NHIS was based on information collected on 14,041 sample adults and 3,842 sample children. Visit the NHIS website at: https://www.cdc.gov/nchs/nhis.htm, for more information about the design, content, and use of NHIS.

Estimation procedures

The National Center for Health Statistics (NCHS) creates survey sampling weights to produce representative national estimates. The base weight is equal to the inverse of the probability of selection of the sample address. In 2019, the adjustment method changed to incorporate more robust multilevel models predictive of response propensity. Nonresponse-adjusted weights are further calibrated to U.S. Census Bureau population projections and American Community Survey 1-year estimates for age, sex, race and ethnicity, educational attainment, census division, and metropolitan statistical area status. Due to the COVID-19 pandemic, NHIS data collection switched to a telephone-only mode beginning March 19, 2020. While this change had little impact on Quarter 1 (January–March), lower response rates and differences in respondent characteristics for Quarter 2 (April–June) were observed. Comparisons of demographic distributions between Quarter 2 and Quarter 1 (and Quarter 2 of 2019) revealed that telephone-only data collection led to an over-representation of more affluent households, including a greater proportion of homeowners, among the participating sample. Though NHIS survey weights account for some of this change, differences observed in estimates between January–June 2020 and earlier time periods may be partially or fully attributable to these changes. More information can be found at: https://www.cdc.gov/nchs/data/earlyrelease/nonresponse202102-508.pdf. Prior to 2019, calibration was only to age, sex, and race and ethnicity projections. These changes to the nonresponse adjustment approach and the calibration methods have the potential to impact the weighted survey estimates. See "2019 questionnaire redesign and comparison of estimates to earlier years" and the NHIS website (https://www.cdc.gov/nchs/nhis.htm) for more details.

Point estimates and estimates of their variances were calculated using SUDAAN software (RTI International, Research Triangle Park, N.C.) to account for the complex sample design of NHIS, taking into account stratum and primary sampling unit identifiers. The Taylor series linearization method was chosen for variance estimation.

All estimates shown meet the NCHS standards of reliability as specified in "National Center for Health Statistics Data Presentation Standards for Proportions" (1). All differences discussed are statistically significant unless otherwise noted. Differences between percentages were evaluated using two-sided significance tests at the 0.05 level. Lack of comment regarding the difference between any two estimates does not necessarily mean that the difference was tested and found to be not significant.

2019 questionnaire redesign and comparison of estimates to earlier years

In 2019, the NHIS questionnaire was redesigned to better meet the needs of data users. Due to changes in weighting and design methodology, direct comparisons between estimates for 2019 and earlier years should be made with caution, as the impact of these changes has not been fully evaluated at this time. A working paper entitled, "Preliminary Evaluation of the Impact of the 2019 National Health Interview Survey Questionnaire Redesign and Weighting Adjustments on Early Release Program Estimates," available from the Early Release Program homepage, discusses both of these issues in greater detail for three indicators of insurance coverage (lack of health insurance [uninsured], public health plan coverage, and private health insurance coverage). However, the discussion of these health insurance indicators is limited to adults aged 18–64.

The increase in the percentage of adults aged 18–64 who were uninsured at the time of interview—from 13.3% in 2018 to 14.7% in 2019—appears to be part of an increasing trend since 2016. The change in weighting approach may account for some (but not all) of the increase between 2018 and 2019.

For public health plan coverage, the increase in the percentage of adults aged 18–64 who were covered by public coverage—from 19.4% in 2018 to 20.4% in 2019—appears to reverse a general decline since 2016. Questionnaire design and weighting adjustment effects may have shifted estimates in opposing directions, leading to little overall impact. The increase observed between 2018 and 2019 is likely to reflect an actual change over time.

For private coverage, the decrease in the percentage of adults aged 18–64 who were covered by private coverage—from 68.9% in 2018 to 66.8% in 2019—appears to be part of a decreasing trend since 2015. Questionnaire design and weighting adjustment effects may have shifted estimates in opposing directions, leading to little overall impact. The decrease observed between 2018 and 2019 is likely to reflect an actual change over time.

Reference

1. Parker JD, Talih M, Malec DJ, Beresovsky V, Carroll M, Gonzalez Jr JF, et al. National Center for Health Statistics data presentation standards for proportions. National Center for Health Statistics. Vital Health Stat 2(175). 2017. Available from: https://www.cdc.gov/nchs/data/series/sr_02/sr02_175.pdf.

Suggested citation

Cohen RA, Terlizzi EP, Cha AE, Martinez ME. Health insurance coverage: Early release of estimates from the National Health Interview Survey, January–June 2020. National Center for Health Statistics. February 2021. DOI: https://dx.doi.org/10.15620/cdc:100469.

Table I. Percentages (and 95% confidence intervals) of persons who lacked health insurance coverage, had public health plan coverage, and had private health insurance coverage at the time of interview, by age group and 6-month interval: United States, 2019–June 2020

Age group (years) and 6-month interval	Uninsured[1] at the time of interview	Public health plan coverage[2]	Private health insurance coverage[3]
All ages			
2019 (full year)	10.3 (9.7–10.8)	37.4 (36.6–38.3)	61.3 (60.2–62.4)
January–June	9.5 (8.9–10.1)	37.4 (36.4–38.4)	62.1 (60.9–63.4)
July–December	11.0 (10.2–11.8)	37.5 (36.3–38.7)	60.5 (59.1–61.8)
2020 (January–June)	9.4 (8.6–10.2)	37.9 (36.8–39.1)	62.2 (60.8–63.6)
Under 65			
2019 (full year)	12.1 (11.4–12.8)	26.0 (25.1–26.9)	63.7 (62.5–64.8)
January–June	11.2 (10.5–11.9)	26.1 (25.0–27.2)	64.5 (63.2–65.8)
July–December	13.0 (12.1–13.9)	26.0 (24.9–27.1)	62.8 (61.4–64.3)
2020 (January–June)	11.1 (10.2–12.1)	26.3 (24.9–27.7)	64.7 (63.1–66.4)
0–17			
2019 (full year)	5.1 (4.5–5.7)	41.4 (39.8–43.0)	55.2 (53.4–57.0)
January–June	4.4 (3.7–5.0)	41.6 (39.7–43.5)	55.8 (53.8–57.8)
July–December	5.8 (5.0–6.7)	41.2 (39.2–43.2)	54.7 (52.4–57.0)
2020 (January–June)	4.7 (3.8–5.8)	41.1 (38.3–43.9)	56.2 (53.5–58.9)
18–64			
2019 (full year)	14.7 (13.9–15.4)	20.4 (19.6–21.2)	66.8 (65.7–67.9)
January–June	13.7 (12.9–14.6)	20.4 (19.4–21.4)	67.7 (66.5–69.0)
July–December	15.6 (14.6–16.7)	20.4 (19.2–21.6)	65.9 (64.5–67.2)
2020 (January–June)	13.4 (12.3–14.6)	20.8 (19.6–22.0)	67.9 (66.4–69.4)
65 and over			
2019 (full year)	0.9 (0.6–1.3)	96.0 (95.5–96.5)	49.1 (47.6–50.7)
January–June	0.7 (0.4–1.1)	96.0 (95.3–96.6)	49.8 (48.0–51.7)
July–December	1.0 (0.5–1.8)	96.0 (95.2–96.7)	48.4 (46.2–50.6)
2020 (January–June)	0.9 (0.4–1.6)	96.1 (95.2–96.8)	49.6 (47.6–51.6)

[1]Persons were defined as uninsured if they did not have any private health insurance, Medicare, Medicaid, Children's Health Insurance Program (CHIP), state-sponsored or other government-sponsored health plan, or military plan. Persons also were defined as uninsured if they had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care.

[2]Public health plan coverage includes Medicaid, CHIP, state-sponsored or other government-sponsored health plan, Medicare, and military plans. A small number of persons were covered by both public and private plans and were included in both categories.

[3]Private health insurance coverage includes any comprehensive private insurance plan (including health maintenance and preferred provider organizations). These plans include those obtained through an employer, purchased directly, purchased through local or community programs, or purchased through the Health Insurance Marketplace or a state-based exchange. Private coverage excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons were covered by both public and private plans and were included in both categories.

NOTES: Due to the COVID-19 pandemic, National Health Interview Survey data collection switched to a telephone-only mode beginning March 19, 2020. This resulted in lower response rates and differences in respondent characteristics for Quarter 2 (April–June). Differences observed in estimates between January–June 2020 and earlier time periods may be partially or fully attributable to these changes. Data are based on household interviews of a sample of the civilian noninstitutionalized population.

SOURCE: National Center for Health Statistics, National Health Interview Surveys, 2019 and 2020.

Table II. Number (millions) of persons who lacked health insurance coverage, had public health plan coverage, and had private health insurance coverage at the time of interview, by age group and 6-month interval: United States, 2019–June 2020

Age group (years) and 6-month interval	Uninsured[1] at the time of interview	Public health plan coverage[2]	Private health insurance coverage[3]
All ages			
2019 (full year)	33.2	121.4	198.7
January–June	30.7	121.0	201.0
July–December	35.7	121.7	196.2
2020 (January–June)	30.4	123.0	201.8
Under 65			
2019 (full year)	32.8	70.6	172.7
January–June	30.4	70.8	175.0
July–December	35.2	70.5	170.4
2020 (January–June)	30.0	71.0	175.0
0–17			
2019 (full year)	3.7	30.3	40.4
January–June	3.2	30.4	40.8
July–December	4.3	30.1	40.0
2020 (January–June)	3.4	29.9	40.9
18–64			
2019 (full year)	29.0	40.3	132.3
January–June	27.2	40.3	134.1
July–December	30.9	40.4	130.5
2020 (January–June)	26.5	41.1	134.1
65 and over			
2019 (full year)	0.5	50.8	26.0
January–June	0.4	50.2	26.1
July–December	0.5	51.2	25.8
2020 (January–June)	0.5	52.0	26.8

[1]Persons were defined as uninsured if they did not have any private health insurance, Medicare, Medicaid, Children's Health Insurance Program (CHIP), state-sponsored or other government-sponsored health plan, or military plan. Persons also were defined as uninsured if they had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care.

[2]Public health plan coverage includes Medicaid, CHIP, state-sponsored or other government-sponsored health plan, Medicare, and military plans. A small number of persons were covered by both public and private plans and were included in both categories.

[3]Private health insurance coverage includes any comprehensive private insurance plan (including health maintenance and preferred provider organizations). These plans include those obtained through an employer, purchased directly, purchased through local or community programs, or purchased through the Health Insurance Marketplace or a state-based exchange. Private coverage excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons were covered by both public and private plans and were included in both categories.

NOTES: Due to the COVID-19 pandemic, National Health Interview Survey data collection switched to a telephone-only mode beginning March 19, 2020. This resulted in lower response rates and differences in respondent characteristics for Quarter 2 (April–June). Differences observed in estimates between January–June 2020 and earlier time periods may be partially or fully attributable to these changes. Data are based on household interviews of a sample of the civilian noninstitutionalized population.

SOURCE: National Center for Health Statistics, National Health Interview Surveys, 2019 and 2020.

Table III. Percentages (and 95% confidence intervals) of persons under age 65 who lacked health insurance coverage, had public health plan coverage, and had private health insurance coverage at the time of interview, by sex, age group, and 6-month interval: United States, 2019–June 2020

Sex, age group (years), and 6-month interval	Uninsured[1] at the time of interview	Public health plan coverage[2]	Private health insurance coverage[3]
Male			
Under 65			
2019 (full year)	13.2 (12.3–14.1)	24.7 (23.6–25.9)	63.9 (62.4–65.4)
January–June	12.4 (11.5–13.5)	25.0 (23.7–26.4)	64.3 (62.7–65.9)
July–December	13.9 (12.6–15.2)	24.4 (23.0–25.9)	63.5 (61.6–65.4)
2020 (January–June)	11.8 (10.7–13.0)	24.8 (23.5–26.2)	65.5 (63.7–67.2)
0–17			
2019 (full year)	5.1 (4.4–5.8)	42.1 (40.1–44.2)	54.5 (52.2–56.7)
January–June	4.7 (3.8–5.6)	42.8 (40.4–45.3)	54.1 (51.5–56.6)
July–December	5.5 (4.4–6.7)	41.4 (38.7–44.1)	54.9 (52.0–57.7)
2020 (January–June)	4.8 (3.5–6.4)	40.9 (37.7–44.1)	56.3 (53.1–59.5)
18–64			
2019 (full year)	16.3 (15.1–17.4)	18.1 (17.0–19.2)	67.5 (66.1–69.0)
January–June	15.4 (14.2–16.7)	18.2 (16.9–19.6)	68.3 (66.5–70.0)
July–December	17.1 (15.5–18.8)	17.9 (16.4–19.6)	66.8 (64.8–68.8)
2020 (January–June)	14.5 (13.1–16.1)	18.7 (17.2–20.2)	69.0 (67.2–70.8)
Female			
Under 65			
2019 (full year)	11.0 (10.4–11.7)	27.3 (26.2–28.4)	63.4 (62.2–64.7)
January–June	10.0 (9.2–10.7)	27.1 (25.7–28.5)	64.7 (63.1–66.3)
July–December	12.1 (11.1–13.1)	27.6 (26.2–28.9)	62.2 (60.6–63.7)
2020 (January–June)	10.3 (9.2–11.6)	27.7 (25.6–29.8)	64.1 (61.9–66.2)
0–17			
2019 (full year)	5.1 (4.4–6.0)	40.6 (38.5–42.8)	56.0 (53.8–58.2)
January–June	4.0 (3.2–5.0)	40.3 (37.6–43.1)	57.6 (55.0–60.2)
July–December	6.2 (5.0–7.6)	41.0 (38.1–43.9)	54.4 (51.5–57.4)
2020 (January–June)	4.6 (3.5–5.9)	41.2 (37.6–44.9)	56.2 (52.8–59.5)
18–64			
2019 (full year)	13.1 (12.4–13.9)	22.6 (21.6–23.6)	66.1 (64.9–67.3)
January–June	12.1 (11.1–13.1)	22.4 (21.1–23.8)	67.2 (65.6–68.8)
July–December	14.2 (13.1–15.3)	22.8 (21.4–24.2)	64.9 (63.4–66.4)
2020 (January–June)	12.3 (10.9–13.9)	22.9 (20.9–24.9)	66.9 (64.7–69.0)

[1]Persons were defined as uninsured if they did not have any private health insurance, Medicare, Medicaid, Children's Health Insurance Program (CHIP), state-sponsored or other government-sponsored health plan, or military plan. Persons also were defined as uninsured if they had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care.

[2]Public health plan coverage includes Medicaid, CHIP, state-sponsored or other government-sponsored health plan, Medicare, and military plans. A small number of persons were covered by both public and private plans and were included in both categories.

[3]Private health insurance coverage includes any comprehensive private insurance plan (including health maintenance and preferred provider organizations). These plans include those obtained through an employer, purchased directly, purchased through local or community programs, or purchased through the Health Insurance Marketplace or a state-based exchange. Private coverage excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons were covered by both public and private plans and were included in both categories.

NOTES: Due to the COVID-19 pandemic, National Health Interview Survey data collection switched to a telephone-only mode beginning March 19, 2020. This resulted in lower response rates and differences in respondent characteristics for Quarter 2 (April–June). Differences observed in estimates between January–June 2020 and earlier time periods may be partially or fully attributable to these changes. Data are based on household interviews of a sample of the civilian noninstitutionalized population.

SOURCE: National Center for Health Statistics, National Health Interview Surveys, 2019 and 2020.

Table IV. Percentages (and 95% confidence intervals) of persons under age 65 who lacked health insurance coverage, had public health plan coverage, and had private health insurance coverage at the time of interview, by poverty status, age group, and 6-month interval: United States, 2019–June 2020

Poverty status[1], age group (years), and 6-month interval	Uninsured[2] at the time of interview	Public health plan coverage[3]	Private health insurance coverage[4]
Poor			
Under 65			
2019 (full year)	18.3 (16.2–20.5)	65.3 (63.0–67.5)	18.2 (16.3–20.3)
January–June	15.5 (13.2–18.1)	68.5 (65.2–71.7)	17.6 (14.6–20.9)
July–December	20.9 (18.1–23.8)	62.2 (58.9–65.4)	18.9 (16.4–21.5)
2020 (January–June)	15.6 (12.3–19.4)	72.0 (67.9–75.9)	14.5 (11.5–17.8)
0–17			
2019 (full year)	5.1 (3.8–6.8)	87.8 (85.3–90.1)	8.9 (7.1–11.1)
January–June	3.4 (1.7–6.1)	90.4 (86.8–93.3)	7.9 (5.2–11.2)
July–December	6.8 (4.7–9.4)	85.4 (81.1–89.0)	9.9 (7.0–13.6)
2020 (January–June)	*	89.9 (85.1–93.6)	6.7 (4.2–9.9)
18–64			
2019 (full year)	25.8 (23.0–28.9)	52.3 (49.4–55.1)	23.6 (20.9–26.5)
January–June	22.6 (19.1–26.3)	55.8 (51.7–59.8)	23.2 (19.0–27.9)
July–December	28.8 (25.2–32.7)	49.1 (45.3–52.9)	23.9 (20.9–27.1)
2020 (January–June)	21.8 (17.2–27.0)	61.8 (56.4–67.0)	18.9 (15.1–23.2)
Near poor			
Under 65			
2019 (full year)	20.1 (18.6–21.6)	47.0 (45.1–48.9)	35.4 (33.6–37.2)
January–June	18.7 (16.5–21.0)	47.6 (45.1–50.0)	36.4 (33.8–39.0)
July–December	21.5 (19.2–23.9)	46.4 (43.6–49.2)	34.3 (32.1–36.6)
2020 (January–June)	18.0 (15.7–20.4)	50.9 (47.9–53.9)	34.3 (31.4–37.3)
0–17			
2019 (full year)	6.5 (5.2–8.0)	70.3 (67.7–72.8)	25.8 (23.1–28.5)
January–June	6.1 (4.5–8.0)	69.8 (65.8–73.6)	27.1 (23.0–31.6)
July–December	7.0 (5.1–9.2)	70.8 (66.6–74.8)	24.3 (21.0–27.9)
2020 (January–June)	6.7 (4.8–9.1)	73.6 (69.6–77.3)	22.6 (18.7–26.8)
18–64			
2019 (full year)	26.8 (24.9–28.8)	35.4 (33.3–37.5)	40.1 (38.3–42.0)
January–June	25.1 (22.2–28.2)	36.2 (33.6–38.9)	41.1 (38.6–43.6)
July–December	28.5 (25.8–31.4)	34.6 (31.6–37.7)	39.2 (36.6–41.9)
2020 (January–June)	23.9 (20.7–27.3)	38.9 (35.3–42.6)	40.5 (37.0–44.1)
Not poor			
Under 65			
2019 (full year)	7.9 (7.3–8.4)	11.8 (11.2–12.5)	82.0 (81.1–82.8)
January–June	7.4 (6.8–8.0)	11.6 (10.8–12.4)	82.7 (81.7–83.6)
July–December	8.4 (7.6–9.3)	12.1 (11.2–13.0)	81.2 (79.9–82.5)
2020 (January–June)	7.5 (6.7–8.4)	12.5 (11.3–13.7)	81.9 (80.6–83.2)
0–17			
2019 (full year)	4.3 (3.6–5.1)	16.3 (14.9–17.8)	80.7 (79.1–82.2)
January–June	3.7 (3.0–4.5)	16.1 (14.5–17.9)	81.5 (79.7–83.2)
July–December	4.9 (3.9–6.2)	16.6 (14.8–18.4)	79.9 (77.7–81.9)
2020 (January–June)	3.6 (2.7–4.6)	18.2 (15.9–20.7)	80.0 (77.5–82.4)
18–64			
2019 (full year)	9.0 (8.4–9.6)	10.4 (9.8–11.0)	82.4 (81.6–83.2)
January–June	8.5 (7.9–9.2)	10.2 (9.4–11.0)	83.1 (82.1–84.1)
July–December	9.5 (8.6–10.6)	10.6 (9.8–11.5)	81.6 (80.4–82.9)
2020 (January–June)	8.8 (7.8–9.8)	10.6 (9.4–11.8)	82.5 (81.2–83.8)

*Estimate is not shown, as it does not meet National Center for Health Statistics standards of reliability.

[1]Poverty categories are based on the ratio of the family's income in the previous calendar year to the appropriate poverty threshold (given the family's size and number of children), as defined by the U.S. Census Bureau for that year (Semega JL, Kollar MA, Creamer J, Mohanty A. Income and poverty in the United States: 2018. Current Population Reports, P60–266. 2019 and Semega J, Kollar M, Shrider EA, Creamer J. Income and poverty in the United States: 2019. Current Population Reports, P60–270. 2020). Poor persons were defined as those with incomes less than 100% of the federal poverty level (FPL); near-poor persons have incomes 100% to less than 200% of the FPL; not-poor persons have incomes that are 200% of the FPL or greater. The percentage of respondents under age 65 with unknown poverty status in was 7.6% in 2019 and 8.0% in the first two quarters of 2020. Persons with unknown poverty status are not shown in this table. Estimates may differ from estimates that are based on both reported and imputed income.

[2]Persons were defined as uninsured if they did not have any private health insurance, Medicare, Medicaid, Children's Health Insurance Program (CHIP), state-sponsored or other government-sponsored health plan, or military plan. Persons also were defined as uninsured if they had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care.

[3]Public health plan coverage includes Medicaid, CHIP, state-sponsored or other government-sponsored health plan, Medicare, and military plans. A small number of persons were covered by both public and private plans and were included in both categories.

[4]Private health insurance coverage includes any comprehensive private insurance plan (including health maintenance and preferred provider organizations). These plans include those obtained through an employer, purchased directly, purchased through local or community programs, or purchased through the Health Insurance Marketplace or a state-based exchange. Private coverage excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons were covered by both public and private plans and were included in both categories.

NOTES: Due to the COVID-19 pandemic, National Health Interview Survey data collection switched to a telephone-only mode beginning March 19, 2020. This resulted in lower response rates and differences in respondent characteristics for Quarter 2 (April–June). Differences observed in estimates between January–June 2020 and earlier time periods may be partially or fully attributable to these changes. Data are based on household interviews of a sample of the civilian noninstitutionalized population.

SOURCE: National Center for Health Statistics, National Health Interview Surveys, 2019 and 2020.

Table V. Percentages (and 95% confidence intervals) of persons under age 65 who lacked health insurance coverage, had public health plan coverage, and had private health insurance coverage at the time of interview, by race and ethnicity, age group, and 6-month interval: United States, 2019–June 2020

Race and ethnicity[1], age group (years), and 6-month interval	Uninsured[2] at the time of interview	Public health plan coverage[3]	Private health insurance coverage[4]
Hispanic			
Under 65			
2019 (full year)	22.1 (20.3–23.9)	34.7 (32.7–36.7)	44.3 (42.1–46.4)
January–June	20.0 (18.1–22.1)	35.0 (32.7–37.4)	45.8 (43.7–47.9)
July–December	24.1 (21.6–26.8)	34.4 (31.8–37.0)	42.7 (39.6–45.9)
2020 (January–June)	19.7 (17.1–22.5)	33.9 (31.0–36.8)	47.9 (44.3–51.4)
0–17			
2019 (full year)	7.2 (6.0–8.6)	58.7 (55.9–61.5)	35.4 (32.7–38.1)
January–June	6.0 (4.6–7.7)	60.1 (56.8–63.4)	34.9 (32.0–38.0)
July–December	8.4 (6.8–10.2)	57.2 (52.9–61.5)	35.8 (31.9–39.8)
2020 (January–June)	6.4 (4.3–9.1)	55.8 (51.5–60.0)	40.4 (36.0–44.9)
18–64			
2019 (full year)	29.7 (27.4–32.0)	22.5 (20.4–24.7)	48.8 (46.5–51.1)
January–June	27.2 (24.6–29.9)	22.2 (19.5–25.2)	51.4 (49.0–53.8)
July–December	32.1 (28.7–35.6)	22.8 (20.3–25.5)	46.2 (42.8–49.6)
2020 (January–June)	26.5 (22.9–30.3)	22.8 (20.0–25.8)	51.7 (47.7–55.6)
Non-Hispanic white			
Under 65			
2019 (full year)	9.0 (8.4–9.7)	19.6 (18.7–20.7)	73.3 (72.2–74.3)
January–June	8.4 (7.7–9.1)	20.0 (18.9–21.1)	73.6 (72.4–74.8)
July–December	9.7 (8.8–10.6)	19.3 (18.0–20.7)	72.9 (71.4–74.4)
2020 (January–June)	8.3 (7.5–9.2)	19.8 (18.3–21.4)	74.1 (72.4–75.7)
0–17			
2019 (full year)	4.5 (3.7–5.4)	27.9 (26.1–29.8)	69.3 (67.4–71.1)
January–June	3.8 (3.0–4.7)	28.3 (26.3–30.5)	69.6 (67.5–71.7)
July–December	5.2 (4.0–6.7)	27.5 (25.1–30.0)	68.9 (66.3–71.4)
2020 (January–June)	4.0 (3.0–5.3)	28.1 (25.1–31.2)	69.8 (66.5–73.0)
18–64			
2019 (full year)	10.5 (9.8–11.2)	17.0 (16.1–18.0)	74.5 (73.5–75.5)
January–June	9.8 (9.1–10.7)	17.4 (16.3–18.5)	74.8 (73.6–76.1)
July–December	11.1 (10.1–12.1)	16.7 (15.4–18.1)	74.2 (72.8–75.6)
2020 (January–June)	9.7 (8.7–10.8)	17.2 (15.9–18.6)	75.4 (73.9–76.9)
Non-Hispanic black			
Under 65			
2019 (full year)	11.6 (10.2–13.0)	42.8 (40.0–45.6)	48.5 (46.0–50.9)
January–June	10.7 (9.1–12.4)	41.9 (38.9–44.9)	50.4 (47.2–53.7)
July–December	12.4 (10.3–14.8)	43.7 (39.9–47.5)	46.5 (43.5–49.6)
2020 (January–June)	11.0 (9.3–12.9)	41.6 (37.7–45.6)	49.9 (46.0–53.9)
0–17			
2019 (full year)	3.5 (2.5–4.9)	64.5 (60.1–68.7)	35.1 (31.1–39.3)
January–June	3.2 (1.7–5.5)	61.0 (55.0–66.7)	39.3 (33.7–45.1)
July–December	3.9 (2.3–6.0)	68.1 (61.8–73.9)	30.8 (25.1–37.0)
2020 (January–June)	5.0 (3.0–7.7)	65.6 (59.7–71.2)	30.3 (25.3–35.6)
18–64			
2019 (full year)	14.7 (12.9–16.7)	34.3 (31.5–37.1)	53.7 (51.3–56.0)
January–June	13.6 (11.7–15.8)	34.2 (31.5–36.9)	54.9 (51.8–57.9)
July–December	15.7 (12.8–18.8)	34.5 (30.6–38.5)	52.5 (49.3–55.7)
2020 (January–June)	13.2 (11.0–15.7)	32.5 (28.5–36.8)	57.3 (53.2–61.4)

See footnotes at the end of table.

Table V. Percentages (and 95% confidence intervals) of persons under age 65 who lacked health insurance coverage, had public health plan coverage, and had private health insurance coverage at the time of interview, by race and ethnicity, age group, and 6-month interval: United States, 2019–June 2020—Con.

Race and ethnicity[1], age group (years), and 6-month interval	Uninsured[2] at the time of interview	Public health plan coverage[3]	Private health insurance coverage[4]
Non-Hispanic Asian			
Under 65			
2019 (full year)	6.6 (5.0–8.7)	17.5 (15.1–20.2)	76.6 (73.5–79.5)
January–June	6.2 (3.7–9.7)	17.1 (14.0–20.7)	77.4 (73.4–81.0)
July–December	7.1 (4.5–10.5)	17.9 (14.0–22.4)	75.8 (70.9–80.2)
2020 (January–June)	8.4 (6.5–10.7)	20.9 (16.3–26.2)	72.3 (67.2–77.0)
0–17			
2019 (full year)	3.2 (1.6–5.7)	24.1 (19.6–29.1)	73.2 (68.2–77.8)
January–June	*	23.1 (18.0–28.9)	75.5 (69.6–80.8)
July–December	*	25.2 (17.4–34.3)	70.8 (61.5–78.9)
2020 (January–June)	*	25.3 (19.8–31.5)	72.0 (64.9–78.3)
18–64			
2019 (full year)	7.5 (5.6–9.9)	15.8 (13.2–18.7)	77.5 (74.2–80.5)
January–June	7.4 (4.4–11.6)	15.5 (12.0–19.7)	77.9 (73.1–82.1)
July–December	7.6 (4.7–11.6)	16.1 (12.5–20.2)	77.1 (72.6–81.2)
2020 (January–June)	9.3 (7.0–12.0)	19.8 (14.9–25.6)	72.4 (67.0–77.4)
Non-Hispanic, other races and multiple races			
Under 65			
2019 (full year)	14.6 (11.4–18.2)	34.5 (28.9–40.3)	52.9 (46.7–59.0)
January–June	15.6 (11.5–20.4)	33.4 (28.0–39.2)	52.6 (46.2–58.9)
July–December	13.5 (9.6–18.2)	35.6 (28.3–43.4)	53.2 (45.1–61.2)
2020 (January–June)	10.6 (6.7–15.6)	40.7 (34.1–47.5)	52.2 (45.1–59.3)
0–17			
2019 (full year)	5.9 (3.5–9.3)	45.3 (38.0–52.8)	50.4 (42.6–58.3)
January–June	6.6 (3.2–11.8)	45.6 (37.9–53.6)	49.5 (41.1–57.9)
July–December	*	44.9 (34.5–55.6)	51.5 (40.9–62.0)
2020 (January–June)	*	49.8 (41.2–58.4)	50.1 (42.1–58.1)
18–64			
2019 (full year)	21.1 (17.0–25.8)	26.2 (20.6–32.5)	54.8 (48.1–61.3)
January–June	22.9 (17.1–29.5)	23.5 (18.1–29.5)	55.1 (47.5–62.5)
July–December	19.4 (14.1–25.6)	29.0 (21.4–37.5)	54.4 (45.5–63.1)
2020 (January–June)	16.0 (10.3–23.3)	34.2 (25.8–43.3)	53.7 (43.9–63.3)

*Estimate is not shown, as it does not meet National Center for Health Statistics standards of reliability.

[1]Hispanic origin and race are two separate and distinct categories. Persons of Hispanic or Latino origin may be of any race or combination of races. Hispanic or Latino origin includes persons of Mexican, Puerto Rican, Cuban, Central and South American, or Spanish origin. Race is based on respondents' descriptions of their own racial background. More than one race may be reported. For conciseness, the text, tables, and figures in this report use shorter versions of the 1997 Office of Management and Budget terms for race and Hispanic or Latino origin. For example, the category "not Hispanic, black or African American, single race" is referred to as "non-Hispanic black" in the text, tables, and figures. Estimates for non-Hispanic persons of races other than white only, black only, and Asian only, or of multiple races, are combined into the "non-Hispanic, other races and multiple races" category.

[2]Persons were defined as uninsured if they did not have any private health insurance, Medicare, Medicaid, Children's Health Insurance Program (CHIP), state-sponsored or other government-sponsored health plan, or military plan. Persons also were defined as uninsured if they had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care.

[3]Public health plan coverage includes Medicaid, CHIP, state-sponsored or other government-sponsored health plan, Medicare, and military plans. A small number of persons were covered by both public and private plans and were included in both categories.

[4]Private health insurance coverage includes any comprehensive private insurance plan (including health maintenance and preferred provider organizations). These plans include those obtained through an employer, purchased directly, purchased through local or community programs, or purchased through the Health Insurance Marketplace or a state-based exchange. Private coverage excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons were covered by both public and private plans and were included in both categories.

NOTES: Due to the COVID-19 pandemic, National Health Interview Survey data collection switched to a telephone-only mode beginning March 19, 2020. This resulted in lower response rates and differences in respondent characteristics for Quarter 2 (April–June). Differences observed in estimates between January–June 2020 and earlier time periods may be partially or fully attributable to these changes. Data are based on household interviews of a sample of the civilian noninstitutionalized population.

SOURCE: National Center for Health Statistics, National Health Interview Surveys, 2019 and 2020.

Table VI. Percentages (and 95% confidence intervals) of persons under age 65 who lacked health insurance coverage, had public health plan coverage, and had private health insurance coverage at the time of interview, by state Medicaid expansion status, age group, and 6-month interval: United States, 2019–June 2020

State Medicaid expansion status[1], age group (years), and 6-month interval	Uninsured[2] at the time of interview	Public health plan coverage[3]	Private health insurance coverage[4]
Medicaid expansion states[5]			
Under 65			
2019 (full year)	9.1 (8.6–9.7)	27.8 (26.7–28.9)	65.0 (63.8–66.2)
January–June	8.2 (7.5–8.9)	27.4 (25.9–28.9)	66.2 (64.7–67.7)
July–December	10.0 (9.3–10.8)	28.2 (26.8–29.6)	63.8 (62.2–65.5)
2020 (January–June)	8.4 (7.5–9.3)	26.9 (25.1–28.8)	67.0 (65.1–68.8)
0–17			
2019 (full year)	3.9 (3.3–4.6)	40.3 (38.3–42.2)	57.6 (55.5–59.7)
January–June	3.2 (2.6–4.0)	40.2 (37.8–42.5)	58.2 (56.0–60.3)
July–December	4.6 (3.6–5.7)	40.3 (37.7–43.0)	57.0 (54.0–60.0)
2020 (January–June)	3.5 (2.5–4.8)	39.5 (36.6–42.6)	59.4 (56.5–62.2)
18–64			
2019 (full year)	11.0 (10.4–11.6)	23.4 (22.3–24.5)	67.6 (66.4–68.8)
January–June	10.0 (9.1–10.9)	22.8 (21.4–24.4)	69.1 (67.5–70.6)
July–December	11.9 (11.2–12.8)	23.9 (22.6–25.3)	66.2 (64.6–67.8)
2020 (January–June)	10.1 (9.2–11.2)	22.2 (20.6–24.0)	69.8 (68.0–71.5)
Non-Medicaid expansion states[6]			
Under 65			
2019 (full year)	17.1 (15.8–18.5)	23.0 (21.5–24.6)	61.4 (59.0–63.8)
January–June	16.2 (14.8–17.7)	23.9 (22.2–25.6)	61.6 (59.0–64.2)
July–December	18.1 (16.4–19.8)	22.2 (20.5–24.0)	61.1 (58.5–63.8)
2020 (January–June)	16.3 (14.4–18.3)	25.1 (23.1–27.2)	60.5 (57.5–63.5)
0–17			
2019 (full year)	7.0 (6.0–8.1)	43.2 (40.1–46.3)	51.5 (47.9–55.0)
January–June	6.1 (4.9–7.5)	43.8 (40.0–47.6)	52.0 (48.0–56.1)
July–December	7.8 (6.5–9.3)	42.5 (39.2–45.9)	50.9 (47.2–54.6)
2020 (January–June)	7.0 (5.0–9.5)	44.0 (38.6–49.5)	50.3 (44.9–55.6)
18–64			
2019 (full year)	21.2 (19.6–22.8)	15.1 (14.0–16.3)	65.3 (63.2–67.3)
January–June	20.2 (18.4–22.1)	16.1 (15.0–17.2)	65.4 (63.1–67.6)
July–December	22.1 (20.0–24.3)	14.2 (12.7–15.7)	65.2 (62.8–67.6)
2020 (January–June)	19.7 (17.4–22.2)	18.0 (16.5–19.7)	64.3 (61.8–66.8)

[1]Under provisions of the Affordable Care Act of 2010 (P.L. 111–148, P.L. 111–152), states have the option to expand Medicaid eligibility to cover adults who have incomes up to and including 138% of the federal poverty level. There is no deadline for states to choose to implement the Medicaid expansion, and they may do so at any time. As of January 1, 2019, 33 states and the District of Columbia moved forward with Medicaid expansion.

[2]Persons were defined as uninsured if they did not have any private health insurance, Medicare, Medicaid, Children's Health Insurance Program (CHIP), state-sponsored or other government-sponsored health plan, or military plan. Persons also were defined as uninsured if they had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care.

[3]Public health plan coverage includes Medicaid, CHIP, state-sponsored or other government-sponsored health plan, Medicare, and military plans. A small number of persons were covered by both public and private plans and were included in both categories.

[4]Private health insurance coverage includes any comprehensive private insurance plan (including health maintenance and preferred provider organizations). These plans include those obtained through an employer, purchased directly, purchased through local or community programs, or purchased through the Health Insurance Marketplace or a state-based exchange. Private coverage excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons were covered by both public and private plans and were included in both categories.

[5]For 2019, states moving forward with Medicaid expansion included: Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, Vermont, Virginia, Washington, and West Virginia. The District of Columbia also moved forward with Medicaid expansion. Beginning with 2020, two states were added to this grouping: Idaho and Utah.

[6]For 2019, states not moving forward with Medicaid expansion included: Alabama, Florida, Georgia, Idaho, Kansas, Mississippi, Missouri, Nebraska, North Carolina, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Wisconsin, and Wyoming. Beginning with 2020, two states have been removed from this grouping: Idaho and Utah.

NOTES: Due to the COVID-19 pandemic, National Health Interview Survey data collection switched to a telephone-only mode beginning March 19, 2020. This resulted in lower response rates and differences in respondent characteristics for Quarter 2 (April–June). Differences observed in estimates between January–June 2020 and earlier time periods may be partially or fully attributable to these changes. Data are based on household interviews of a sample of the civilian noninstitutionalized population.

SOURCE: National Center for Health Statistics, National Health Interview Surveys, 2019 and 2020.

Table VII. Percentage (and 95% confidence interval) and number (millions) of persons under age 65 who had exchange-based private health insurance coverage at the time of interview, by 6-month interval and selected characteristics: United States, 2019–June 2020

6-month interval and selected characteristics	Percent (95% confidence interval)	Number in millions
2019 (full year)		
Age group (years)		
Under 65	3.7 (3.4–4.0)	10.0
0–17	1.7 (1.4–2.1)	1.3
18–64	4.4 (4.0–4.8)	8.7
Sex		
Male	3.5 (3.1–3.9)	4.7
Female	3.9 (3.5–4.4)	5.3
Poverty status[1]		
Poor	3.0 (2.2–4.0)	1.1
Near poor	5.3 (4.6–6.1)	2.8
Not poor	3.2 (2.9–3.5)	5.8
Race and ethnicity[2]		
Hispanic	3.8 (3.1–4.6)	2.1
Non-Hispanic white	3.6 (3.2–4.0)	5.5
Non-Hispanic black	2.9 (2.2–3.9)	1.0
Medicaid expansion status[3]		
Medicaid expansion states[4]	3.3 (3.0–3.8)	5.7
Non-Medicaid expansion states[5]	4.3 (3.8–4.9)	4.3
January–June 2019		
Age group (years)		
Under 65	3.8 (3.5–4.2)	10.4
0–17	1.8 (1.5–2.3)	1.3
18–64	4.6 (4.1–5.0)	9.0
Sex		
Male	3.5 (3.0–4.0)	4.7
Female	4.2 (3.7–4.7)	5.7
Poverty status[1]		
Poor	3.6 (2.5–5.1)	1.2
Near poor	5.1 (4.2–6.2)	2.7
Not poor	3.2 (2.9–3.6)	5.9
Race and ethnicity[2]		
Hispanic	3.9 (3.1–4.9)	2.2
Non-Hispanic white	3.7 (3.2–4.2)	5.7
Non-Hispanic black	3.0 (2.2–3.9)	1.0
Medicaid expansion status[3]		
Medicaid expansion states[4]	3.4 (3.0–3.9)	5.8
Non-Medicaid expansion states[5]	4.5 (3.7–5.4)	4.5

See footnotes at the end of table.

Table VII. Percentage (and 95% confidence interval) and number (millions) of persons under age 65 who had exchange-based private health insurance coverage at the time of interview, by 6-month interval and selected characteristics: United States, 2019–June 2020—Con.

6-month interval and selected characteristics	Percent (95% confidence interval)	Number in millions
July–December 2019		
Age group (years)		
Under 65	3.6 (3.1–4.0)	9.7
0–17	1.6 (1.2–2.2)	1.2
18–64	4.3 (3.7–4.8)	8.5
Sex		
Male	3.5 (2.9–4.1)	4.7
Female	3.6 (3.1–4.3)	5.0
Poverty status[1]		
Poor	2.5 (1.6–3.7)	0.9
Near poor	5.5 (4.4–6.7)	2.9
Not poor	3.1 (2.7–3.6)	5.7
Race and ethnicity[2]		
Hispanic	3.7 (2.8–4.7)	2.0
Non-Hispanic white	3.5 (2.9–4.1)	5.4
Non-Hispanic black	2.9 (1.7–4.7)	1.0
Medicaid expansion status[3]		
Medicaid expansion states[4]	3.3 (2.7–3.9)	5.6
Non-Medicaid expansion states[5]	4.1 (3.5–4.7)	4.1
January–June 2020		
Age group (years)		
Under 65	3.7 (3.4–4.0)	10.0
0–17	2.1 (1.6–2.7)	1.5
18–64	4.3 (3.9–4.7)	8.4
Sex		
Male	3.0 (2.6–3.5)	4.1
Female	4.3 (3.8–5.0)	5.9
Poverty status[1]		
Poor	1.6 (1.0–2.6)	0.5
Near poor	4.7 (3.7–5.8)	2.3
Not poor	3.5 (3.2–3.9)	6.8
Race and ethnicity[2]		
Hispanic	4.0 (3.0–5.2)	2.2
Non-Hispanic white	3.7 (3.3–4.2)	5.8
Non-Hispanic black	2.6 (1.7–3.8)	0.9
Medicaid expansion status[3]		
Medicaid expansion states[4]	3.6 (3.2–4.0)	6.3
Non-Medicaid expansion states[5]	3.9 (3.3–4.6)	3.6

[1]Poverty categories are based on the ratio of the family's income in the previous calendar year to the appropriate poverty threshold (given the family's size and number of children), as defined by the U.S. Census Bureau for that year (Semega JL, Kollar MA, Creamer J, Mohanty A. Income and poverty in the United States: 2018. Current Population Reports, P60–266. 2019 and Semega J, Kollar M, Shrider EA, Creamer J. Income and poverty in the United States: 2019. Current Population Reports, P60–270. 2020). Poor persons were defined as those with incomes less than 100% of the federal poverty level (FPL); near-poor persons have incomes 100% to less than 200% of the FPL; not-poor persons have incomes that are 200% of the FPL or greater. The percentage of respondents under age 65 with unknown poverty status was 7.6% in 2019 and 8.0% in the first two quarters of 2020. Persons with unknown poverty status are not shown in this table. Estimates may differ from estimates that are based on both reported and imputed income.

[2]Hispanic origin and race are two separate and distinct categories. Persons of Hispanic origin may be of any race or combination of races. Hispanic origin includes persons of Mexican, Puerto Rican, Cuban, Central and South American, or Spanish origin. Race is based on respondents' descriptions of their own racial background. More than one race may be reported. For conciseness, the text, tables, and figures in this report use shorter versions of the 1997 Office of Management and Budget terms for race and Hispanic or Latino origin. For example, the category "not Hispanic, black or African American, single race" is referred to as "non-Hispanic black" in the text, tables, and figures.

[3]Under provisions of the Affordable Care Act of 2010 (P.L. 111–148, P.L. 111–152), states have the option to expand Medicaid eligibility to cover adults who have income up to and including 138% of the FPL. There is no deadline for states to choose to implement the Medicaid expansion, and they may do so at any time. As of January 1, 2019, 33 states and the District of Columbia moved forward with Medicaid expansion.

[4]For 2019, states moving forward with Medicaid expansion included: Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, Vermont, Virginia, Washington, and West Virginia. The District of Columbia also moved forward with Medicaid expansion. Beginning with 2020, two states were added to this grouping: Idaho and Utah.

[5]For 2019, states not moving forward with Medicaid expansion included: Alabama, Florida, Georgia, Idaho, Kansas, Mississippi, Missouri, Nebraska, North Carolina, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Wisconsin, and Wyoming. Beginning with 2020, two states have been removed from this grouping: Idaho and Utah.

NOTES: Exchange-based coverage is a private health insurance plan purchased through the Health Insurance Marketplace or state-based exchanges that were established as part of the Affordable Care Act of 2010 (P.L. 111–148, P.L. 111–152). Due to the COVID-19 pandemic, National Health Interview Survey data collection switched to a telephone-only mode beginning March 19, 2020. This resulted in lower response rates and differences in respondent characteristics for Quarter 2 (April–June). Differences observed in estimates between January–June 2020 and earlier time periods may be partially or fully attributable to these changes. Data are based on household interviews of a sample of the civilian noninstitutionalized population.

SOURCE: National Center for Health Statistics, National Health Interview Surveys, 2019 and 2020.

JAMA Health Forum™

Original Investigation

Trends in US Health Insurance Coverage During the COVID-19 Pandemic

M. Kate Bundorf, PhD, MBA, MPH; Sumedha Gupta, PhD, MA, MSc; Christine Kim, BA

Abstract

IMPORTANCE While most working-age adults in the US obtain health insurance through an employer, little is known about the implications of the massive pandemic-related job loss in March 2020 and subsequent rebound for rates of employer-sponsored coverage and uninsurance.

OBJECTIVE To determine how health insurance coverage changed during the COVID-19 pandemic.

DESIGN, SETTING, AND PARTICIPANTS Analysis of trends in insurance coverage based on repeated cross sections of the US Census Bureau's Household Pulse Survey data, using linear regression to adjust for respondent's demographic and socioeconomic characteristics and state of residence. More than 1.2 million US adults aged 18 to 64 years were surveyed from April 23 through December 21, 2020.

EXPOSURES The COVID-19 pandemic, separated into spring and summer and fall and winter time periods during 2020, as well as state Medicaid expansion status.

MAIN OUTCOMES AND MEASURES Regression-based estimates of the weekly percentage-point change in respondents' health insurance status, including having any health insurance, any employer-sponsored health insurance, or only nonemployer sponsored coverage. Nonemployer-sponsored coverage is categorized into private, Medicaid, and other public in some analyses.

RESULTS The study population included 1 212 816 US adults (51% female; mean [SD] age, 42 [13] years) across all 50 US states and Washington DC. Among these respondents, rates of employer-sponsored coverage declined by 0.2 percentage points each week during the COVID-19 pandemic. Other types of coverage, particularly from public sources, increased by 0.1 and 0.2 percentage points in the spring and summer and fall and winter periods, respectively. Overall, health insurance coverage of any type declined, particularly during the spring and summer period, during which uninsurance increased by 1.4 percentage points, representing more than 2.7 million newly uninsured people, over a 12-week period.

CONCLUSIONS AND RELEVANCE In this cross-sectional study of data from the US Census Bureau's Household Pulse Survey, results showed that while public programs played an important role in protecting US adults from pandemic-driven declines in employment-sponsored coverage, many people became uninsured during 2020.

JAMA Health Forum. 2021;2(9):e212487. doi:10.1001/jamahealthforum.2021.2487

Key Points

Question How did health insurance coverage change during the COVID-19 pandemic?

Findings In this cross-sectional survey study of more than 1.2 million US adults, rates of employer-sponsored coverage declined and rates of other types of coverage increased after the pandemic began and throughout 2020. Rates of uninsurance increased, particularly during the spring and summer.

Meaning While public programs played an important role in protecting US adults from pandemic-driven declines in employer-sponsored coverage, many people became uninsured during the pandemic.

+ Invited Commentary

+ Multimedia

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

Introduction

The COVID-19 pandemic has placed millions of workers at risk of uninsurance. The pandemic's onset was accompanied by an unprecedentedly large, swift decline in employment, with the unemployment rate peaking at 14.7% in April 2020 and steadily declining to 6.7% in December 2020. These rates do not account for those who had dropped out of the labor force.[1] Because employer-sponsored insurance (ESI) is the primary source of coverage for working-age adults,[2] losing a job not only leads to loss of income, but may also lead to loss of health insurance. The financial risk of COVID-19–related care heightened the potential negative consequences of uninsurance.

The extent of uninsurance during the COVID-19 recession, however, is largely unknown, primarily owing to a lack of comprehensive, real-time data on coverage.[3] Yet, this recession differed in important ways from earlier economic downturns, including the swiftness of the initial economic decline and the sensitivity of the recovery to both policy and the epidemiology of COVID-19. We addressed this gap by analyzing the 2020 Household Pulse Survey (HPS),[4] a US Census Bureau experimental data product intended to provide timely information on the pandemic's effect on US households. The survey, which has been conducted approximately every 1 to 2 weeks since April 2020, allows us to examine trends in coverage during the pandemic and to provide some of the first evidence on coverage from a large, high-frequency survey designed to be nationally representative. While the HPS has limitations, primarily owing to its low response rate and its lag in data collection relative to the large, initial decline in employment, with 40 000 to 130 000 respondents per week it is perhaps the only source of information on trends in health insurance coverage during the pandemic from a large population-based sample.

We documented the extent to which insurance coverage changed between mid-April and December 2020. The present analysis is based on the premise that pandemic-driven job loss may have led to declines in ESI that lagged the initial employment decline and persisted throughout 2020. In addition, the extent to which declining own ESI was accompanied by rising uninsurance depends on both whether newly unemployed workers had coverage prior to the pandemic and whether people accessed coverage alternatives during the pandemic, including enrolling in coverage through a spouse or other family member, retaining group coverage through COBRA (Consolidated Omnibus Budget Reconciliation Act),[5] purchasing subsidized or unsubsidized private individual coverage, or enrolling in a public program such as Medicaid. Given Medicaid's safety-net role, we investigated differences between states that did and did not expand Medicaid through the Affordable Care Act (ACA). We also examined differences by prepandemic family income, age, sex, and race and ethnicity based on evidence of the pandemic's disproportionate labor market effects across groups.[6]

Methods

We collected data from the US Census Bureau's 2020 HPS, which was fielded approximately every 1 to 2 weeks beginning April 23, 2020.[7] The HPS randomly selects participants using the US Census Bureau's Master Address File. Sampled households are contacted by either email or cell phone and then directed to an online survey.[7] The survey, which was designed to produce state-level estimates, includes responses from between approximately 40 000 and 130 000 respondents each week. As anticipated by the survey designers, however, response rates are relatively low at 1.3% to 10.3% per week.[7-9] We limited the sample to people aged 18 to 64 years to focus on those reliant on ESI. Herein we present several analyses comparing the HPS with alternative nationally representative surveys (eTable 1 in the Supplement).

Because this study used deidentified secondary data, it was not deemed human subject research and not subject to review by the institutional review board at Duke University. The study provides information on response rates as advised by the American Association for Public Opinion Research (AAPOR) reporting guideline.[10]

Measures

We defined any insurance as whether the respondent indicated having any source of coverage. We divided this category into 2 mutually exclusive groups: any ESI and, among those without ESI, any other non-ESI coverage. When comparing expansion and nonexpansion states, we delineated non-ESI into other private, Medicaid, and other public coverage. Details on measure construction and comparisons to other surveys are provided in eFigures 1, 2A, and 2B in the Supplement.

Statistical Analyses

We estimated the weekly percentage-point change in insurance between April 23 and December 21, 2020. For each coverage type, we regressed an indicator on a continuous measure of calendar week, testing for a linear trend in coverage over the survey period. We separately analyzed 2 time periods: April 23 through July 21, 2020 (spring and summer), and August 19 through December 21, 2020 (fall and winter), for 2 reasons. First, the epidemiologic, policy, and economic environments changed dramatically between the periods. Spring and summer were marked by a flatter pandemic curve, gradual reopenings of state economies, and the operation of the federal Paycheck Protection Program.[11-14] In contrast, fall and winter saw a resurgence in COVID-19 cases and deaths, the lifting of many state business closures, school reopenings, and termination of the federal Paycheck Protection Program. Second, the survey instrument changed between the 2 periods, with a nearly month-long gap between them, a shift from weekly to biweekly frequency, and, while the health insurance questions were asked in the same way, they appeared later in the questionnaire, resulting in higher nonresponse rates (eTable 2 in the Supplement).

We estimated linear regression models, adjusting for respondents' sex, age, race and ethnicity, education, household size, and indicators of any children in the household and state of residence to control for changes over time in sample composition that may not be captured in survey weights (eTable 1 in the Supplement). We applied the replicate weights developed by the US Census Bureau, which adjusted for nonresponse and coverage of the demographics of the US population,[7] adjusted the standard errors for clustering within state, and reported the coefficient and 95% CIs on the week measure.

We also estimated separate models by state Medicaid expansion status and by respondent sex (male and female), age (18-26, 27-40, 41-50, and 51-64 years), race and ethnicity (Hispanic, non-Hispanic Asian, non-Hispanic Black, and non-Hispanic White), and pretax, prepandemic annual household income reported retrospectively by the respondent (<$50 000, $50 000-99 999, and ≥$100 000). We excluded observations with missing values for health insurance and those from respondents in the state of Nebraska because it underwent ACA Medicaid expansion during the study period. We also excluded those with missing values for family income in analyses by family income (eTable 2 in the Supplement).

The Supplement provides several analyses supporting our approach. First, models estimated with weekly fixed effects rather than the linear trend demonstrate that the linear trend is an appropriate approximation for health insurance trends (eFigure 3 in the Supplement). Second, tests of whether the linear trend differed between the 2 time periods guide the interpretation of the findings (eTable 3 in the Supplement). Finally, rather than dropping those with missing data on insurance, we reestimated the models by coding missing coverage as a separate category, providing evidence that the results were not sensitive to this exclusion (eFigure 4 in the Supplement). All analyses were conducted using Stata MP, version 16.1 (StataCorp), and statistical significance was defined as $P \leq .05$.

Results

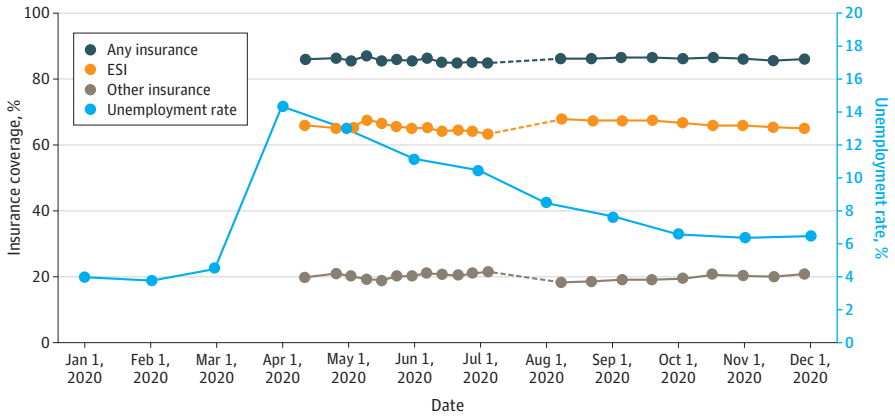
The study sample, which included 1 212 816 US adults aged 18 to 64 years (51% female; mean [SD] age, 42 [13] years), is similar to the nationally representative American Community Survey and National Health Interview Survey[15] based on respondent sex, race and ethnicity, and education, but

it is slightly older with a larger mean household size (eTable 1 in the Supplement). The HPS was first fielded on April 23, 2020, just after unemployment had peaked (**Figure 1**). The unemployment rate steadily declined during the remainder of the calendar year. Unadjusted rates of ESI generally declined throughout the year while other coverage generally increased, resulting in either stable or slightly declining rates of any insurance coverage in both time periods. Figure 1 also demonstrates that there were upward and downward shifts in rates of ESI and other coverage, respectively, between the 2 periods. Analyses were conducted separately for each period because it could not be determined whether these shifts were due to survey changes or true coverage changes.

The proportion of people with any type of health insurance decreased by 0.11 percentage points each week during the 12-week period of spring and summer (**Figure 2** and eTable 4A in the Supplement), resulting in a 1.36 (0.1137 × 12) percentage-point decline in coverage over the 12-week period. The rise in uninsurance resulted from a 0.21–percentage-point weekly decline in employer-sponsored coverage that was only partly offset by an increase in other coverage.

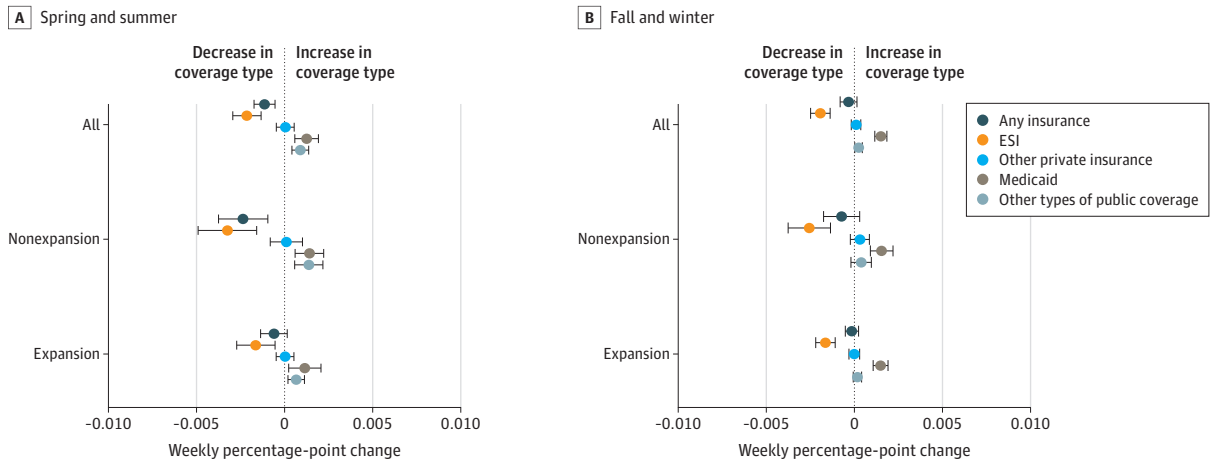
In contrast, in the fall and winter period the estimate of the decline in any coverage was smaller and not statistically significant; the difference between the 2 periods is statistically significant (eTable 3 in the Supplement). While rates of ESI continued to decline by 0.19 percentage points weekly, the decline was more fully offset by increases in other coverage, primarily Medicaid.

Figure 1. Survey Timing and Trends in Unemployment and Insurance Coverage



ESI indicates employer-sponsored insurance.

Figure 2. Weekly Percentage-Point Change in 2020 Insurance Coverage, Overall and by State Medicaid Expansion Status



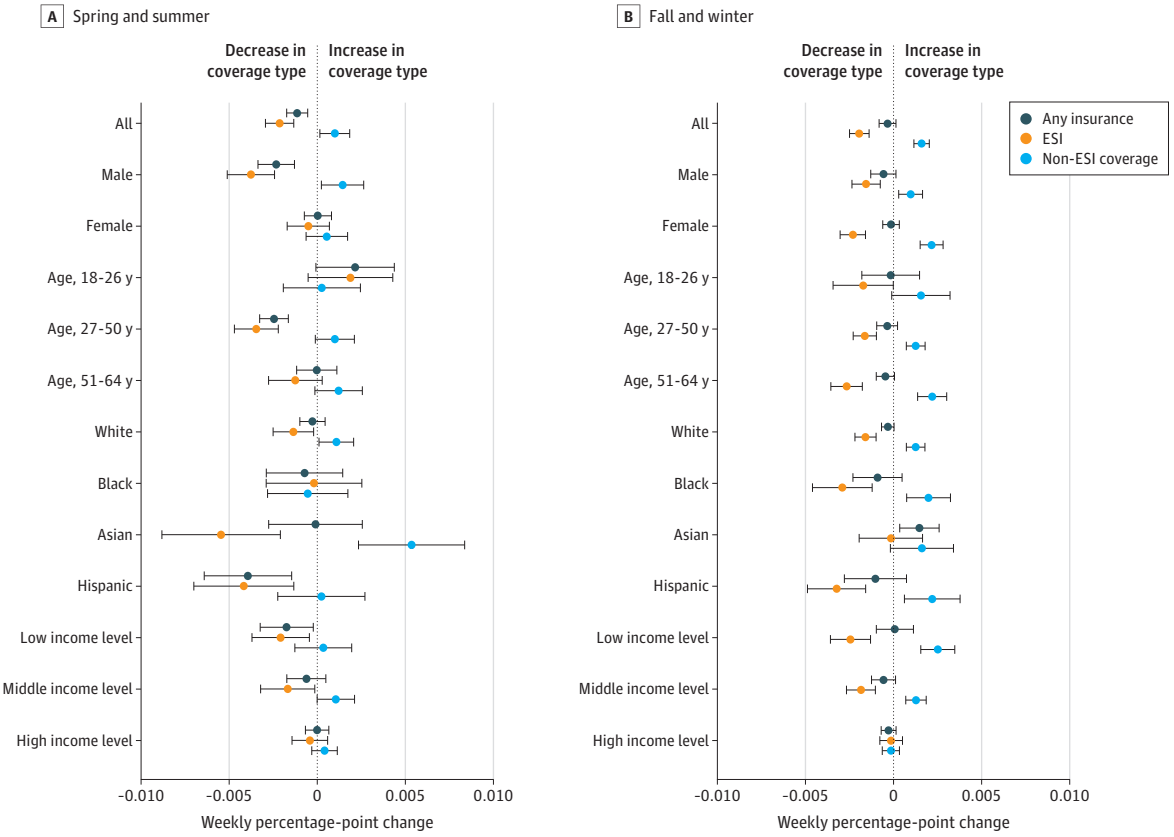
Point estimates from regressions are shown, and the error bars indicate 95% CIs. ESI indicates employer-sponsored insurance.

The decline in insurance during spring and summer was concentrated in states not expanding Medicaid. In nonexpansion states, rates of any coverage declined by 0.23 percentage points weekly; rates of ESI declined by 0.32 percentage points per week, while rates of other coverage increased by 0.09 percentage points. In expansion states, in contrast, the overall decline in coverage was small and not statistically significantly different from zero—the combination of a smaller decline in ESI (0.16 percentage points per week) and a similarly sized increase in other coverage as nonexpansion states. In other words, decline in insurance in nonexpansion states was associated with a large decline in ESI, relative to expansion states, that was less fully offset by increases in non-ESI. The increase in non-ESI represented 28% and 63% of the decline in ESI in nonexpansion and expansion states, respectively, during the spring and summer. In both expansion and nonexpansion states, public rather than private coverage was the primary source of coverage gains.

In contrast, during the fall and winter, the differences between expansion and nonexpansion states were less striking (Figure 2). In both types of states, rates of ESI continued to decline but were nearly fully offset by increases in public coverage.

The trends varied by population subgroups, particularly in the spring and summer (**Figure 3** and eTable 4B in the Supplement). Early in the pandemic, rising uninsurance was concentrated among men, people aged 27 to 50 years, people of Hispanic ethnicity, and people in families with relatively low prepandemic income. For these groups, the decline in ESI was larger than the increase in other sources. People classified in the HPS as Asian and those in the middle family income category also experienced declines in ESI, but they were nearly fully offset by increases in other coverage. In contrast, in the fall and winter declines in rates of ESI were more similar across demographic and socioeconomic subgroups, with nearly every group with the exception of Asian individuals and high

Figure 3. Weekly Percentage-Point Change in 2020 Insurance Coverage, Overall and by Demographic and Socioeconomic Characteristics



Point estimates from regressions are shown, and the error bars indicate 95% CIs. ESI indicates employer-sponsored insurance.

prepandemic income households reporting a statistically significant decline (eTable 4B in the Supplement). However, there was not evidence of rising uninsurance in any subgroup due to increases in other sources.

Discussion

Results of this study provide new evidence on how insurance coverage changed during the COVID-19 pandemic. We found that rates of ESI declined throughout much of 2020, even after the initial shock to employment in March. Because ESI declined throughout the 2 study time periods, a time during which employment was increasing, the results suggest either that ESI declines lagged job loss or that people who returned to work did not necessarily recover their employer-sponsored coverage.

While rates of ESI declined, enrollment in other types of coverage increased. Over the spring and summer period, increases in other types of coverage only partially offset declining ESI, resulting in a 1.36–percentage point increase in uninsurance or approximately 2.7 million newly uninsured people over the 12-week period. The 2.7 million estimate is the product of the number of people 18 to 64 years old in the US in 2019 (202 142 110),[16] the weekly change in coverage (0.11 percentage points), and the number of weeks (12).

The results indicate that much of the overall decline in coverage took place within a short 3-month period early in the pandemic. While employer-sponsored coverage declined throughout 2020, the decline was more fully offset by increases in other sources later in the year. This could be due to several factors. People may have delayed pursuing alternative sources of coverage early in the pandemic because of substantial uncertainty in the economic environment, such as likely length of unemployment. In addition, it may have taken people time to identify and enroll in alternative coverage sources, particularly because the enrollment process itself may have slowed, given the widespread disruption to businesses and government offices. Finally, the winter surge of COVID-19 cases may have strengthened incentives to obtain coverage as the risk of infection increased. The cross-sectional nature of the HPS does not allow us to determine whether those losing ESI were the same as those gaining other coverage—indeed the gains in non-ESI coverage we observed in the fall and winter period may be responses to coverage loss earlier in the year.

We found that enrollment in public programs, rather than private insurance such as COBRA or on- or off-exchange individual coverage, increased throughout the year. A large increase in Medicaid enrollment was consistent with documentation of rising Medicaid enrollment during the pandemic, as well as prepandemic evidence that the ACA's new coverage options have alleviated the negative effect of unemployment on insurance coverage.[17-19] The increase in public coverage may also be because of provisions of the Families First Coronavirus Response Act, which prevented states from terminating Medicaid coverage during the pandemic.[20] In other words, rising rates of Medicaid coverage in both expansion and nonexpansion states may have been driven in part by declining disenrollment due to this policy.

Low take-up of private alternatives may have been driven by their high cost, particularly given the uncertainty over the length of job loss. Many people view extending coverage through COBRA as expensive because most are required to pay the full premium paid by the employer—more than $21 000 annually for family coverage in 2020, plus an administrative fee.[21,22] People, particularly those without large subsidies, may also view exchange coverage as expensive. Finally, some workers may have been furloughed, retaining coverage until they returned to work. Of course, it is also possible that people either were simply not aware of these options or had private coverage but thought it was public when responding to the survey, particularly in the case of subsidized exchange coverage.

We also documented that, particularly in the early stages, the pandemic had disproportionate associations with coverage across population subgroups. The present results indicate that this issue may be particularly important for Hispanic adults who experienced a decline in ESI without an offsetting increase in non-ESI, resulting in an increase in uninsurance. This raises the concern that the

COVID-19 pandemic may have undone some of the reductions in disparities in health insurance generated by the ACA.[23]

The COVID-19 recession, which was initiated by a public health crisis rather than a financial crisis, differs in important ways from the most recent major economic downturn, the Great Recession (2007-2010). In the Great Recession, the association between rising unemployment and uninsurance was concentrated among college-educated, white, older men, and public programs served as a key insurance safety net for women and children.[24] The COVID-19 recession's 2-month employment decline, however, was approximately 50% larger than the 2-year employment decline in the Great Recession. In addition, the types of workers losing jobs differed; workers in construction and manufacturing were most affected in the Great Recession, while job loss was concentrated among low-wage service workers in the COVID-19 recession.[25] Not only did the nature of job loss differ, but newly unemployed workers had more sources of subsidized insurance available to them in the COVID-19 recession. Results of this study suggest that Medicaid, in particular, played an important safety-net role for a broader population, likely because more people are now eligible for Medicaid than in 2007 through 2009. Whether Medicaid coverage continues to expand in 2021 depends on the extent to which employment gains affect Medicaid eligibility. In addition, the American Rescue Plan considerably expanded subsidies for both exchange and COBRA coverage, creating additional alternatives for people without ESI[26] and suggesting that the private plans may begin to play a more important role.

Looking ahead, unemployment rates are currently much lower than the pandemic's peak (5.8% in May 2021 vs 14.7% in April 2020) but still above the prepandemic levels, and employment recovery has been lagging among racial and ethnic minority subpopulations.[6,27] These trends point to the continued importance of safety-net programs both in providing coverage for unemployed workers and in addressing insurance disparities.

Limitations

This study has several limitations. The HPS's low response rate, as well as the use of alternative contact modalities including email and texts, raises concern over sample representativeness. The weighted HPS sample is similar to the American Community Survey (eTable 1 in the Supplement) along some dimensions but not others. While rates of insurance coverage differ from those of other surveys, we note that the differences are consistent across states (eFigures 1 and 2 in the Supplement). The present analyses also may miss some of the pandemic's early effect on coverage given the timing of the HPS's initial wave relative to the timing of pandemic-related job loss (Figure 1). We also emphasize that the analyses are descriptive. We expect that changes in ESI during the COVID recession were driven by changes in employment. However, the present data do not allow us to link insurance coverage and employment at the individual level. Finally, we note that we interpreted the change in coverage between the spring and summer and fall and winter phases of the survey as driven primarily by the change in survey design and the resulting lower response rate for health insurance questions. It is possible that coverage changed in this short time period in ways that the survey does not allow us to track with the result that the findings may not be representative of the total change in coverage over the study period.

Conclusions

Overall, results of this cross-sectional study indicate that while public programs played an important role in insulating US adults from pandemic-driven declines in ESI, many became uninsured. Monitoring and strengthening the health insurance safety net will continue to be a policy challenge during the COVID-19 pandemic and beyond.

ARTICLE INFORMATION

Accepted for Publication: July 12, 2021.

Published: September 3, 2021. doi:10.1001/jamahealthforum.2021.2487

Corresponding Author: M. Kate Bundorf, PhD, MBA, MPH, Sanford School of Public Policy, Duke University, 302 Towerview Rd, PO Box 90311, Durham, NC 27708 (kate.bundorf@duke.edu).

Author Affiliations: Sanford School of Public Policy, Duke University, Durham, North Carolina (Bundorf); National Bureau of Economic Research, Cambridge, Massachusetts (Bundorf); Indiana University–Purdue University Indianapolis, Indianapolis (Gupta); Stanford University, Stanford, California (Kim).

Author Contributions: Prof Bundorf and Dr Gupta had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: Bundorf, Gupta.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Bundorf, Gupta.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: All authors.

Administrative, technical, or material support: Bundorf, Gupta.

Supervision: Bundorf, Gupta.

Conflict of Interest Disclosures: None reported.

Additional Contributions: We thank Kosali Simon, PhD, of Indiana University for helpful suggestions in the development of this article, as well as the editor and 2 anonymous reviewers from *JAMA Health Forum* for their constructive comments. No compensation was provided for the contributions.

Additional Information: The data sources used in this project are publicly available. The programming code used to generate these results is publicly available at github.com/bundorf/doi-10.1001-jamahealthforum.2021.2487.

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SUPPLEMENT.

eTable 1. Comparison of the Weighted Estimates of Demographic Characteristics of Respondents in the 2018 and 2019 ACS, 2018 NHIIS, and the 2020 HPS
eFigure 1. Comparison of Distribution of Health Insurance Coverage between the 2019 ACS and the 2020 HPS
eFigure 2A. Comparison of Distribution of Health Insurance Coverage between the 2019 ACS and HPS Spring/Summer 2020 Period by State
eFigure 2B. Comparison of Distribution of Health Insurance Coverage between the 2019 ACS and HPS Fall/Winter 2020 Period by State
eTable 2. Rates of Missing Data from the Household Pulse Survey for Key Study Variables by Week
eFigure 3. Estimates of Insurance Coverage in the HPS by Week and Type of Insurance

JAMA Health Forum™

Invited Commentary

Fewer People May Have Become Uninsured in 2020 Than Feared

Jessica Banthin, PhD

The effect of the COVID-19 pandemic on health insurance coverage is still not known with certainty. Yet health economists and policy makers are eager to understand how many people became uninsured in 2020 so that we can assess how well the safety net established by the Affordable Care Act (ACA) is working. In this issue of *JAMA Health Forum*, Bundorf et al[1] make an important contribution to our understanding of what happened in 2020 with their study that draws on data from the US Census Bureau's Household Pulse Survey (HPS). The study finds that rates of employer-sponsored insurance (ESI) steadily declined by 0.2 percentage points each week from April through December 2020. However, rates of other sources of coverage, especially public sources, increased.

The authors[1] divide their data into 2 distinct time periods in 2020: the spring and summer and the fall and winter. During the first period, they find that losses of ESI were only partially offset by increases in other sources of coverage. This leads to their main result that 2.7 million people aged 18 to 64 years became newly uninsured during the spring and summer of 2020. However, in the later period, the authors find that weekly gains in rates of coverage from alternative sources, primarily Medicaid, mostly offset weekly declines in rates of ESI coverage, with no statistically significant change in the number of uninsured people during the fall and winter of 2020.

This study is important because the authors[1] have overcome various data limitations with the HPS to provide some of the most robust and credible estimates available to date of coverage changes during the pandemic. Administrative data has revealed part of the story by documenting a surge in Medicaid and CHIP enrollment[2] and a somewhat smaller increase in Marketplace plan selections,[3] but household survey data are the only source of information on the number of people who have ESI and who are uninsured.

The emerging story suggests that nearly 3 million people lost ESI and became uninsured for several months. This estimate is in line with a July 2020 report[4] that projected 2.9 million people younger than 65 years (including children) would become uninsured in 2020 due to the COVID-19–related recession, based on detailed analysis of data on employment losses by industry, state, and demographic characteristics. A key result from Bundorf et al[1] is that ESI coverage rates declined steadily over 9 months. We also know from the administrative data that Medicaid enrollment has steadily increased each month since April 2020. This suggests that some of the people who lost ESI and became uninsured during the spring and summer may have eventually found an alternative source of coverage, such as Medicaid, later in 2020 and, perhaps, in early 2021.

We also have more robust evidence that the ACA safety net is making a difference in outcomes by state expansion status. The authors[1] found that in states that had expanded Medicaid as permitted under the ACA, declines in ESI coverage were offset to a greater degree by gains in other sources of coverage compared with states that had not expanded Medicaid.

The robustness of the study by Bundorf et al[1] rests on the authors' use of data from the US Census Bureau's HPS. The experimental internet survey started in April 2020 and missed the first month of the pandemic's influence. Response rates were very low, ranging from about 1% to 10% each week. Most concerning to observers of the HPS estimates, there was a discontinuous jump in insurance coverage estimates in September 2020 that strongly suggested measurement error rather than a real change in coverage levels. The discontinuity was likely the result of a change in the survey instrument first fielded in September. Despite these limitations, the HPS has some important strengths. The survey covered a large sample of the population drawn from the US Census Bureau's Master Address File and included tens of thousands of respondents each week, more than tenfold

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the number of respondents in a typical privately funded survey. The large sample size and ongoing administration over a 9-month period increases the HPS's value to researchers substantially.

The authors[1] used a simple approach for gleaning useful information from the HPS by estimating the weekly percentage-point change in coverage as a linear regression on a continuous variable indicating the calendar week. They avoided the problem of the discontinuous jump in estimates by estimating 2 separate linear trends for the 2 time periods defined by the change in instruments. The value of this approach is seen in Figure 1, which shows, for example, the ESI line declining steadily in both time periods despite the discontinuity in between.

Small, timely, internet-based surveys of people can be useful in yielding early indications of major trends, but they often lack the sample size to detect small changes with precision. For example, early estimates from the Urban Institute's Health Reform Monitoring Survey and its Coronavirus Tracking Survey found a small decline in ESI between March/April and May of 2020 but no statistically significant change in the number of uninsured adults.[5] With 4000 to 5000 respondents, those surveys have less statistical power than large federal household surveys.

More data from the major federal household surveys, including the National Health Interview Survey, the American Community Survey, and the Current Population Survey, are likely to be released in the early fall of 2021. Results for the first half of 2020 from the National Health Interview Survey are already available and show a small reduction in the number of uninsured, the opposite of what most experts expected.[6] A change in the mode of administration and in response rates over the 6 months during which the survey was administered may partially explain these anomalous results.[7]

As we wait for more data on the changes in insurance coverage that occurred in 2020 as a result of the pandemic, the study by Bundorf et al[1] provides critical information as policy makers consider further expanding the health care safety net. Although the HPS data have limitations, the authors should be commended for not throwing out the proverbial baby with the bathwater. The study reports a credible estimate of 2.7 million newly uninsured adults in the spring and summer of 2020, a number specific to the months studied that does not represent an annual estimate. Moreover, the study finds support for the effectiveness of safety-net policies with its overall findings and the results by expansion status.

ARTICLE INFORMATION

Published: September 3, 2021. doi:10.1001/jamahealthforum.2021.2255

Corresponding Author: Jessica Banthin, PhD, Health Policy Center, Urban Institute, 500 L'Enfant Plaza SW, Washington, DC 20024 (jbanthin@urban.org).

Author Affiliation: Health Policy Center, Urban Institute, Washington, DC.

Conflict of Interest Disclosures: None reported.

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Support for this research was provided by the Robert Wood Johnson Foundation. The views expressed here do not necessarily reflect the views of the Foundation.

The Uninsurance Rate Held Steady during the Pandemic as Public Coverage Increased

Trends in Health Insurance Coverage between March 2019 and April 2021

Michael Karpman and Stephen Zuckerman

August 2021

Rapid job losses in the early months of the COVID-19 pandemic raised fears that millions of people would lose their health insurance coverage and become uninsured (Banthin et al. 2020; Garfield et al. 2020; Garrett and Gangopadhyaya 2020). In previous recessions, laid-off workers who lost employer-sponsored insurance (ESI) faced limited coverage options through Medicaid and the private nongroup insurance market and the number of people uninsured increased (Holahan and Chen 2011). The Affordable Care Act (ACA) significantly expanded access to those options in 2014, driving the uninsurance rate to record lows (ASPE 2021; Obama 2016). And as the pandemic posed the first test of the post-ACA health insurance safety net during an economic downturn, Congress further supported access to coverage by not allowing disenrollment from Medicaid through the March 2020 Families First Coronavirus Response Act (Brooks and Schneider 2020).[1]

In this brief, we examine changes in health insurance coverage among nonelderly adults ages 18 to 64 during the pandemic using data from the Urban Institute's Health Reform Monitoring Survey (HRMS). Since it was launched in 2013, the HRMS has provided timely information on coverage before data from federal surveys become available (Long et al. 2014). Our analysis focuses on changes in coverage across three rounds of the survey: March 2019; March/April 2020, just after the pandemic caused a steep decline in employment; and April 2021, more than one year after the secretary of health and human services declared a national public health emergency on January 31, 2020. We estimate regression-adjusted changes for the national nonelderly adult population overall, by state Medicaid expansion status,[2] and by annual family income as a percentage of the federal poverty level

(FPL). We focus on adults with low incomes targeted by the ACA Medicaid expansion (with incomes at or below 138 percent of FPL) and adults with moderate incomes eligible for ACA Marketplace premium tax credits (with incomes between 139 and 399 percent of FPL).[3] We find the following:

- Between March 2019 and April 2021, the share of nonelderly adults reporting ESI declined from 65.0 to 62.3 percent, a decrease of approximately 5.5 million adults. The share reporting public coverage increased from 13.6 to 17.5 percent, an increase of approximately 7.9 million adults. The national uninsurance rate held steady at approximately 11 percent.
- The share of adults reporting public coverage increased between 2019 and 2021 in both states that had and had not expanded Medicaid under the ACA (hereafter called expansion and nonexpansion states). Such coverage increased from 14.9 to 19.2 percent in expansion states and from 10.7 to 14.3 percent in nonexpansion states.
- In Medicaid expansion states, the uninsurance rate was near 8 percent across all three study years. In nonexpansion states, the uninsurance rate was higher in 2021 (18.2 percent) than in 2020 (16.5 percent) and 2019 (17.2 percent), though the difference between 2019 and 2021 was not statistically significant. Adults in nonexpansion states were more than twice as likely as adults in expansion states to be uninsured in 2021 (18.2 percent versus 7.7 percent).
- Declines in ESI and increases in public coverage between 2019 and 2021 were concentrated among adults with low and moderate incomes. Uninsurance rates among the national nonelderly adult population did not change significantly for any income group examined.
- The share of adults with low incomes reporting public coverage increased in both expansion states (from 54.6 to 62.9 percent) and nonexpansion states (from 30.4 to 37.3 percent) between 2019 and 2021. More than one in three adults with low incomes in nonexpansion states (37.7 percent) were uninsured in 2021, compared with about one in seven of such adults in expansion states (14.5 percent).

Between 2019 and 2021, the rise in public coverage helped offset a decline in ESI, and unlike in previous recessions, the uninsurance rate did not change. Medicaid and, to a lesser extent, private nongroup insurance sold through the Marketplaces have provided many adults with coverage options following unprecedented job and income losses. However, more than 1 in 10 adults were uninsured in April 2021, including nearly 1 in 5 adults in nonexpansion states.

Maintaining the current uninsurance rate will require protecting coverage for current and prospective Medicaid enrollees as the economy improves and the disenrollment freeze is lifted (which is unlikely to occur before early 2022). Adults eligible for Medicaid may be at risk of having their applications or renewals erroneously rejected if states resume normal operations for reviewing eligibility too rapidly (Rosenbaum, Handley, and Morris 2021). Other adults will no longer be eligible for Medicaid when their incomes recover and will need to seek private coverage to remain insured. For those without access to affordable ESI, outreach efforts can raise their awareness of the enhanced premium tax credits for Marketplace plans made available under the March 2021 American Rescue Plan Act (Haley and Wengle 2021). States will also need to assess eligibility for subsidized Marketplace

coverage for people losing Medicaid eligibility after the public health emergency ends (Musumeci and Dolan 2021). Permanently extending the American Rescue Plan Act's enhanced tax credits could further reduce the number of uninsured people over the long term, and adults with moderate incomes would experience the largest decline in uninsurance (Banthin et al. 2021). Policymakers can also build on coverage gains under the ACA by addressing the persistently high uninsurance rates among adults with low incomes, particularly in nonexpansion states.

Results

Between March 2019 and April 2021, the share of nonelderly adults reporting ESI declined and the share reporting public coverage increased; the national uninsurance rate held steady.

Approximately 65 percent of nonelderly adults reported having ESI coverage in March 2019 and March/April 2020 (figure 1).[4] This share had declined to 62.3 percent by April 2021, when many adults remained out of work just over one year after the pandemic recession began.[5] The 2.7 percentage-point decline in ESI between 2019 and 2021 represents a decrease of approximately 5.5 million adults (95 percent confidence interval: 2.5 million, 8.5 million).[6] During this period, the share of adults reporting public coverage—including Medicare, Medicaid, the Children's Health Insurance Program (CHIP), and other state or government plans based on income or disability[7]—increased from 13.6 percent in 2019 to 17.5 percent in 2021, representing an increase of approximately 7.9 million adults (95 percent confidence interval: 5.4 million, 10.4 million).[8]

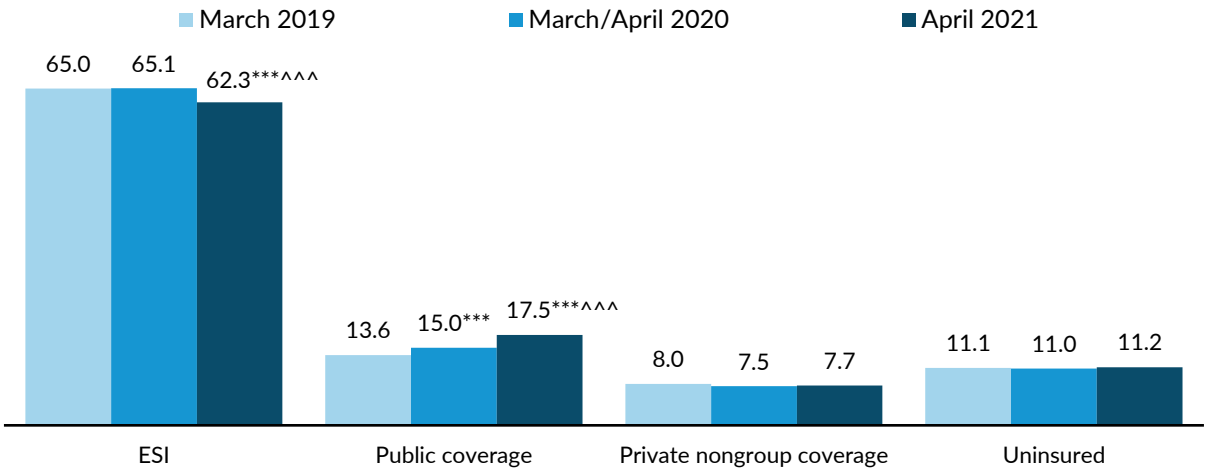
We did not observe a statistically significant change in private nongroup coverage, which approximately 8 percent of adults reported in each year and includes plans purchased through and outside the ACA Marketplaces.[9] But the share of adults with unspecified coverage (i.e., reporting the name of a comprehensive health plan but not the type of coverage) declined by 1.1 percentage points between 2019 and 2021.[10] The share of adults with unspecified coverage was also slightly higher in 2019 than in March 2018, suggesting an anomalous result in 2019 (data not shown). Despite the significant loss of ESI, the uninsurance rate held steady nationally at approximately 11 percent in each study year.

Net changes in ESI, public coverage, and private nongroup coverage do not fully capture the transitions across coverage types that may have occurred during the pandemic. Income losses made some adults eligible for Medicaid and others eligible for subsidized Marketplace coverage, regardless of whether they were previously covered by ESI. The lack of net change in nongroup coverage could indicate that new Marketplace enrollment among people who became eligible for premium tax credits was not large enough to offset transitions from Marketplace or non-Marketplace nongroup coverage to Medicaid. In addition, the sample size of the HRMS may not be large enough to detect statistical significance for the relatively small changes in Marketplace enrollment found in administrative data.

FIGURE 1

Health Insurance Coverage among Adults Ages 18 to 64, March 2019 to April 2021

Percent



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Source: Health Reform Monitoring Survey, March 2019 through April 2021.

Notes: ESI is employer-sponsored insurance. Estimates are regression adjusted. Estimates are not shown for the share of adults with an unspecified coverage type (2.3 percent in 2019, 1.4 percent in 2020, and 1.3 percent in 2021).

*/**/*** Estimate differs significantly from that for March 2019 at the 0.10/0.05/0.01 level, using two-tailed tests.

^/^^/^^^ Estimate differs significantly from that for March/April 2020 at the 0.10/0.05/0.01 level, using two-tailed tests.

The share of adults reporting public coverage increased in both Medicaid expansion and nonexpansion states.

As shown in figure 2, ESI coverage declined between 2019 and 2021 in expansion states (from 67.0 to 64.6 percent) and nonexpansion states (from 61.3 to 57.9 percent). But public coverage increased during this period in both groups of states, from 14.9 to 19.2 percent in expansion states and from 10.7 to 14.3 percent in nonexpansion states. These patterns are consistent with Centers for Medicare & Medicaid Services data showing rapid Medicaid enrollment growth in both expansion and nonexpansion states during the pandemic (Corallo and Rudowitz 2021; Khorrami and Sommers 2021).[11]

The higher rates of public coverage in expansion states than in nonexpansion states in both 2019 and 2021 largely reflect the former's more generous eligibility for Medicaid; nearly all adults living in expansion states with incomes below 138 percent of FPL are eligible.[12] In nonexpansion states, nondisabled, nonpregnant parents typically must have very low incomes to qualify for Medicaid (e.g., 17 percent and 18 percent of FPL in Texas and Alabama) and nonparents are ineligible.[13] The increase in reported public coverage in nonexpansion states over the study period was concentrated among the groups most likely to be eligible for Medicaid or CHIP.[14]

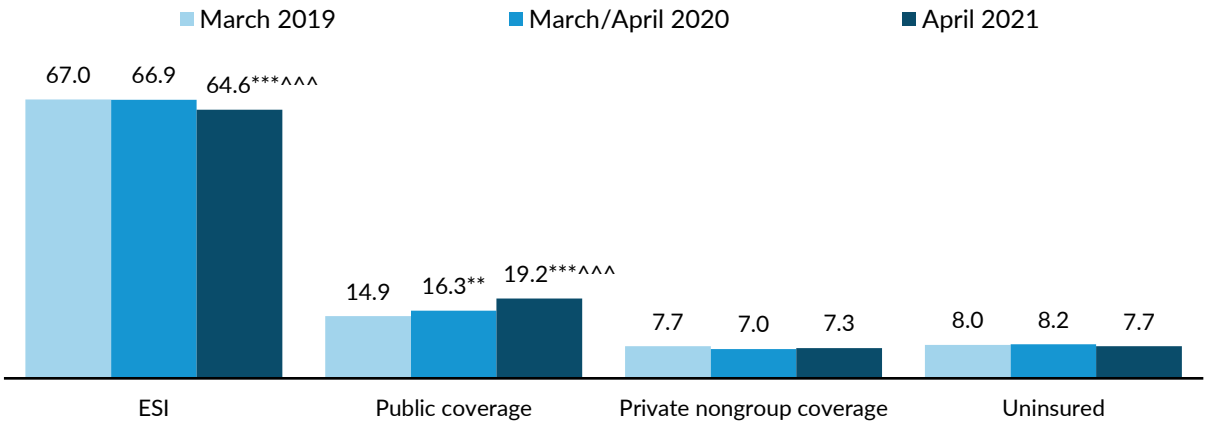
The uninsurance rate in Medicaid expansion states was approximately 8 percent between 2019 and 2021. In nonexpansion states, the uninsurance rate was higher in 2021 (18.2 percent) than in

2020 (16.5 percent) and 2019 (17.2 percent), though the difference between 2019 and 2021 was not statistically significant. As in prior years, adults in nonexpansion states were more than twice as likely as adults in expansion states to be uninsured in 2021 (18.2 versus 7.7 percent). However, differences in uninsurance are not entirely attributable to differences in Medicaid eligibility, because other factors (e.g., access to ESI, funding for outreach and enrollment assistance) likely affect coverage status.

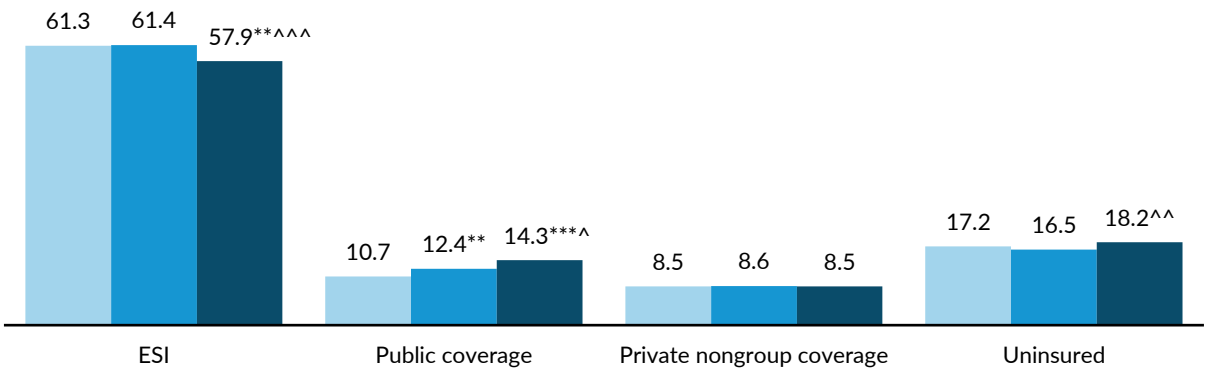
FIGURE 2

Health Insurance Coverage among Adults Ages 18 to 64, by State Medicaid Expansion Status, March 2019 to April 2021

Expansion states (%)



Nonexpansion states (%)



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Source: Health Reform Monitoring Survey, March 2019 through April 2021.

Notes: ESI is employer-sponsored insurance. Medicaid expansion states implemented expansions by April 2021. Estimates are regression adjusted. Estimates are not shown for the share of adults with an unspecified coverage type; these shares were 2.4 percent, 1.6 percent, and 1.3 percent in expansion states in 2019, 2020, and 2021 and 2.3 percent, 1.1 percent, and 1.2 percent in nonexpansion states in 2019, 2020, and 2021.

*/**/*** Estimate differs significantly from that for March 2019 at the 0.10/0.05/0.01 level, using two-tailed tests.

^/^^/^^^ Estimate differs significantly from that for March/April 2020 at the 0.10/0.05/0.01 level, using two-tailed tests.

Declines in ESI and increases in public coverage between 2019 and 2021 were concentrated among adults with low and moderate incomes.

Adults with low and moderate incomes were hardest hit by the recession (Karpman, Zuckerman, and Kenney 2020)[15] and reported the largest declines in ESI over the study period. Among adults with past-year incomes at or below 138 percent of FPL, the share with ESI fell from 21.4 to 16.0 percent during this period (table 1). Among adults with incomes between 139 and 399 percent of FPL, the share with ESI fell from 64.5 to 60.0 percent. We did not find a statistically significant change in ESI among adults with incomes at or above 400 percent of FPL.

Increased public coverage among adults with low incomes, from 45.0 to 52.6 percent, and those with moderate incomes, from 9.7 to 14.3 percent, helped offset declines in ESI among these groups. Most adults must have incomes below 138 percent of FPL to qualify for Medicaid in expansion states, and eligibility in nonexpansion states is limited to parents with even lower incomes and generally nonexistent for nonparent adults. However, eligibility is based on current monthly income, meaning an adult whose annual family income in the past year was above the eligibility threshold may qualify if they experience a loss of income that places them below the threshold.

The uninsurance rate did not change significantly in any of the income groups examined. Nearly one in four adults with low incomes (23.7 percent) and about one in eight with moderate incomes (12.8 percent) were uninsured in April 2021.

TABLE 1

Health Insurance Coverage among Adults Ages 18 to 64, by Family Income, March 2019 to April 2021

Percent

Family income	March 2019	March/April 2020	April 2021
At or below 138% of FPL			
ESI	21.4	21.5	16.0***^^^
Public coverage	45.0	48.5**	52.6***^^
Private nongroup coverage	6.8	5.5	5.6
Uninsured	24.3	22.4	23.7
139–399% of FPL			
ESI	64.5	64.0	60.0***^^^
Public coverage	9.7	10.8	14.3***^^^
Private nongroup coverage	11.3	10.8	11.8
Uninsured	11.8	12.9	12.8
At or above 400% of FPL			
ESI	86.9	88.1	87.8
Public coverage	1.5	1.6	2.1**
Private nongroup coverage	6.1	5.8	5.3
Uninsured	3.6	3.5	3.7

Source: Health Reform Monitoring Survey, March 2019 through April 2021.
Notes: FPL is federal poverty level. ESI is employer-sponsored insurance. Estimates are regression adjusted. Estimates are not shown for the share of adults with an unspecified coverage type, which is between 1 and 3 percent across income groups and years.
*/**/*** Estimate differs significantly from that for March 2019 at the 0.10/0.05/0.01 level, using two-tailed tests.
^/^^/^^^ Estimate differs significantly from that for March/April 2020 at the 0.10/0.05/0.01 level, using two-tailed tests.

The share of adults with low incomes reporting public coverage increased in both Medicaid expansion and nonexpansion states between 2019 and 2021. More than one in three adults with low incomes in nonexpansion states were uninsured in 2021, compared with about one in seven of such adults in expansion states.

Among adults with incomes at or below 138 percent of FPL, the share reporting public coverage increased from 54.6 to 62.9 percent in Medicaid expansion states and from 30.4 to 37.3 percent in nonexpansion states between 2019 and 2021 (table 2). The uninsurance rate for adults with low incomes was statistically unchanged in both groups of states, but wide disparities by Medicaid expansion status persisted. In 2021, more than one in three adults with low incomes (37.7 percent) in nonexpansion states were uninsured, compared with about one in seven (14.5 percent) of such adults in expansion states. Adults with moderate incomes in nonexpansion states were nearly twice as likely as those in expansion states to be uninsured (17.8 versus 10.1 percent).

TABLE 2

Health Insurance Coverage among Adults Ages 18 to 64, by State Medicaid Expansion Status and Family Income, March 2019 to April 2021

Percent

	Expansion States			Nonexpansion States		
Family income	March 2019	March/ April 2020	April 2021	March 2019	March/ April 2020	April 2021
At or below 138% of FPL						
ESI	20.7	21.2	15.7***^^^	22.7	22.2	16.2*^^^
Public coverage	54.6	57.3	62.9***^^^	30.4	34.3	37.3**
Private nongroup coverage	5.3	3.7**	4.4	8.8	8.3	7.6
Uninsured	16.5	15.0	14.5	36.3	34.3	37.7
139–399% of FPL						
ESI	65.4	64.8	61.2**^^^	63.1	62.6	57.7***^^
Public coverage	11.4	12.2	16.6***^^^	6.2	8.0*	10.3***^
Private nongroup coverage	11.5	10.7	11.3	10.9	10.8	12.9
Uninsured	9.3	10.8	10.1	16.8	16.8	17.8
At or above 400% of FPL						
ESI	87.9	88.3	88.4	84.6	87.3**	86.4
Public coverage	1.3	1.5	2.1***	2.2	1.8	2.5
Private nongroup coverage	5.9	5.7	5.5	6.5	6.1	4.9*
Uninsured	2.9	3.2	3.0	4.9	4.2	5.3

Source: Health Reform Monitoring Survey, March 2019 through April 2021.

Notes: FPL is federal poverty level. ESI is employer-sponsored insurance. Medicaid expansion states implemented expansions by April 2021. Estimates are regression adjusted. Estimates are not shown for the share of adults with an unspecified coverage type, which is between 0 and 3 percent across income levels, state groups, and years.

*/**/*** Estimate differs significantly from that for March 2019 at the 0.10/0.05/0.01 level, using two-tailed tests.

^/^^/^^^ Estimate differs significantly from that for March/April 2020 at the 0.10/0.05/0.01 level, using two-tailed tests.

Discussion

Despite losses of jobs, income, and ESI during the pandemic, the uninsurance rate did not change between March 2019 and April 2021. Increased public coverage helped counter ESI losses, protecting many adults from becoming uninsured both in Medicaid expansion and nonexpansion states. But in April 2021, the uninsurance rate in nonexpansion states was higher than it had been in March/April 2020 and was more than double the uninsurance rate in expansion states.

The growth in public coverage reflects several factors, including expanded Medicaid eligibility under the ACA that has strengthened the safety net in 37 states and the District of Columbia, the freeze on Medicaid disenrollment under the Families First Coronavirus Response Act, and the historic pattern of rising Medicaid enrollment during recessions (Corallo and Rudowitz 2021).[16] Assessing how each factor has affected coverage during the pandemic is beyond the scope of this brief. However, the study findings highlight several challenges and opportunities for protecting and expanding coverage in the near term.

Though the public health emergency and Medicaid disenrollment freeze will likely be extended at least until early 2022,[17] states will need to process a backlog of coverage renewals and redeterminations when the freeze is lifted (Musumeci and Dolan 2021). Resuming normal operations too quickly could lead to a surge in erroneously rejected applications and renewals, putting coverage at risk for people who are eligible for Medicaid (Rosenbaum, Handley, and Morris 2021). The Centers for Medicare & Medicaid Services recently issued updated guidance stating Medicaid eligibility and enrollment backlogs should be processed within 12 months of the end of the public health emergency.[18] The guidance also prohibits states from terminating Medicaid coverage for people deemed ineligible during the public health emergency until the state has completed an additional redetermination of eligibility after the emergency ends. Finally, under previous guidance from December 2020, the Centers for Medicare & Medicaid Services expected states to prioritize eligibility and enrollment actions for people most likely to no longer be eligible for coverage (Musumeci and Dolan 2021). The updated guidance requires states to consider how their approaches for processing these actions will ensure continuity of coverage for eligible people and limit delays for those who become newly eligible. State officials can begin preparing for the end of the public health emergency now and avoid terminating coverage based on outdated information for eligible enrollees, many of whom experienced disruptions to their employment and housing during the pandemic (Wagner 2020).

Medicaid enrollees whose incomes have risen above the eligibility threshold in their state will no longer qualify for coverage when the disenrollment freeze expires. If such adults lack access to affordable ESI, they will need to turn to the private nongroup market to remain insured. The temporarily expanded Marketplace premium tax credits under the American Rescue Plan Act will make Marketplace plans more affordable, but some adults may not be aware of the availability of zero-premium or low-cost plans. Outreach and enrollment assistance can help adults transition from Medicaid to Marketplace coverage and avoid disruptions in care (Haley and Wengle 2021). State agencies will also need to assess eligibility for subsidized Marketplace coverage and other insurance

affordability programs for adults who lose Medicaid eligibility after the public health emergency ends (Musumeci and Dolan 2021).

The American Rescue Plan Act increased the subsidy amounts of Marketplace premium tax credits, reducing the percentage of income people have to pay toward premiums, and expanded eligibility for premium tax credits to adults with incomes above 400 percent of FPL. If Congress does not extend these changes, they will expire at the end of 2022. Making the enhanced subsidies permanent could reduce the number of people uninsured in the longer term, and most of the coverage gains would occur among adults with moderate incomes (Banthin et al. 2021).

Policymakers can further reduce uninsurance by addressing the high uninsurance rates among adults with low incomes, particularly in the remaining Medicaid nonexpansion states, where more than one-third of adults with incomes at or below 138 percent of FPL are uninsured. The American Rescue Plan Act provides these states with new incentives to expand Medicaid by increasing the federal matching rate for regular (i.e., nonexpansion) Medicaid populations for two years (Musumeci 2021). If the nonexpansion states had adopted Medicaid expansion in 2020, 4.4 million fewer people would have been uninsured that year (Buettgens 2021). Federal policymakers are also considering approaches for closing the Medicaid coverage gap in states that have not expanded eligibility under the ACA.[19]

Additional health care reforms, ranging from incremental improvements to the ACA to more comprehensive approaches, can advance the US toward universal coverage, though they have different trade-offs in costs, provider payment rates, and disruptions to the existing health care system (Blumberg et al. 2019).

Data and Methods

This brief draws on data from the Urban Institute's Health Reform Monitoring Survey, a nationally representative, internet-based survey of adults ages 18 to 64. Launched in 2013, the HRMS provides timely information on health insurance coverage, health care access and affordability, and other health topics before federal survey data become available. For each round of the HRMS, we draw a stratified, random sample of nonelderly adults from Ipsos's KnowledgePanel, the nation's largest probability-based online panel. Members of the panel are recruited from an address-based sampling frame covering approximately 97 percent of US households, including those without internet access. If needed, panel members are given internet access and web-enabled devices to facilitate their participation.

For this analysis, we used data from the March 2019, March/April 2020, and April 2021 rounds of the HRMS. The 2019 round was fielded March 4 through 14; it had a sample size of 9,596 adults, and 91 percent completed the survey in the first week of fielding. The 2020 round was fielded March 25 through April 10; it had a sample size of 9,032 adults, and 75 percent completed the survey in the first week. And the 2021 round was fielded April 2 through 20; it had a sample size of 9,067 adults, and 82 percent completed the survey in the first week.

The 2019 round of the HRMS included an oversample of adults with incomes below 138 percent of FPL. In 2020, we changed the survey's design to include larger oversamples of adults in low- and moderate-income households, nonwhite and Hispanic/Latinx adults, and young adults. Survey weights adjust for unequal selection probabilities and are poststratified to the characteristics of the national nonelderly adult population, based on benchmarks from the Current Population Survey and the American Community Survey. Participants can take the survey in English or Spanish, and the survey takes a median of 15 minutes to complete. The margin of sampling error, including the design effect, for the full sample of adults in the 2021 survey round is plus or minus 1.2 percentage points for a 50 percent statistic at the 95 percent confidence level.

Health Insurance Coverage Measures

In all rounds of the HRMS, respondents received a question, adapted from the American Community Survey, about their current health insurance coverage. Respondents could report more than one type of coverage, and those who did not report any coverage were asked to verify if they have health insurance. We used additional follow-up questions to determine whether respondents enrolled in their health plan through the Marketplace, whether they enrolled in a private plan through the Marketplace, whether they are covered under certain state programs, and the name of the health plan for their main source of coverage.

Because respondents could report more than one coverage type, we established a hierarchy of responses to assign coverage types so that coverage estimates sum to 100 percent: ESI/military coverage; public coverage, including Medicare, Medicaid, and CHIP; private nongroup coverage purchased through or outside the Marketplaces; and other unspecified coverage. To address the challenges associated with identifying health insurance coverage type in surveys (Call et al. 2013; Klerman et al. 2009; Pascale 2008; Pascale, Fertig, and Call 2019), we used a logical editing process to identify the most likely type of health insurance coverage held by respondents, based on the information they provided in the survey (Blavin, Karpman, and Zuckerman 2016). However, measurement error still occurs in survey estimates of coverage type, particularly in reports of private nongroup coverage (which can be purchased through government-run Marketplaces with public subsidies) and Medicaid coverage (which is often provided through private Medicaid managed-care plans).

Estimates from this brief are not directly comparable with estimates from HRMS analyses from before 2020 because of a change in the coverage editing process for respondents who reported having insurance but did not report a specific coverage type and who did not enroll in a health plan through the Marketplace. Under the previous approach, these respondents were identified as insured with an unspecified coverage type if they reported having a deductible. The updated approach only assigns unspecified coverage to these respondents if they report the name of a health plan that provides a valid form of comprehensive health insurance coverage. Based on this update, respondents reporting plans that do not offer comprehensive health insurance (e.g., health care sharing ministries) are considered uninsured, yielding slightly higher estimates of uninsurance in this brief than in

previous analyses of the HRMS. Under this updated coverage editing approach, estimates of the share of uninsured nonelderly adults in previous rounds of the HRMS would be 1 to 2 percentage points higher than under the previous approach. We applied the updated coverage editing process consistently for all years of data in this brief.

Analysis

Estimated changes in coverage are regression adjusted to control for any changes in the demographic and socioeconomic characteristics of respondents in each survey round not fully captured in the survey weights. This allows us to remove variation in coverage caused by changes in the observable characteristics of people responding to the survey over time. We control for measures used in poststratification of both the KnowledgePanel and the HRMS, including gender, age, race and ethnicity, primary language, educational attainment, marital status, presence of children in the household, household income, family income, homeownership status, internet access, urban/rural residence, and region. We also control for citizenship status and participation in the previous round of the survey. In presenting the regression-adjusted estimates, we use the predicted rate of each coverage measure in each year for the same nationally representative population. For this analysis, we base the nationally representative sample on respondents for the 2020 and 2021 rounds of the survey. We emphasize changes in coverage that are statistically different from 0 at the 5 percent level or lower and provide a 95 percent confidence interval for key estimates of changes in the number of adults with selected coverage types.

Limitations

This analysis has several limitations. First, studies have found significant measurement error in reported health insurance coverage type across surveys (Call et al. 2013; Klerman et al. 2009; Pascale 2008; Pascale, Fertig, and Call 2019). We attempt to mitigate this error using a logical editing process for coverage type that relies on multiple data elements (Blavin, Karpman, and Zuckerman 2016). Second, the probability-based internet panel underlying the HRMS does not cover some adult populations, including those who are homeless, are institutionalized, or do not speak English or Spanish. Third, the HRMS has a low cumulative response rate, and nonresponse bias is likely only partially mitigated by the survey weights. However, previous studies assessing recruitment for the panel from which HRMS samples are drawn have found little evidence of nonresponse bias for core demographic and socioeconomic measures (Garrett, Dennis, and DiSogra 2010; Heeren et al. 2008). Further, HRMS estimates of changes in coverage have been consistent with estimates from federal surveys with larger samples sizes, higher response rates, and stronger designs (Karpman and Long 2015). Finally, though nonresponse in federal surveys increased significantly during the pandemic (Dahlhamer et al. 2021; Rothbaum and Bee 2021), we find little change in nonresponse in the HRMS. Probability-based internet panels could potentially have more stable response patterns because panel members have previously agreed to participate in surveys. However, the impact of the pandemic on these types of surveys is not yet fully understood.

Notes

[1] The Families First Coronavirus Response Act has provided all states with a temporary increase in federal matching funds for Medicaid beneficiaries not in the ACA Medicaid expansion population. To receive the higher rate, states must follow several maintenance-of-effort requirements, including not disenrolling people from Medicaid unless they request termination of coverage or move to a different state. These provisions will remain in place at least until the end of the calendar quarter when the secretary of health and human services declares the end of the public health emergency.

[2] The states that did not expand Medicaid by April 2021 are Alabama, Georgia, Florida, Kansas, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Wisconsin, and Wyoming. Wisconsin has used state funding to expand eligibility to nonelderly adults with incomes up to the FPL. In other nonexpansion states, parents generally must have very low incomes to qualify for Medicaid, and nonpregnant, nondisabled adults who are not parents living with dependent children are ineligible. In 2020, voters in Missouri and Oklahoma approved ballot initiatives to expand Medicaid by July 1, 2021. Oklahoma's expansion took effect as scheduled. However, the Missouri legislature did not provide funding for the expansion in the state budget, and the governor withdrew the state plan amendment for the expansion. On July 22, 2021, the Missouri Supreme Court ruled that the state must implement the Medicaid expansion. For this analysis, we treat Missouri and Oklahoma as nonexpansion states because they did not implement their expansions by April 2021.

[3] Under the American Rescue Plan Act, many people with incomes above 400 percent of FPL are eligible for premium tax credits, but expanded eligibility is set to expire after 2022.

[4] Coverage estimates often vary across surveys because of differences in survey design (Au-Yeung and Hest 2019). In this brief, we discuss statistically significant changes in coverage over the study period. Previous analyses have found HRMS estimates of coverage changes to be consistent with estimates from other surveys (Karpman and Long 2015).

[5] US Bureau of Labor Statistics, "The Employment Situation – May 2021," news release, June 4, 2021, https://www.bls.gov/news.release/pdf/empsit.pdf.

[6] We multiplied the estimated 2.7 percentage-point change in ESI between March 2019 and April 2021 by the projected number of adults ages 18 to 64 in 2021. We used national population predictions from the US Census Bureau stratified by race, ethnicity, and sex for people of all ages from 2016 to 2060, based on estimated birth, death, and net migration rates over the period. Using the "main series" file, we summed the 2021 population projections for all nonelderly adults to arrive at 203,018,143 such adults that year. See "2017 National Population Projections Datasets," US Census Bureau, February 20, 2020, https://www.census.gov/data/datasets/2017/demo/popproj/2017-popproj.html.

[7] In this brief, we combine Medicare, Medicaid, CHIP, and other government- or state-sponsored health plans into a single measure of public coverage because survey respondents may confuse the names of these coverage types (Pascale 2008). For a previous fact sheet based on data from the March/April 2020 HRMS and the Urban Institute's September 2020 Coronavirus Tracking Survey, we excluded Medicare from estimated changes in public coverage (Karpman and Zuckerman 2020). Estimates in this brief also differ slightly from estimates in that analysis because of differences in the survey weights and the regression adjustment, which we describe in the Data and Methods section.

[8] Administrative data show an increase of approximately 6 million adults enrolled in Medicaid between February 2020 and January 2021 in the 49 states and DC that report adult and child enrollment separately (Corallo and Rudowitz 2021). Differences between the HRMS estimates of changes in public coverage and administrative data for Medicaid enrollment may reflect several factors, including differences in the study period; inclusion of 18-year-olds as adults in the HRMS; inclusion of Medicare, CHIP, and state programs other than Medicaid in the definition of public coverage in the HRMS; survey sampling error; and measurement error in coverage type reported in the survey.

[9] The number of people selecting Marketplace plans increased from 11.4 million during the 2019 open enrollment period (November 1–December 15, 2018) to approximately 12 million during the 2021 open enrollment period (November 1–December 15, 2020). The Centers for Medicare & Medicaid Services reported

an additional 940,000 people enrolled in Marketplace coverage during the special enrollment period between February 15 and April 30, 2021, compared with 266,000 and 391,000 people who signed up through special enrollment periods based on qualifying life events during the same periods in 2019 and 2020. Though the 2021 special enrollment period was extended to August 15, about half of new enrollment during the period's original time frame (February 15–April 30, 2021) occurred in April. Thus, some of these enrollments may have occurred after the HRMS was fielded. See "2021 Open Enrollment Report," Centers for Medicare & Medicaid Services, accessed June 30, 2021, https://www.cms.gov/files/document/health-insurance-exchanges-2021-open-enrollment-report-final.pdf; and "2021 Marketplace Special Enrollment Report," Centers for Medicare & Medicaid Services, May 6, 2021, https://www.cms.gov/newsroom/fact-sheets/2021-marketplace-special-enrollment-period-report-1.

[10] The shares of adults with an unspecified coverage type were 2.3 percent in 2019, 1.4 percent in 2020, and 1.3 percent in 2021.

[11] Joan Alker and Allie Corcoran, "What Is Happening with Medicaid Enrollment in Q1 of 2021?" *Say Ahhh*! (blog), Georgetown University Health Policy Institute, Center for Children and Families, May 21, 2021, https://ccf.georgetown.edu/2021/05/21/what-is-happening-with-medicaid-enrollment-in-q1-of-2021/.

[12] Noncitizens' eligibility for Medicaid depends on several factors, including whether they are lawfully present, considered qualified noncitizens based on their immigration status, and subject to the five-year waiting period after receiving qualified status. See "Coverage for Lawfully Present Immigrants," Centers for Medicare & Medicaid Services, accessed June 30, 2021, https://www.healthcare.gov/immigrants/lawfully-present-immigrants/.

[13] "State Health Facts: Medicaid and CHIP," Kaiser Family Foundation, accessed June 30, 2021, https://www.kff.org/state-category/medicaid-chip/medicaidchip-eligibility-limits/.

[14] The increase in public coverage between 2019 and 2021 in nonexpansion states was concentrated among the group of adults most likely to be eligible for Medicaid or CHIP: 18-year-olds (who qualify for Medicaid or CHIP based on eligibility thresholds for children), adults living with children under 18 in the household (who potentially qualify as parents or caregivers), and adults in Wisconsin, which has used state funds to provide coverage to adults with incomes up to the FPL (data not shown). The increase in public coverage for other adults was statistically significant but small in magnitude.

[15] "Opportunity Insights Economic Tracker," Harvard University, accessed July 14, 2021, https://www.tracktherecovery.org/.

[16] Alker and Corcoran, "What Is Happening with Medicaid Enrollment in Q1 of 2021?" *Say Ahh!*.

[17] Norris Cochran (acting secretary, US Department of Health and Human Services), letter to governors regarding the public health emergency, January 22, 2021, https://ccf.georgetown.edu/wp-content/uploads/2021/01/Public-Health-Emergency-Message-to-Governors.pdf.

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About the Authors

Michael Karpman is a senior research associate in the Health Policy Center at the Urban Institute. His work focuses primarily on the implications of the Affordable Care Act, including quantitative analysis related to health insurance coverage, access to and affordability of health care, use of health care services, and health status. His work includes overseeing and analyzing data from the Urban Institute's Health Reform Monitoring Survey and Well-Being and Basic Needs Survey. Before joining Urban in 2013, Karpman was a senior associate at the National League of Cities Institute for Youth, Education, and Families. He received his MPP from Georgetown University.

Stephen Zuckerman is a senior fellow and vice president for health policy at the Urban Institute. He has studied health economics and health policy for 30 years and is a national expert on Medicare and Medicaid physician payment, including how payments affect enrollee access to care and the volume of services they receive. He is currently examining how payment and delivery system reforms can affect the availability of primary care services and studying the implementation and impact of the Affordable Care Act. Before joining Urban, Zuckerman worked at the American Medical Association's Center for Health Policy Research. He received his PhD in economics from Columbia University.

Acknowledgments

This brief was funded by the Robert Wood Johnson Foundation. The views expressed here do not necessarily reflect the views of the Foundation.

The views expressed are those of the authors and should not be attributed to the Urban Institute, its trustees, or its funders. Funders do not determine research findings or the insights and recommendations of Urban experts. Further information on the Urban Institute's funding principles is available at urban.org/fundingprinciples.

The authors gratefully acknowledge Linda J. Blumberg, Matthew Buettgens, and Jennifer M. Haley for helpful feedback and Rachel Kenney for her careful editing.

500 L'Enfant Plaza SW
Washington, DC 20024

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Peterson-KFF
Health System Tracker

Most private insurers are no longer waiving cost-sharing for COVID-19 treatment

By Jared Ortaliza, Matthew Rae, Krutika Amin, Matthew McGough, and Cynthia Cox *KFF*

Briefs | **Health Spending**

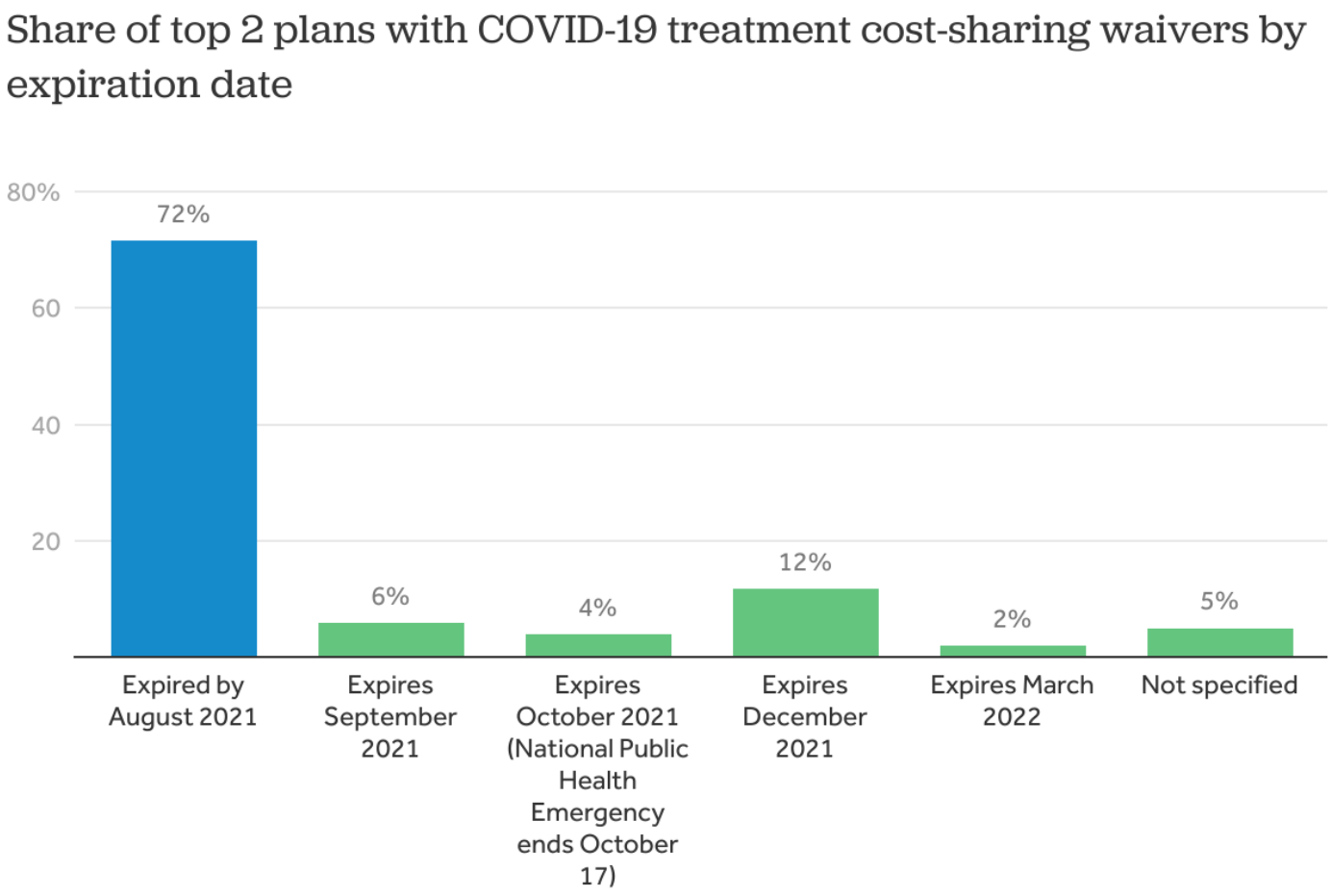
Posted: August 19, 2021

Federal law requires all private insurance plans to cover the entire cost associated with approved COVID-19 *testing* so long as the test is deemed medically appropriate. Additionally, the U.S. government pre-paid for COVID-19 vaccines and required COVID-19 *vaccines* be made available at no out-of-pocket costs regardless of whether the vaccine recipient is insured. However, while a handful of states required or created agreements with insurers to waive COVID-19 out-of-pocket *treatment* costs for their fully-insured plan enrollees, there is no federal mandate requiring insurers to do so.

Earlier in the pandemic, we found that the vast majority (88%) of people enrolled in fully-insured private health plans nonetheless would have had their out-of-pocket costs waived if they were hospitalized with COVID-19. At the time, health insurers were highly profitable due to lower-than-expected health care use, while hospitals and health care workers were overwhelmed with COVID-19 patients. Insurers may have also wanted to be sympathetic toward COVID-19 patients, and some may have also feared the possibility of a federal mandate to provide care free-of-charge to COVID-19 patients, so they voluntarily waived these costs for at least some period of time during the pandemic. Our subsequent analysis found that several of these insurers were starting to phase out COVID-19 cost-sharing waivers by November 2020.

In the last few months, the environment has shifted with safe and highly effective vaccines now widely available. In this brief, we once again review how many private insurers are continuing to waive patient cost sharing for COVID-19 treatment. We find that 72% of the two largest insurers in each state and DC (102 health plans) are no longer waiving these costs, and another 10% of plans are phasing out waivers by the end of October.

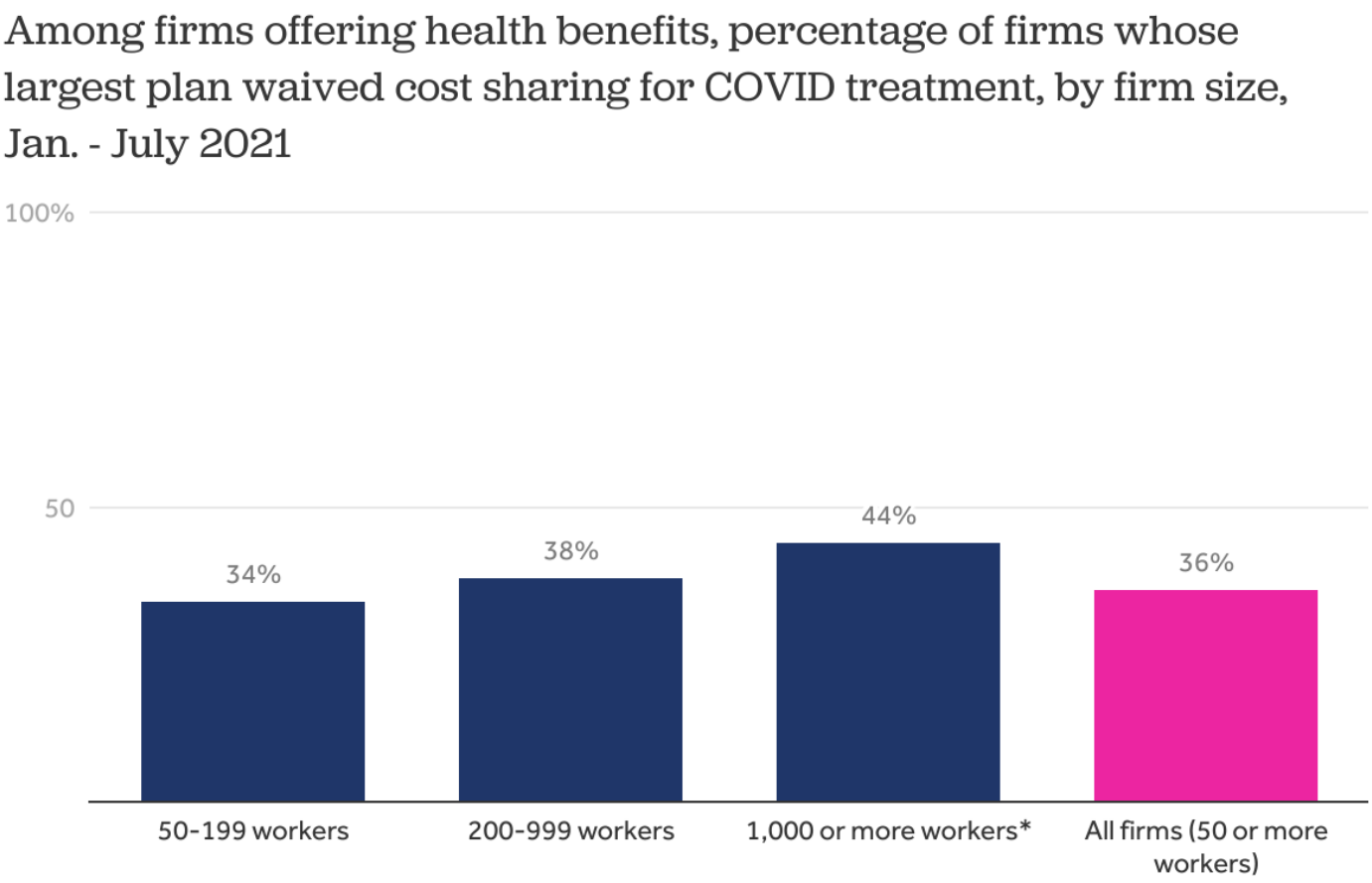
Nearly three-quarters of the largest health plans are no longer waiving cost-sharing for COVID-19 treatment



Across the two largest health plans in each state and D.C. (102 plans), 73 plans (72% of 102 plans) are no longer waiving out-of-pocket costs for COVID-19 treatment. Almost half these plans (50 plans) ended cost-sharing waivers by April 2021, which is around the time most states were opening vaccinations to all adults. Of the 29 plans still waiving cost-sharing for COVID-19 treatment, 10 waivers are set to expire by the end of October. This includes waivers that tie to the end of the federal Public Health Emergency, which is currently set to expire on October 17, 2021, though may be extended. Another 12 plans state that their cost-sharing waivers will expire by the end of 2021. Two plans specified end dates for COVID-19 treatment waivers in 2022 and 5 plans did not specify an expiration date.

All of the 102 plans we reviewed (two largest plans in each state) had waived cost-sharing for COVID-19 treatment at some point since 2020. (These health plans represent 62% of enrollment across the fully insured individual and group markets).

In early 2021, about one-third of employers said their largest plan waived COVID-19 treatment costs



Many employers offering self-funded and fully insured health plans to their employees also reported waiving COVID-19 treatment cost sharing based on preliminary results from the 2021 KFF Employer Health Benefits Survey (EHBS), which was fielded between January and July 2021 with over 70% of the interviews completed before April 19th when vaccines became available for most adults. Since this survey was conducted earlier in the year, many of the waivers may have already expired by the time of this report.

Based on preliminary results from the 2021 EHBS, 36% of firms (with 50 or more employees) reported that their largest plan waived cost sharing for COVID-19 treatment at the time of the survey. Larger firms with 1,000 or more workers were more likely to waive COVID-19 treatment cost-sharing for enrollees than smaller employers.

This survey includes both self-funded employers and those buying fully insured coverage. Before this survey, there was no way to know whether self-funded employers were also waiving these costs as the decision was not up to the insurer administering the plan. In the survey, we see that self-funded employers were similarly likely as employers purchasing fully-insured plans to offer waivers for COVID-19 cost sharing.

Discussion

Motivated by high profits, ACA medical loss ratio rebate requirements, public health concerns about managing the pandemic, and concern over a federal mandate to cover COVID-19 treatment costs, many insurers offered financial relief to their enrollees amid the coronavirus pandemic, primarily through waived COVID-19 treatment costs and less commonly through premium credits or reductions.

Earlier in the pandemic, relatively few COVID-19 patients would have been billed for their hospitalization because of the voluntary waivers extended by private insurers and employers. But as vaccines have become widely available to adults in the U.S. and health care utilization has rebounded more generally, health insurers may no longer face political or public relations pressure to continue waiving costs for COVID-19 treatment. As more waivers expire, more people hospitalized for COVID-19 – the vast majority of whom are unvaccinated – will likely receive significant medical bills for their treatment.

The typical deductible in employer health plans is $1,644, and our earlier analysis found that large group enrollees hospitalized with pneumonia (requiring similar treatment to those hospitalized with COVID-19) paid an average of over $1,300 out-of-pocket. Although this is a large amount to most patients, and could be an incentive to get vaccinated, it still only represents a fraction of the cost born to society for these largely preventable hospitalizations. Unvaccinated COVID-19 hospitalizations cost the U.S. health system $2.3 billion in June and July 2021.

Methods

We used the 2019 Mark Farrah HHS MLR Reporting data to identify the top two plans with the largest combined individual and fully-insured plan enrollment in each state and D.C. We systematically reviewed whether each of the 102 plan provided cost-sharing waivers for COVID-19 treatment and when the waivers expired using each insurer's COVID-19 resources webpage and relevant press releases.

Many insurers referenced "treatment" broadly in context of cost-sharing waivers. However, there were instances when the form of treatment was specified. We used the cost-sharing waiver expiration date for hospitalizations and emergency room visits when the insurer reported different cost-sharing waiver expiration dates for antibody treatment and for hospitalizations and emergency room visits. If the information could not be located on the plan's website, we pulled information from the insurer's parent company's website and made phone calls to insurers when necessary.

In instances where we could not locate information from insurer or parent company websites, we deferred to the America's Health Insurance Plans (AHIP), the trade association representing private insurers, summary that was last updated as of April 8, 2021. If a date of expiration was unavailable for insurers that said they were waiving treatment costs, we categorized the plans as "not specified."

The annual KFF Employer Health Benefits Survey (EHBS) for 2021 was conducted between January and July of 2021 and included almost 1,700 randomly selected, non-federal public and private firms with three or more employees. The methods for the 2021 EHBS are similar to those used in 2020. In 2021, we asked firms if they currently waived cost-sharing for treating enrollees who become infected with COVID-19. A full description of the 2021 methods, finalized data, and findings on other topics such as health insurance premiums and firm offer rates will be released in the fall of 2021. The results described above are preliminary.

Access & Coverage | Affordability | Coronavirus | Cost Sharing | COVID-19 | Disease Treatment Costs | Hospitalization

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With Obamacare Plans, Cost of 'Silver' Is Seen as Too Cheap

By Sara Hansard

Aug. 17, 2021, 2:45 AM

- Gold, bronze plan coverage, pricing don't match
- Some states taking action to realign ACA premiums

Some state Obamacare exchanges are raising the price on the most popular "silver" plans because they say the plans are too cheap based on the coverage they offer. Regulators say their actions will effectively reduce how much most consumers pay because the higher prices will trigger higher subsidies for those plans.

The Affordable Care Act allows for platinum plans that should cover 90% of claims, gold plans that cover 80%, silver plans that cover 70%, and bronze plans that cover 60%. Premiums are supposed to be priced according to coverage, with rarely available platinum plans the most expensive and bronze plans the least expensive. However, premium subsidies are based on the second-cheapest silver plans, and cost-sharing subsidies are available for silver plans for people earning between 100% and 250% of the poverty level, or $26,500 to $66,250 for a family of four.

New Mexico and Colorado recently issued regulatory guidance requiring health insurers in their individual and small group markets to take into account the higher value of most silver plans, which include extra subsidies for the lowest-income groups, when setting their rates for 2022. Maryland, Virginia, and Pennsylvania previously took similar actions, and Texas recently passed legislation (S.B. 1296) that paves the way for the insurance department to make such changes.

The actions of these states, championed by health-care consumer advocacy group Families USA, could change the way Obamacare premiums are set so that gold plans are available at the same price, or below, some of the least-expensive silver plans, Duke University researcher David Anderson said in an interview.

Biden Gold Plan Goal

If the Department of Health and Human Services follows suit, it could accomplish one of President Joe Biden's campaign goals: to base the tax credits on the more generous gold plan, rather than silver plans, without having to pass new legislation through Congress. Biden wants the gold plans to be the new standard for ACA plans.

An HHS spokesman responded that, "The portion of out of pocket costs that a plan covers refers to the plan's actuarial value (AV) and does not vary based on the premium charged. Plans are required to meet the metal-level AV bands established in the ACA, and CMS has not seen evidence of plans violating this requirement."

Gold plans only cover less out-of-pocket costs than silver plans for low-income enrollees who receive cost-sharing reductions, as required by the ACA, the spokesman said. "At this time, state regulators have the flexibility to determine how issuers address CSR costs in the absence of federal funding for CSRs. Some states have given specific guidance to their issuers, while others leave it up to the issuer," the HHS spokesman said.

"Issuers have generally elected to load silver plan premiums to account for these lost payments, as it is silver plan variants that account for CSRs. Other issuers have opted to load the lost CSR payments across the entire single risk pool or partially load silver plans and spread some of the remaining cost across other plans in the risk pool. In some cases, but not all, this may lead to silver plan premiums exceeding gold plan premiums. However, CMS has not seen evidence of issuer rating behavior that violates ACA requirements. CMS continues to carefully monitor the impact of "silver loading" on premiums and subsidies."

Democrats expanded ACA subsidies for a two-year period in the American Rescue Plan Act (H.R. 1319) enacted in March, and Senate Democrats have called for extending the subsidies in Biden's $3.5 trillion economic plan.

What has happened with the way ACA premiums are priced has evolved, along with the perceptions of ACA watchers, especially since 2017, when President Donald Trump stopped providing funding for health insurers to cover required out-of-pocket subsidies for low-income enrollees.

To make up for the lost payments, insurers raised the list price for benchmark silver plans on which premium subsidies are based by nearly 34% in 2018. Most state regulators encouraged or required insurers to raise the silver premiums to avoid raising premiums for other tiers, a process called "silver loading."

That resulted in more generous federal subsidies, and the rescue plan made them still more generous. "There's so few people left who are actually paying unsubsidized premiums," Cynthia Cox, director of the Kaiser Family Foundation's program on the ACA, said in an interview. About 92% of ACA enrollees are eligible for subsidies, she said.

"The ARPA is kind of changing the dynamics of silver-loading," Cox said. The law guarantees the availability of free premiums to low-income enrollees for the two lowest-premium silver plans, Cox said.

That creates a "winner-takes-all situation," in which the insurer that offers the lowest-cost silver plans "is going to get the vast majority of the enrollment in that plan, and then the other insurers don't have a chance," Cox said. "One way to do that might be if their competitors are silver-loading, but they're not silver-loading."

Misaligned Premiums

But premiums are not aligned appropriately based on the underlying generosity of coverage, Stan Dorn, director of Families USA's National Center for Coverage Innovation, said in an interview.

"Insurance companies have financial incentives to aggressively under-price silver and make up for it by raising premiums at other metal levels," he said.

In addition to other incentives, the federal ACA risk adjustment program overcompensates silver plans and undercompensates plans at other metal tiers, Dorn said. The risk adjustment program was set up with the intent of compensating plans that sign up sicker enrollees.

The result of all the incentives for silver plans is, "If you wind up being a plan with a whole bunch of gold and bronze people and your competitor has a whole bunch of silver people, you are going to lose money and your competitor's going to make money," Dorn said.

Low Use of Services

Moreover, low-income people who are enrolled in silver plans don't use as many services as enrollees in corporate plans that have rich benefits, Dorn said. "What that means is that plans are being overpaid for their silver enrollees and underpaid for all their other metal level enrollees," he said.

The federal government should update its risk adjustment program "so that it fits the profile of actual enrollees," Dorn said.

Dorn also says that "what insurance companies are doing is not allowed by the ACA. The ACA's regulations say that you have to price each plan based on utilization by a standard population, not by the actual enrollees."

The average generosity of coverage in silver plans is about 85% of claims, which is above the generosity of gold plans, Dorn said. "So therefore silver premiums should be higher than gold. They're not," he said.

"The people hurt the most are people like moderate income folks who earn between twice the poverty and four times the poverty level," Dorn said. "If things are priced properly, they could enroll in low-deductible gold and pay less than they pay now for high-deductible silver."

In New Mexico, state regulators issued guidance that changes the way insurers must calculate their premiums and attempts to reduce the amount consumers will pay in 2022 after taking subsidies into consideration, Colin Baillio, project manager for the New Mexico Office of the Superintendent of Insurance, said in an interview.

Plans Undercutting One Another

Insurers "have been undercutting each other in the market to the point that it actually now has kind of deflated the premium tax credit in a way that is harming consumers, and particularly it's harming those who don't qualify for cost-sharing reductions," Baillio said.

Rates for 2022 will be finalized later this month, Baillio said. Premiums for gold plans after subsidies are taken into account are expected to go down, while silver premiums after subsidies are accounted for "shouldn't be altered all that much" because the subsidy is adjusted with the cost of the benchmark plans, he said.

Colorado also issued a regulatory bulletin to standardize the way plans must account for consumer use of services to make sure plans are priced appropriately, Kyle Brown, deputy commissioner for affordability programs of the Division of Insurance, said in an interview.

"We're always refining our process and our regulatory understanding of how plans are working," Brown said.

Colorado expects gold and bronze plan prices will likely come down significantly, Brown said. "We would expect a small increase in silver prices," he said. Based on preliminary findings, Colorado expects about a 1.4% overall increase in the individual market, he said.

To contact the reporter on this story: Sara Hansard in Washington at shansard@bloomberglaw.com

To contact the editors responsible for this story: Fawn Johnson at fjohnson@bloombergindustry.com; Karl Hardy at khardy@bloomberglaw.com

Documents

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Families USA report

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Colorado plan guidance

Bill
Texas S.B. 1296

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JAMA | Original Investigation

Trends in Differences in Health Status and Health Care Access and Affordability by Race and Ethnicity in the United States, 1999-2018

Shiwani Mahajan, MBBS, MHS; César Caraballo, MD; Yuan Lu, ScD; Javier Valero-Elizondo, MD, MPH; Daisy Massey, BA; Amarnath R. Annapureddy, MD; Brita Roy, MD, MPH, MHS; Carley Riley, MD, MPP, MHS; Karthik Murugiah, MD; Oyere Onuma, MD, MSc; Marcella Nunez-Smith, MD, MHS; Howard P. Forman, MD, MBA; Khurram Nasir, MD, MPH, MSc; Jeph Herrin, PhD; Harlan M. Krumholz, MD, SM

IMPORTANCE The elimination of racial and ethnic differences in health status and health care access is a US goal, but it is unclear whether the country has made progress over the last 2 decades.

OBJECTIVE To determine 20-year trends in the racial and ethnic differences in self-reported measures of health status and health care access and affordability among adults in the US.

DESIGN, SETTING, AND PARTICIPANTS Serial cross-sectional study of National Health Interview Survey data, 1999-2018, that included 596 355 adults.

EXPOSURES Self-reported race, ethnicity, and income level.

MAIN OUTCOMES AND MEASURES Rates and racial and ethnic differences in self-reported health status and health care access and affordability.

RESULTS The study included 596 355 adults (mean [SE] age, 46.2 [0.07] years, 51.8% [SE, 0.10] women), of whom 4.7% were Asian, 11.8% were Black, 13.8% were Latino/Hispanic, and 69.7% were White. The estimated percentages of people with low income were 28.2%, 46.1%, 51.5%, and 23.9% among Asian, Black, Latino/Hispanic, and White individuals, respectively. Black individuals with low income had the highest estimated prevalence of poor or fair health status (29.1% [95% CI, 26.5%-31.7%] in 1999 and 24.9% [95% CI, 21.8%-28.3%] in 2018), while White individuals with middle and high income had the lowest (6.4% [95% CI, 5.9%-6.8%] in 1999 and 6.3% [95% CI, 5.8%-6.7%] in 2018). Black individuals had a significantly higher estimated prevalence of poor or fair health status than White individuals in 1999, regardless of income strata ($P < .001$ for the overall and low-income groups; $P = .03$ for middle and high-income group). From 1999 to 2018, racial and ethnic gaps in poor or fair health status did not change significantly, with or without income stratification, except for a significant decrease in the difference between White and Black individuals with low income (−6.7 percentage points [95% CI, −11.3 to −2.0]; $P = .005$); the difference in 2018 was no longer statistically significant ($P = .13$). Black and White individuals had the highest levels of self-reported functional limitations, which increased significantly among all groups over time. There were significant reductions in the racial and ethnic differences in some self-reported measures of health care access, but not affordability, with and without income stratification.

CONCLUSIONS AND RELEVANCE In a serial cross-sectional survey study of US adults from 1999 to 2018, racial and ethnic differences in self-reported health status, access, and affordability improved in some subgroups, but largely persisted.

Editorial page 613

Supplemental content

CME Quiz at jamacmelookup.com

Author Affiliations: Author affiliations are listed at the end of this article.

Corresponding Author: Harlan M. Krumholz, MD, SM, Yale New Haven Hospital Center for Outcomes Research and Evaluation, 195 Church St, Fifth floor, New Haven, CT 06510 (harlan.krumholz@yale.edu).

JAMA. 2021;326(7):637-648. doi:10.1001/jama.2021.9907

In 1985, the US Department of Health and Human Services published a landmark report on Black and minority health, commonly known as the Heckler Report, highlighting the racial and ethnic differences in health.[1] Since then, the US has implemented many public health policies and programs to address these racial and ethnic differences.[2-4] Age-adjusted death rates by race and ethnicity between Black individuals and White individuals narrowed from 1993 to 2015, but since 2016 the gap began widening.[5-7]

It is not clear whether the US has made progress in eliminating racial and ethnic differences in self-reported health status and health care access. Prior studies have not evaluated national, long-term trends from the individual's perspective. This study used the National Health Interview Survey (NHIS),[8] the principal federal source of health information on the US civilian, noninstitutionalized population, to study 20-year trends in self-reported health status and health care access and affordability by race and ethnicity. Considering that income can influence health and health care access in the US,[9] this study also evaluated how racial and ethnic differences varied by income.

Key Points

Question How have racial and ethnic differences in self-reported health status, access, and affordability among US adults changed between 1999 and 2018?

Findings In this serial cross-sectional study that included 596 355 adults, there were marked racial and ethnic differences in measures of health status, access, and affordability, with evidence of improvement in some subgroups but persistence overall. In 2018, Black individuals with low income had the highest estimated prevalence of poor or fair health (24.9%), while White individuals with middle or high income had the lowest (6.3%).

Meaning Between 1999 and 2018, some estimated racial and ethnic differences in measures of self-reported health status and health care access improved, but many differences persisted.

Methods

Data Source

We used data from the serial cross-sectional surveys of the NHIS for the years 1999 to 2018. The survey uses a complex multistage area probability design that accounts for nonresponse and allows for nationally representative estimates, including among underrepresented groups.[8] We obtained the data from the Integrated Public Use Microdata Series Health Surveys website (https://nhis.ipums.org/).[10] The codes used to analyze these data are available on reasonable request. The institutional review board at Yale University exempted the study from review.

Demographic Variables

Race and Ethnicity

Latino/Hispanic ethnicity was defined as answering "yes" to the question, "Do you consider yourself Latino/Hispanic?" Race was ascertained by the question, "What race do you consider yourself to be?" and, if more than 1 was reported, "Which one of these groups would you say best represents your race?" Participants were divided into 4 mutually exclusive subgroups based on their race and ethnicity combination: non-Hispanic Asian (Asian), non-Hispanic Black/African American (Black), Latino/Hispanic, and non-Hispanic White (White).

Income Level

Annual family income was categorized relative to the respective year's federal poverty limit from the US Census Bureau[11]: middle and high income (≥200%) and low income (<200%)—a method consistent with prior NHIS studies.[9,12]

Respondent Characteristics

Respondent characteristics included in the models were age (in years), sex, and region (Northeast, North Central/Midwest, South, West). Other sociodemographic and clinical variables were used only to describe the characteristics of the population.

Study Population

We included individuals 18 years and older from years 1999 to 2018 of the Sample Adult Core file, which contains the responses from 1 adult who is randomly selected from each family for an in-depth questionnaire. The mean conditional response rate of the Sample Adult Core survey during the study period was 81%. The mean final response rate of the Sample Adult Core survey, which accounts for household and family nonresponse,[13] was 64.8% (eMethods 1 in the Supplement).

Study Outcomes

The study outcomes are defined below, with details in eMethods 2 in the Supplement. "Don't know," "refused," or no response values were set to missing for each outcome. Additionally, a description of how the study met recommendations for publishing on racial health inequities is provided in eMethods 3 in the Supplement.[14]

Health Status Outcomes

Self-rated health status was assessed on a 5-point scale (excellent, very good, good, fair, or poor) based on an individual's self-perceived general health.[15] Responses were dichotomized into a binary variable: poor or fair health status (yes vs no).

Functional limitation was assessed by asking respondents about their ability to perform 9 routine physical tasks (derived from the work of Nagi[16] and Nagi and Marsh[17]) and 3 social and leisure activities without special equipment. We identified individuals as having a functional limitation if they reported any limitation in any of the 12 tasks.[18] We also assessed limitations in physical tasks and social and leisure activities separately.

Severe psychological distress was assessed using the Kessler-6 Scale, which asks about 6 manifestations of nonspecific psychological distress over a 30-day recall period.[19] Responses are rated on a 5-point scale (ranging from 0 to 4) based on the frequency of the feelings, and a summed score of 13 or greater was defined as having severe psychological distress.

Health Care Access, Utilization, and Affordability Outcomes

Health care access was assessed by ascertaining whether individuals had health insurance coverage and a usual source

of care.[12] Individuals were classified as "uninsured" if at the time of interview, they reported not having any private health insurance, Medicare, Medicaid, military plan, other government- or state-sponsored health plan, or if they had only Indian Health Service coverage.[20] Individuals were identified as not having a usual source of care if they did not have a usual place to go whenever they were sick or needed health advice.[21]

Health care utilization was based on whether individuals had seen or talked to a health professional in the past 12 months.[21]

Health care affordability was assessed by determining whether individuals, in the past 12 months, had foregone or delayed medical care because of cost or had not gotten needed prescription medicines because they were unable to afford them.[22]

Statistical Analysis

All analyses incorporated strata and weights to produce nationally representative estimates using the Stata *-svy-* command for structured survey data. All person weights were pooled and divided by the number of years studied, in accordance with guidance from the NHIS.[13] We summarized general characteristics of respondents by race and ethnicity. We then estimated annual outcome rates for each race and ethnicity subgroup, overall and by income level, using multivariable logistic regression models, with each outcome as the dependent variable, and age, sex, a dummy variable for each region, and an indicator for each year of interview as independent variables. Age, sex, and region were centered on their overall mean for the study sample; the coefficients for each year, when combined with the intercept, then represented the logit of the annual outcome rates adjusted for age, sex, and region. A separate model was estimated for each racial and ethnic subgroup, and the results were used to generate estimated rates for each year, using the inverse logit of each year effect as the annual rate and applying the method of parametric bootstrapping to calculate the standard error (SE) and the confidence interval (CI) for the transformed coefficients.[23] To show alignment with prior work by the National Center for Health Statistics (NCHS), we also estimated the results for 1 of our study outcomes (poor or fair health status) using the same methodology as per the NCHS (ie, by standardizing only for age using direct standardization). For each regression, observations with missing outcome data were excluded from the model (ie, complete case analysis). Missing rates of each outcome are presented in the Results section. Due to high rates of missing income information from nonresponse, the publicly available NHIS data include multiply imputed income variables for respondents who do not report income. Thus, following NCHS recommendations for multiply imputed data analysis,[24] to estimate the annual low-income prevalence by race and ethnicity, we used the mean annual estimate obtained by separate regressions using a similar approach as above but with each of the multiply imputed income variables as the dependent variable and an indicator for each year as the independent variables. Similarly, for the income-stratified analysis, we used the mean prevalence estimate of each outcome obtained by separate regressions for each of the imputed income values.

To quantify the racial and ethnic gap for each outcome, we used White individuals as the reference group and subtracted the annual rate for White individuals from the annual rate among Asian, Black, and Latino/Hispanic individuals for that year (eg, percentage of Latino/Hispanic individuals uninsured in 2010 − percentage of White individuals uninsured in 2010), also constructing SEs for the differences. Using these annual rates and differences, we then estimated trends over the study period by fitting weighted linear regression models where the dependent variable was the adjusted annual prevalence of each outcome or difference (calculated as described earlier), and the independent variable was time in years. To account for varying precision of each estimated rate or the difference over time, each observation was weighted by the inverse square of the SE.

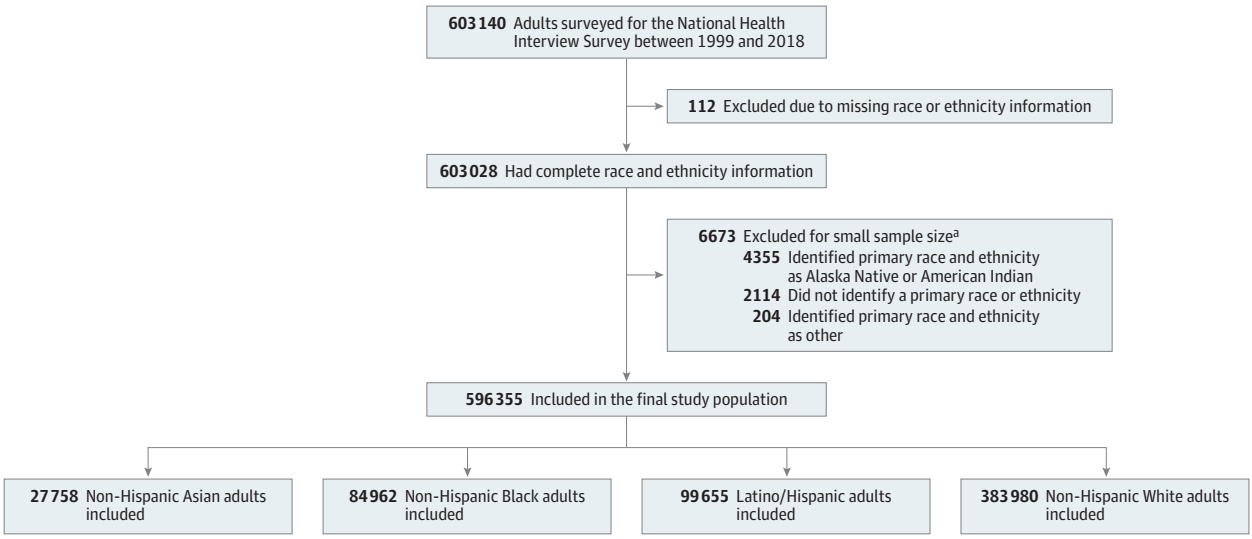
For health care access and affordability indicators, rather than assuming a monotonic relationship between time and outcome rates, we graphically assessed the relationship of foregone or delayed medical care due to cost and health insurance coverage first. Based on this assessment, we modeled time as a linear spline with knots at 2010 and 2016 to reflect the observed inflection points. We then used the coefficient of the time variables to evaluate the slope of each outcome's prevalence during each period. For all outcomes, we also performed a sensitivity analysis to account for the serial correlation of annual outcome rates, incorporating an autoregressive error term with 1-year correlation.

In a separate analysis, we tested for an absolute difference in the prevalence of each outcome and the racial and ethnic difference between 1999 and 2018 using a z test. For all analyses, a 2-sided P value less than .05 was used to determine statistical significance. All analyses were performed using Stata SE version 16.1 (StataCorp). Because of the potential for type I error due to multiple comparisons, findings of the analyses should be interpreted as exploratory.

Results

The study population included 603 140 adults, from which we excluded 112 individuals with unknown race or ethnicity information and 6673 individuals who identified their primary race as Alaska Native or American Indian (n = 4355), did not identify as Latino/Hispanic and did not select a primary race (n = 2114), or identified their primary race as other (n = 204) because of small numbers (**Figure 1**). The final study population included 596 355 adults (mean [SE] age, 46.2 [0.07] years; 51.8% [SE, 0.10] women) of whom 4.7% (SE, 0.07) were Asian, 11.8% (SE, 0.20) were Black, 13.8% (SE, 0.17) were Latino/Hispanic, and 69.7% (SE, 0.23) were White. The study population is described in **Table 1**; eTable 1 and eFigures 1 and 2 in the Supplement. The estimated prevalence of people with low income was 28.2% (SE, 1.80) among Asian individuals, 46.1% (SE, 1.18) among Black individuals, 51.5% (SE, 1.08) among Latino/Hispanic individuals, and 23.9% (SE, 0.50) among White individuals. Over the study period, there were no significant changes in the difference of the proportion of people with low income between

Figure 1. Study Population



The 4 mutually exclusive racial and ethnic subgroups were created based on the primary race and ethnicity combinations.

[a] Small sample size defined as less than 1% of the surveyed population. Individuals in these categories did not identify as Latino/Hispanic.

White individuals and the other race and ethnicity groups (eFigure 2 in the Supplement). The overall rates of each outcome are shown in eFigure 3 in the Supplement, and the rate of missingness was less than 2.5% for each (eTable 2 in the Supplement).

Health Status

Poor or Fair Health Status

In 1999, the estimated percentage of people who reported poor or fair health status was 10.0% (95% CI, 7.9%-12.6%) among Asian individuals, 17.7% (95% CI, 16.1%-19.4%) among Black individuals, 14.3% (95% CI, 13.0%-15.8%) among Latino/Hispanic individuals, and 9.4% (95% CI, 8.9%-9.8%) among White individuals (**Figure 2**A; eTable 3A in the Supplement). Between 1999 and 2018, there was no significant change in the estimated prevalence of poor health across all 4 race and ethnic groups (**Table 2**) and no significant change in the estimated gap between White and Black or Latino/Hispanic individuals (P = .08 and P = .88, respectively) (**Table 3**). Between 1999 and 2018, Black individuals with low income had the highest estimated prevalence of poor or fair health (29.1% [95% CI, 26.5%-31.7%] in 1999 and 24.9% [95% CI, 21.8%-28.3%] in 2018), while White individuals with middle and high income had the lowest (6.4% [95% CI, 5.9%-6.8%] in 1999 and 6.3% [95% CI, 5.8%-6.7%] in 2018) (eFigure 4A and eTable 3B in the Supplement). When stratified by income, in the low-income strata, the estimated prevalence of poor or fair health among White individuals increased significantly (P = .01), significantly narrowing their gap with Black individuals (P = .005), and the difference between Black and White individuals with low income was no longer significant in 2018 (P = .13) (Table 3). The difference between the estimated prevalence of poor or fair health with the prevalence estimated using the NCHS methodology was minimal (eTable 4 in the Supplement).

Functional Limitation

In 1999, the estimated percentage of people reporting functional limitation was 19.0% (95% CI, 16.1%-22.4%) among Asian individuals, 29.4% (95% CI, 27.4%-31.5%) among Black individuals, 22.5% (95% CI, 20.9%-24.3%) among Latino/Hispanic individuals, and 29.7% (95% CI, 28.9%-30.6%) among White individuals (Figure 2B; eTable 5A in the Supplement). Between 1999 and 2018, the estimated prevalence of adults reporting functional limitation increased significantly for Black, Latino/Hispanic, and White individuals regardless of their income level (P < .001 for all) and for Asian individuals with low income (P = .03) (Table 2). Between 1999 and 2018, the estimated gap between White and Asian and Latino/Hispanic individuals did not significantly change (P = .10 and P = .34, respectively) (Table 3); and in 2018, White individuals with low income had the highest estimated prevalence of functional limitation (57.0% [95% CI, 54.8%-59.2%]), whereas Asian people with middle and high income had the lowest (20.4% [95% CI, 17.4%-23.8%]) (eFigure 4B and eTable 5B in the Supplement). Trends in differences by race and ethnicity were similar when physical tasks and social and leisure activities were analyzed separately (eFigure 5 in the Supplement).

Severe Psychological Distress

In 1999, the estimated percentage of people who reported severe psychological distress was 0.8% (95% CI, 0.4%-1.5%) among Asian individuals, 3.0% (95% CI, 2.5%-3.7%) among Black individuals, 3.2% (95% CI, 2.6%-3.8%) among Latino/Hispanic individuals, and 2.3% (95% CI, 2.0%-2.5%) among White individuals (Figure 2C; eTable 6A in the Supplement). Between 1999 and 2018, estimated rates of severe psychological distress significantly increased for Black (+1.3 percentage points [95% CI, 0.04-2.5]; P = .04), Latino/Hispanic (+1.5 percentage points [95% CI, 0.4-2.7]; P = .007),

Table 1. General Characteristics of the Study Population by Race and Ethnicity[a]

Characteristic	% (95% CI)			
	Asian individuals	Black individuals	Latino/Hispanic individuals	White individuals
Sample size, No. (N = 596 355)	27 758	84 962	99 655	383 980
Age, median (IQR), y	41 (30-55)	42 (29-55)	38 (28-50)	47 (33-61)
Age category, y				
18-39	45.7 (44.7-46.6)	45.4 (44.8-46.0)	54.2 (53.7-54.8)	35.3 (35.0-35.7)
40-64	41.5 (40.7-42.4)	41.8 (41.3-42.3)	36.7 (36.2-37.1)	44.4 (44.1-44.7)
≥65	12.8 (12.3-13.5)	12.8 (12.4-13.2)	9.1 (8.8-9.4)	20.3 (20.0-20.6)
Sex				
Men	47.7 (46.9-48.4)	44.8 (44.3-45.3)	50.5 (50.0-50.9)	48.3 (48.1-48.5)
Women	52.3 (51.6-53.1)	55.2 (54.7-55.7)	49.6 (49.1-50.0)	51.7 (51.5-51.9)
US citizenship (n = 594 976)	68.1 (67.0-69.1)	95.3 (95.0-95.7)	64.4 (63.6-65.2)	98.4 (98.3-98.5)
Education level (n = 591 769)				
<High school	9.9 (9.3-10.5)	18.3 (17.8-18.9)	36.9 (36.2-37.6)	10.3 (10.1-10.5)
High school diploma/GED	16.4 (15.7-17.1)	30.6 (30.1-31.1)	26.2 (25.8-26.7)	27.9 (27.6-28.2)
Some college	22.4 (21.7-23.2)	32.7 (32.2-33.3)	24.3 (23.8-24.8)	31.0 (30.7-31.3)
≥Bachelor degree	51.3 (50.1-52.5)	18.4 (17.9-18.9)	12.6 (12.2-13.0)	30.8 (30.4-31.2)
Annual income <200% federal poverty limit[b]	28.2 (24.9-31.7)	46.1 (43.9-48.3)	51.5 (50.2-52.7)	23.9 (23.0-24.9)
Uninsured at the time of interview (n = 594 122)	12.9 (12.3-13.5)	18.5 (18.1-18.9)	34.1 (33.4-34.8)	10.5 (10.4-10.7)
US region[c]				
Northeast	20.1 (18.9-21.4)	16.3 (15.5-17.0)	14.0 (13.3-14.8)	19.3 (18.8-19.8)
Midwest	13.3 (12.3-14.3)	17.8 (17.0-18.7)	9.0 (8.3-9.8)	28.2 (27.6-28.8)
South	21.7 (20.4-23.0)	57.8 (56.6-59.1)	36.3 (35.0-37.6)	33.9 (33.3-34.6)
West	44.9 (43.3-46.6)	8.1 (7.7-8.5)	40.7 (39.3-42.1)	18.6 (18.2-19.1)
Married or living with partner (n = 593 917)	64.5 (63.6-65.3)	35.1 (34.6-35.7)	53.9 (53.4-54.4)	58.5 (58.1-58.9)
Employment status (n = 595 593)				
With a job/working	65.3 (64.5-66.2)	60.5 (59.9-61.0)	65.4 (64.9-65.9)	62.9 (62.6-63.2)
Not in labor force	30.8 (29.9-31.6)	32.0 (31.4-32.5)	29.3 (28.8-29.8)	34.0 (33.7-34.3)
Unemployed	3.9 (3.7-4.2)	7.6 (7.3-7.9)	5.3 (5.1-5.5)	3.2 (3.1-3.2)
Comorbidities				
Hypertension	21.0 (20.3-21.7)	35.0 (34.5-35.6)	20.0 (19.6-20.4)	28.9 (28.7-29.2)
Diabetes	7.2 (6.8-7.6)	11.0 (10.7-11.2)	8.6 (8.3-8.9)	7.7 (7.5-7.8)
Prior stroke/ myocardial infarction	2.7 (2.4-2.9)	5.3 (5.1-5.5)	3.0 (2.9-3.2)	5.9 (5.8-6.0)
Cancer	2.9 (2.7-3.2)	4.0 (3.8-4.1)	2.8 (2.7-2.9)	10.0 (9.9-10.1)
Emphysema/ chronic bronchitis	1.8 (1.6-2.0)	4.7 (4.5-4.9)	2.8 (2.7-2.9)	5.9 (5.8-6.0)
Current smoker	10.2 (9.7-10.7)	19.7 (19.3-20.2)	13.4 (13.1-13.7)	20.6 (20.4-20.9)
Flu vaccine in past 12 mo	36.8 (35.9-37.6)	27.1 (26.7-27.6)	24.6 (24.1-25.0)	37.2 (36.9-37.5)
Obese (BMI ≥30)	9.1 (8.7-9.6)	36.3 (35.8-36.8)	29.6 (29.1-30.1)	25.6 (25.4-25.9)

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); GED, general equivalency diploma.

[a] All percentages presented here are weighted percentages. Population characteristics of all racial and ethnic groups varied over the study period, as shown in eTable 1 in the Supplement. The outcomes prevalence estimates in this study were adjusted for age, sex, and US region.

[b] Annual family income was categorized relative to the respective year's federal poverty limit from the US Census Bureau into middle and high income (≥200%) and low income (<200%). The weighted proportion of individuals with annual income <200% federal poverty limit was estimated using multiple imputation.

[c] Based on where the housing unit of the survey participant was located. The 4 regions correspond to the regions recognized by the US Census Bureau (https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf).

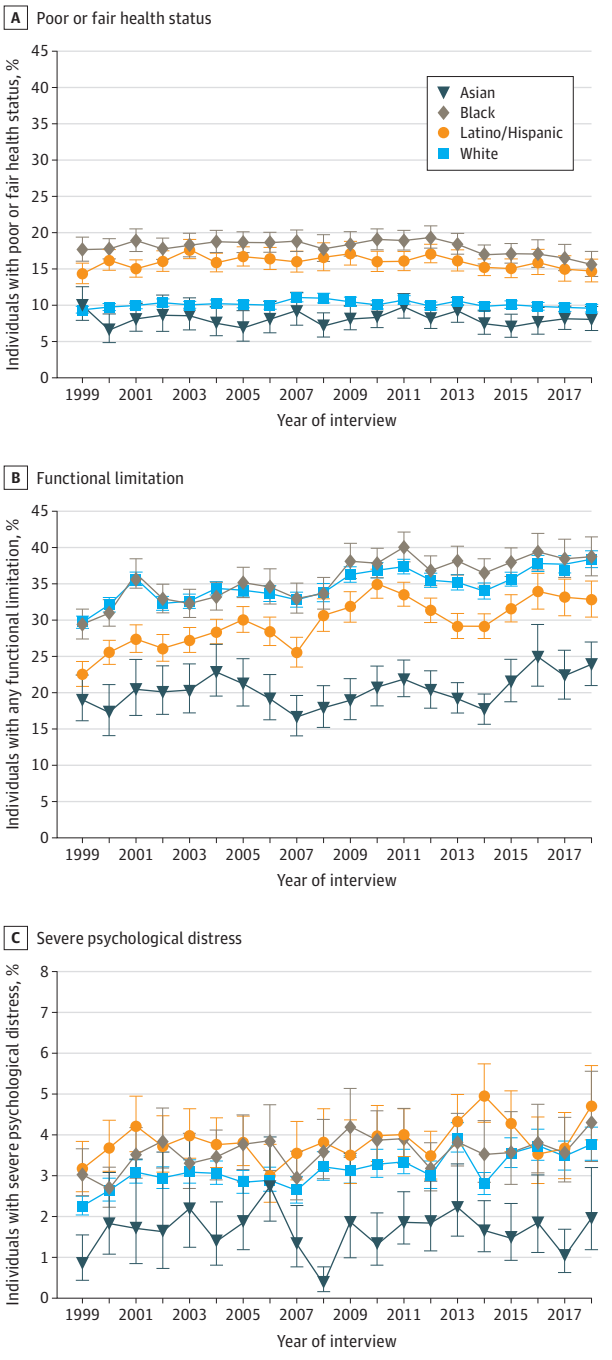
and White individuals (+1.5 percentage points [95% CI, 1.0-2.0]; $P < .001$) but there was no significant change for Asian individuals (+1.1 percentage points [95% CI, −0.01 to 2.3]; $P = .05$) (Table 2). The estimated differences between White individuals and the other racial and ethnic groups did not significantly change, either overall or by income level ($P > .05$ for each group) (Table 3; eFigure 4C and eTable 6B in the Supplement). Findings were consistent in sensitivity analyses using autoregressive models (eTable 7 in the Supplement).

Health Care Access, Utilization, and Affordability

Lack of Health Insurance

In 1999, the estimated percentage of people who reported being uninsured was 14.4% (95% CI, 11.5%-17.7%) among Asian

Figure 2. Trends of Self-reported Poor or Fair Health Status, Functional Limitation, and Severe Psychological Distress by Race and Ethnicity, 1999-2018



Data source is the National Health Interview Survey from years 1999 to 2018. Rates are adjusted for age, sex, and US region using logistic regression, with 95% CIs shown with error bars. Definitions of each outcome are shown in Study Outcomes in the Methods section. The median annual number of adults included in the study by race and ethnicity were 1301 (IQR, 911-1815) non-Hispanic Asian, 4355 (IQR, 3843-4589) non-Hispanic Black, 5325 (IQR, 4212-5603) Latino/Hispanic, and 20 290 (IQR, 16919-20961) non-Hispanic White. The annual number and weighted proportion of individuals included in the study population are shown in eFigure 1 in the Supplement. The income-stratified results for these measures are presented in eFigure 4 in the Supplement.

individuals, 13.8% (95% CI, 12.5%-15.3%) among Black individuals, 26.1% (95% CI, 24.4%-28.0%) among Latino/Hispanic individuals, and 8.6% (95% CI, 8.2%-9.0%) among White individuals (**Figure 3**A; eTable 8A in the Supplement). Between 1999 and 2018, the estimated rates of uninsured people decreased significantly for all racial and ethnic subgroups ($P < .001$ for each) (Table 2). This decrease occurred mostly between 2010 and 2015 (eTable 9 in the Supplement). In the same period, the estimated difference between White and Asian, Black, and Latino/Hispanic individuals also decreased significantly ($P = .001$, $P = .03$, and $P < .001$ respectively) (Table 3). However, in 2018, there was still a significant difference in the estimated uninsured prevalence between White and Black individuals (3.0 points higher for Black individuals [95% CI, 1.7-4.3]; $P < .001$) and Latino/Hispanic individuals (12.2 points higher for Latino/Hispanic individuals [95% CI, 10.1-14.3]; $P < .001$). In 2018, Latino/Hispanic individuals with low income had the highest estimated percentage of uninsurance (27.3% [95% CI, 24.0%-30.8%]), whereas White individuals with middle and high income had the lowest (4.2% [95% CI, 3.8%-4.7%]) (eFigure 6A and eTable 8B in the Supplement).

No Usual Source of Care

The estimated percentage of people reporting being without a usual source of care in 1999 was 17.0% (95% CI, 14.2%-20.2%) among Asian individuals, 13.0% (95% CI, 11.7%-14.6%) among Black individuals, 20.3% (95% CI, 18.8%-21.9%) among Latino/Hispanic individuals, and 10.6% (95% CI, 10.1%-11.0%) among White individuals (Figure 3B; eTable 10A in the Supplement). Between 1999 and 2018, the estimated prevalence of people without a usual source of care decreased significantly for Asian and Latino/Hispanic individuals ($P = .001$ and $P = .002$, respectively), but not for Black and White individuals ($P = .92$ and $P = .20$, respectively) (Table 2). The estimated difference between White and Asian and Latino/Hispanic individuals significantly decreased (−5.3 points [95% CI, −9.0 to −1.7; $P = .004$] and −3.2 points [95% CI, −5.6 to −0.7; $P = .01$], respectively) (Table 3). However, in 2018, a significantly higher estimated proportion of Latino/Hispanic individuals did not have a usual source of care compared with White individuals, both overall and by income level ($P < .001$ among the overall and middle and high-income groups, and $P = .002$ among low-income groups) (Table 3; eFigure 6B and eTable 10B in the Supplement).

Not Seen or Talked to a Health Professional in the Past Year

The estimated percentage of people who reported not having seen or talked to a health professional in the past year in 1999 was 20.6% (95% CI, 17.8%-23.7%) among Asian individuals, 14.0% (95% CI, 12.7%-15.5%) among Black individuals, 21.9% (95% CI, 20.5%-23.4%) among Latino/Hispanic individuals, and 13.2% (95% CI, 12.7%-13.7%) among White individuals (Figure 3C; eTable 11A in the Supplement). The differences between White and Asian, Black, and Latino/Hispanic individuals did not significantly change during the study period ($P = .97$, $P = .68$, and $P = .69$, respectively) (Table 3). In 2018, Asian and Latino/Hispanic individuals with low income had the highest estimated percentage of individuals who did not see a health

Table 2. Change in the Adjusted Prevalence of Health Status and Health Care Access, Utilization, and Affordability Measures from 1999 to 2018, by Race and Ethnicity[a]

	Asian individuals		Black individuals		Latino/Hispanic individuals		White individuals	
	Percentage points (95% CI)	*P* value	Percentage points (95% CI)	*P* value	Percentage points (95% CI)	*P* value	Percentage points (95% CI)	*P* value
Poor or fair health status								
Overall	−1.94 (−4.78 to +0.90)	.18	−2.06 (−4.45 to +0.34)	.09	+0.39 (−1.73 to +2.50)	.72	+0.21 (−0.50 to +0.91)	.56
Low income	−5.03 (−13.96 to +3.90)	.27	−4.12 (−8.32 to +0.07)	.05	+1.07 (−2.51 to +4.66)	.56	+2.54 (+0.51 to +4.58)	.01
Middle and high income	−0.44 (−4.15 to +3.26)	.82	+0.47 (−1.98 to +2.91)	.71	+0.25 (−2.10 to +2.61)	.83	−0.09 (−0.72 to +0.54)	.77
Functional limitation								
Overall	+4.85 (+0.51 to +9.19)	.03	+9.30 (+5.91 to +12.69)	<.001	+10.33 (+7.29 to +13.36)	<.001	+8.69 (+7.26 to +10.11)	<.001
Low income	+11.05 (+1.18 to +20.92)	.03	+8.80 (+3.54 to +14.07)	.001	+12.59 (+8.22 to +16.97)	<.001	+15.37 (+12.41 to +18.33)	<.001
Middle and high income	+3.34 (−1.68 to +8.36)	.19	+10.47 (+6.32 to +14.62)	<.001	+8.61 (+4.51 to +12.71)	<.001	+7.22 (+5.76 to +8.69)	<.001
Severe psychological distress								
Overall	+1.14 (−0.01 to +2.30)	.05	+1.29 (+0.04 to +2.53)	.04	+1.54 (+0.43 to +2.65)	.007	+1.51 (+1.04 to +1.97)	<.001
Low income	+1.53 (−1.23 to +4.29)	.28	+2.10 (−0.22 to +4.41)	.08	+2.12 (+0.47 to +3.77)	.01	+3.67 (+2.37 to +4.98)	<.001
Middle and high income	+1.06 (−0.37 to +2.48)	.15	+0.78 (−0.46 to +2.02)	.22	+1.12 (−0.36 to +2.59)	.14	+0.99 (+0.55 to +1.43)	<.001
Lack of health insurance at the time of interview								
Overall	−8.51 (−11.95 to −5.07)	<.001	−5.01 (−6.86 to −3.15)	<.001	−8.16 (−10.89 to −5.44)	<.001	−2.83 (−3.44 to −2.22)	<.001
Low income	−22.95 (−31.22 to −14.68)	<.001	−9.96 (−13.07 to −6.84)	<.001	−13.13 (−17.59 to −8.67)	<.001	−9.09 (−11.05 to −7.14)	<.001
Middle and high income	−3.56 (−6.84 to −0.29)	.03	−1.42 (−3.41 to +0.57)	.16	−3.40 (−5.86 to −0.93)	.007	−1.27 (−1.85 to −0.68)	<.001
No usual source of care at the time of interview								
Overall	−5.86 (−9.40 to −2.31)	.001	+0.12 (−2.12 to +2.35)	.92	−3.70 (−6.02 to −1.37)	.002	−0.52 (−1.30 to +0.27)	.20
Low income	−15.72 (−24.56 to −6.89)	<.001	+1.36 (−2.05 to +4.78)	.43	−5.64 (−9.32 to −1.96)	.003	+0.03 (−1.93 to +1.98)	.98
Middle and high income	−2.55 (−6.08 to +0.97)	.16	−0.66 (−3.31 to +1.99)	.62	−1.51 (−4.00 to +0.99)	.24	−0.61 (−1.44 to +0.21)	.15
Not seen or talked to a health professional in the past 12 mo								
Overall	−2.37 (−6.39 to +1.66)	.25	−2.00 (−4.05 to +0.05)	.06	−2.96 (−5.31 to −0.62)	.01	−2.46 (−3.24 to −1.68)	<.001
Low income	−7.72 (−17.36 to +1.92)	.12	−0.67 (−3.97 to +2.64)	.69	−4.28 (−7.89 to −0.67)	.02	−1.60 (−3.53 to +0.33)	.10
Middle and high income	−0.29 (−4.90 to +4.31)	.90	−2.91 (−5.55 to −0.27)	.03	−1.37 (−4.25 to +1.50)	.35	−2.59 (−3.42 to −1.76)	<.001
Foregone or delayed medical care due to cost in the past 12 mo								
Overall	+0.46 (−2.04 to +2.97)	.72	+3.23 (+1.04 to +5.43)	.004	+2.30 (+0.51 to +4.09)	.01	+3.07 (+2.25 to +3.88)	<.001
Low income	−2.06 (−8.08 to +3.97)	.50	+0.70 (−2.85 to +4.24)	.70	+2.84 (−0.09 to +5.77)	.06	+3.52 (+1.43 to +5.61)	<.001
Middle and high income	+1.43 (−0.95 to +3.81)	.24	+5.83 (+3.10 to +8.56)	<.001	+2.20 (−0.08 to +4.47)	.06	+3.11 (+2.25 to +3.96)	<.001

[a] Data source is the National Health Interview Survey from years 1999 to 2018. Definitions of each outcome are shown in Study Outcomes in the Methods section. For change in prevalence: a positive sign (+) means the prevalence of such a measure increased and a negative sign (−) means it decreased. For all measures, a decrease in prevalence (negative sign) is a socially positive result (ie, increased percentage of people with insurance coverage, increased percentage of people with a usual source of care, increased percentage of people with recent health care utilization, reduced percentage of people with unmet medical needs due to cost, reduced percentage of people with poor or fair health status, reduced percentage of people with severe psychological distress, and reduced percentage of people with functional limitations). Of note, the Affordable Care Act was enacted in March 2010. Rates of each measure were adjusted for age, sex, and US region.

professional in the past year (20.7% [95% CI, 15.8%-26.5%] and 22.4% [95% CI, 19.8%-25.2%], respectively), whereas middle and high-income Black and White individuals had the lowest (10.0% [95% CI, 8.2%-12.1%] and 9.6% [95% CI, 9.0%-10.2%], respectively) (eFigure 6C and eTable 11B in the Supplement).

Foregone or Delayed Medical Care Due to Cost

In 1999, the estimated percentage of people who reported foregone or delayed medical care due to cost was 6.7% (95% CI, 5.0%-9.0%) among Asian individuals, 13.6% (95% CI, 12.3%-15.1%) among Black individuals, 12.1% (95% CI, 11.0%-13.3%)

Table 3. Relative Racial and Ethnic Differences in the Adjusted Prevalence of Health Status and Health Care Access, Utilization, and Affordability Measures in 1999 and 2018[a]

	Difference between Asian and White individuals				Difference between Black and White individuals				Difference between Latino/Hispanic and White individuals			
	Percentage points (95% CI)		Difference in difference		Percentage points (95% CI)		Difference in difference		Percentage points (95% CI)		Difference in difference	
	1999	2018	Percentage points (95% CI)	*P* value	1999	2018	Percentage points (95% CI)	*P* value	1999	2018	Percentage points (95% CI)	*P* value
Poor or fair health status												
Overall	+0.61 (−1.74 to +2.96)	−1.54 (−3.27 to +0.20)	−2.14 (−5.07 to +0.78)	.15	+8.29 (+6.57 to +10.02)	+6.03 (+4.23 to +7.83)	−2.26 (−4.75 to +0.23)	.08	+4.95 (+3.46 to +6.45)	+5.13 (+3.48 to +6.79)	+0.18 (−2.05 to +2.41)	.88
Low income	−0.47 (−8.39 to +7.46)	−8.04 (−12.64 to −3.45)	−7.57 (−16.74 to +1.59)	.11	+9.48 (+6.56 to +12.41)	+2.82 (−0.81 to +6.45)	−6.67 (−11.33 to −2.01)	.005	−0.24 (−2.75 to +2.27)	−1.71 (−4.98 to +1.56)	−1.47 (−5.59 to +2.66)	.49
Middle and high income	+0.06 (−3.26 to +3.38)	−0.29 (−2.04 to +1.47)	−0.35 (−4.11 to +3.41)	.86	+2.14 (+0.22 to +4.06)	+2.70 (+1.06 to +4.34)	+0.56 (−1.97 to +3.09)	.67	+3.24 (+1.54 to +4.95)	+3.59 (+1.84 to +5.34)	+0.34 (−2.09 to +2.78)	.78
Functional limitation												
Overall	−10.66 (−13.90 to −7.42)	−14.50 (−17.71 to −11.28)	−3.84 (−8.40 to +0.73)	.10	−0.26 (−2.49 to +1.97)	+0.35 (−2.57 to +3.28)	+0.61 (−3.07 to +4.29)	.74	−7.17 (−9.08 to −5.26)	−5.53 (−8.28 to −2.77)	+1.64 (−1.71 to +5.00)	.34
Low income	−17.65 (−24.84 to −10.46)	−21.96 (−29.34 to −14.59)	−4.31 (−14.62 to +5.99)	.41	−1.55 (−5.14 to +2.05)	−8.11 (−12.96 to −3.26)	−6.56 (−12.60 to −0.52)	.03	−16.94 (−20.28 to −13.59)	−19.71 (−23.80 to −15.62)	−2.77 (−8.06 to +2.51)	.30
Middle and high income	−9.30 (−13.24 to −5.35)	−13.18 (−16.61 to −9.75)	−3.89 (−9.11 to +1.34)	.15	−5.05 (−7.64 to −2.46)	−1.81 (−5.37 to +1.75)	+3.24 (−1.16 to +7.64)	.15	−5.88 (−8.40 to −3.37)	−4.50 (−8.04 to −0.95)	+1.38 (−2.96 to +5.73)	.53
Severe psychological distress												
Overall	−1.44 (−2.05 to −0.83)	−1.81 (−2.89 to −0.72)	−0.36 (−1.61 to +0.88)	.57	+0.77 (+0.15 to +1.39)	+0.55 (−0.63 to +1.72)	−0.22 (−1.55 to +1.11)	.75	+0.91 (+0.25 to +1.57)	+0.94 (−0.07 to +1.95)	+0.03 (−1.17 to +1.23)	.96
Low income	−3.27 (−5.19 to −1.35)	−5.42 (−7.79 to −3.04)	−2.15 (−5.20 to +0.91)	.17	+0.11 (−1.15 to +1.38)	−1.46 (−3.80 to +0.88)	−1.58 (−4.24 to +1.08)	.25	−0.65 (−1.75 to +0.45)	−2.20 (−4.00 to −0.40)	−1.55 (−3.66 to +0.56)	.15
Middle and high income	−1.02 (−1.81 to −0.24)	−0.95 (−2.22 to +0.31)	+0.07 (−1.42 to +1.56)	.93	−0.07 (−0.82 to +0.68)	−0.28 (−1.35 to +0.80)	−0.21 (−1.52 to +1.10)	.75	+0.56 (−0.30 to +1.41)	+0.68 (−0.60 to +1.96)	+0.12 (−1.41 to +1.66)	.87
Lack of health insurance at the time of interview												
Overall	+5.75 (+2.62 to +8.87)	+0.06 (−1.50 to +1.62)	−5.68 (−9.18 to −2.19)	.001	+5.21 (+3.75 to +6.67)	+3.03 (+1.73 to +4.33)	−2.18 (−4.13 to −0.23)	.03	+17.52 (+15.68 to +19.36)	+12.19 (+10.08 to +14.29)	−5.33 (−8.13 to −2.54)	<.001
Low income	+11.93 (+4.38 to +19.48)	−1.93 (−5.83 to +1.97)	−13.86 (−22.36 to −5.36)	.001	+1.53 (−1.21 to +4.27)	+0.67 (−1.78 to +3.12)	−0.86 (−4.54 to +2.82)	.65	+19.41 (+16.30 to +22.52)	+15.37 (+11.62 to +19.12)	−4.04 (−8.91 to +0.83)	.10
Middle and high income	+2.52 (−0.38 to +5.42)	+0.22 (−1.41 to +1.86)	−2.30 (−5.63 to +1.03)	.18	+1.93 (+0.43 to +3.44)	+1.78 (+0.35 to +3.20)	−0.16 (−2.23 to +1.92)	.88	+8.41 (+6.66 to +10.16)	+6.28 (+4.45 to +8.11)	−2.13 (−4.66 to +0.40)	.10

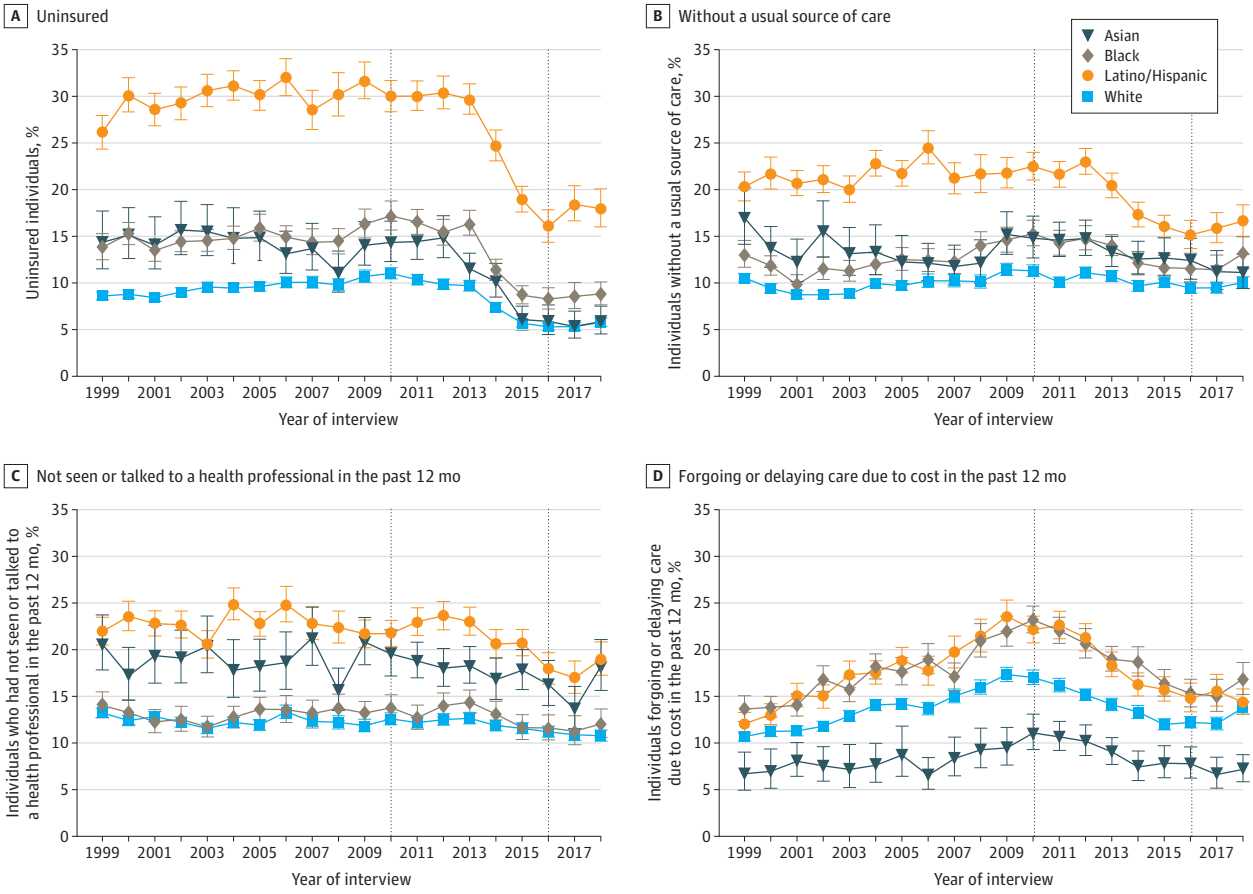
(continued)

Table 3. Relative Racial and Ethnic Differences in the Adjusted Prevalence of Health Status and Health Care Access, Utilization, and Affordability Measures in 1999 and 2018[a] (continued)

	Difference between Asian and White individuals				Difference between Black and White individuals				Difference between Latino/Hispanic and White individuals			
	Percentage points (95% CI)		Difference in difference		Percentage points (95% CI)		Difference in difference		Percentage points (95% CI)		Difference in difference	
	1999	2018	Percentage points (95% CI)	*P* value	1999	2018	Percentage points (95% CI)	*P* value	1999	2018	Percentage points (95% CI)	*P* value
No usual source of care at the time of interview												
Overall	+6.42 (+3.36 to +9.48)	+1.08 (−0.87 to +3.03)	−5.34 (−8.97 to −1.71)	.004	+2.47 (+0.96 to +3.98)	+3.10 (+1.28 to +4.93)	+0.63 (−1.74 to +3.00)	.60	+9.76 (+8.13 to +11.40)	+6.58 (+4.75 to +8.41)	−3.18 (−5.63 to −0.73)	.01
Low income	+15.28 (+7.55 to +23.00)	−0.47 (−5.18 to +4.24)	−15.75 (−24.80 to −6.70)	<.001	−0.06 (−2.49 to +2.38)	+1.28 (−1.82 to +4.37)	+1.34 (−2.60 to +5.28)	.51	+10.74 (+8.01 to +13.48)	+5.08 (+1.93 to +8.22)	−5.67 (−9.83 to −1.50)	.008
Middle and high income	+3.20 (+0.31 to +6.09)	+1.26 (−0.92 to +3.44)	−1.94 (−5.56 to +1.67)	.29	+1.25 (−0.53 to +3.03)	+1.20 (−0.92 to +3.32)	−0.05 (−2.82 to +2.72)	.97	+5.06 (+3.31 to +6.82)	+4.17 (+2.21 to +6.13)	−0.89 (−3.52 to +1.73)	.51
Not seen or talked to a health professional in the past 12 mo												
Overall	+7.35 (+4.35 to +10.35)	+7.44 (+4.65 to +10.24)	+0.09 (−4.01 to +4.20)	.97	+0.80 (−0.67 to +2.27)	+1.26 (−0.37 to +2.89)	+0.46 (−1.74 to +2.65)	.68	+8.68 (+7.11 to +10.26)	+8.18 (+6.27 to +10.09)	−0.51 (−2.98 to +1.97)	.69
Low income	+11.94 (+3.92 to +19.95)	+5.82 (+0.12 to +11.52)	−6.12 (−15.95 to +3.72)	.22	−1.11 (−3.67 to +1.46)	−0.17 (−3.02 to +2.67)	+0.93 (−2.89 to +4.76)	.63	+10.22 (+7.54 to +12.90)	+7.54 (+4.45 to +10.64)	−2.68 (−6.77 to +1.41)	.20
Middle and high income	+5.53 (+2.20 to +8.86)	+7.83 (+4.55 to +11.11)	+2.30 (−2.38 to +6.98)	.34	+0.67 (−1.17 to +2.52)	+0.36 (−1.70 to +2.42)	−0.31 (−3.08 to +2.45)	.82	+5.30 (+3.37 to +7.23)	+6.52 (+4.24 to +8.80)	+1.22 (−1.77 to +4.21)	.43
Foregone or delayed medical care due to cost in the past 12 mo												
Overall	−3.97 (−6.06 to −1.88)	−6.58 (−8.18 to −4.97)	−2.61 (−5.24 to +0.03)	.05	+2.94 (+1.48 to +4.41)	+3.10 (+1.28 to +4.93)	+0.16 (−2.18 to +2.50)	.89	+1.39 (+0.16 to +2.63)	+0.62 (−0.91 to +2.15)	−0.77 (−2.73 to +1.20)	.44
Low income	−8.87 (−13.94 to −3.80)	−14.45 (−18.32 to −10.58)	−5.58 (−11.96 to +0.80)	.09	−0.19 (−2.91 to +2.54)	−3.01 (−6.10 to +0.07)	−2.83 (−6.94 to +1.29)	.18	−5.28 (−7.52 to −3.05)	−5.97 (−8.79 to −3.15)	−0.68 (−4.28 to +2.92)	.71
Middle and high income	−3.20 (−5.02 to −1.37)	−4.87 (−6.62 to −3.12)	−1.68 (−4.21 to +0.85)	.19	−0.09 (−1.63 to +1.45)	+2.63 (+0.22 to +5.04)	+2.72 (−0.14 to +5.58)	.06	+0.72 (−0.77 to +2.21)	−0.19 (−2.12 to +1.73)	−0.91 (−3.34 to +1.52)	.46

[a] Data source is the National Health Interview Survey from years 1999 to 2018. Definitions of each outcome are shown in Study Outcomes in the Methods section. For all measures, a negative sign in any 1 year indicates a more socially positive result in comparison with the White population (ie, increased percentage of people with insurance coverage, increased percentage of people with a usual source of care, increased percentage of people with recent health care utilization, reduced percentage of people with unmet medical needs due to cost, reduced percentage of people with poor or fair health status, reduced percentage of people with severe psychological distress, and reduced percentage of people with functional limitations). Likewise, a difference-in-difference result that is negative indicates a socially positive change in comparison with the White population over the same timeframe. Of note, the Affordable Care Act was enacted in March 2010. Rates of each measure were adjusted for age, sex, and US region.

Figure 3. Trends of Self-reported Health Care Access, Utilization, and Affordability Measures by Race and Ethnicity, 1999-2018



Data source is the National Health Interview Survey from years 1999 to 2018. Rates are adjusted for age, sex, and US region using logistic regression, with 95% CIs shown with error bars. Definitions of each outcome are shown in Study Outcomes in the Methods section. The median annual numbers of adults included in the study by race and ethnicity were 1301 (IQR, 911-1815) non-Hispanic Asian, 4355 (IQR, 3843-4589) non-Hispanic Black, 5325 (IQR, 4212-5603) Latino/Hispanic, and 20 290 (IQR, 16 919-20 961) non-Hispanic White. The annual number and weighted proportion of individuals included in the study population are shown in eFigure 1 in the Supplement.

For these measures, rather than assuming a monotonic relationship between time and outcome rates, time was modeled as a linear spline with knots at 2010 and 2016 (dotted vertical lines) to reflect the observed inflection points of foregone or delayed medical care due to cost and health insurance coverage. Of note, the Affordable Care Act was enacted in March 2010. The annualized rate of change of each outcome during each of the 3 time periods is presented in eTable 8 in the Supplement. The income-stratified results for these measures are presented in eFigure 6 in the Supplement.

among Latino/Hispanic individuals, and 10.7% (95% CI, 10.2%-11.2%) among White individuals (Figure 3D; eTable 12A in the Supplement). From 1999 to 2018, the estimated prevalence of foregone or delayed care due to cost increased among Black, Latino/Hispanic, and White individuals ($P = .004$, $P = .01$, and $P < .001$, respectively) (Table 2); however, there was no statistically significant change in the estimated differences between racial and ethnic groups ($P \geq .05$ for each group) (Table 3). During this time, Black and White individuals with low income had the highest estimated rates of foregone or delayed care due to cost (21.0% [95% CI, 18.7%-23.4%] and 21.1% [95% CI, 19.9%-22.4%] in 1999 and 21.6% [95% CI, 19.2%-24.3%] and 24.7% [95% CI, 23.0%-26.3%] in 2018, respectively), while Asian individuals with middle and high income had the lowest (4.5% [95% CI, 3.1%-6.5%] in 1999 and 5.9% [95% CI, 4.6%-7.7%] in 2018) (eFigure 6D and eTable 12B in the Supplement).

The trends in race and ethnicity differences in these measures of health care access, utilization, and affordability using the autoregressive models were consistent with the main analyses (eTable 13 in the Supplement).

Discussion

In this US nationally representative serial cross-sectional study, from 1999 to 2018, racial and ethnic differences in health status, access, and affordability improved in some subgroups, but largely persisted. The main findings were for health status, which had significant differences between Black and White individuals that persisted over time.

Self-rated health status is associated with comorbidity burden—including physical functional status—and lower self-rated health is associated with increased mortality.[25,26]

Research has shown that Black, Latino/Hispanic, and American Indian individuals have worse self-rated health.[27] The current study found that between 1999 and 2018, there had been no significant decrease in the percentage of people reporting poor or fair health across any racial and ethnic subgroup, and Black individuals consistently had the highest rates. Odlum and colleagues,[28] with a different analysis that used the Behavioral Risk Factor Surveillance System from 1999 to 2018, had results that were broadly consistent although they did not examine income. These stagnant trends in self-reported health status prevalence and racial and ethnic differences, especially while health care costs are rising, are of concern.

Over the 20-year study period, functional limitations and severe psychological distress significantly increased for all groups. Though previous studies have described these trends by race and ethnicity, most have focused on shorter time frames, which limits detailed evaluation of the progress made. For example, Mojtabai et al[29] found no significant trends in the percentage of people reporting severe psychological distress between 2001 and 2012, whereas Olfson et al[30] reported a significant decline in severe psychological distress between 2004 and 2015.

Racial and ethnic differences in health care access and affordability were also noted in 2018, though there were some improvements in the racial and ethnic gaps over time. Even after the Affordable Care Act was implemented, affordability of health care appeared to have not substantially improved from what it was in 1999.

These findings may have important implications. Despite a wide variety of health care and social policies and markedly increased health care spending,[31] health inequities persisted with modest evidence of progress. Structural factors in US society, including systemic racism and barriers associated with citizenship status, can contribute to such inequities.[32-35] Other approaches to address historical racial and ethnic segregation and differences in income, education, and other nonmedical determinants of health in the US may be needed.

Limitations

This study has several limitations. First, this study was focused on the perspectives of those surveyed and did not include any other triangulating measures of health status, access, or affordability. Though these self-reported outcomes have been extensively used in previous studies,[12,15,18,19,21,22] there are limited data indicating their validity. Second, self-reports of health may be influenced by other factors, such as overall happiness. However, self-rated health has been shown to be a good predictor of morbidity, health care utilization, and mortality.[15,36] Third, nonresponse rates could bias the results and the NHIS does not provide data on nonresponse rates stratified by race and ethnicity, though the NHIS has several strategies to mitigate the bias. Fourth, the study primarily focused on large racial and ethnic group categories and did not examine subgroups within the non-Hispanic Asian and the Latino/Hispanic groups, in which patterns could differ and whose distribution could have changed during the study period.[37] Fifth, considering the number of statistical comparisons in this study, some of the significant associations may represent type I error.

Conclusions

In a serial cross-sectional survey study of US adults from 1999 to 2018, racial and ethnic differences in self-reported health status, access, and affordability improved in some subgroups, but largely persisted.

ARTICLE INFORMATION

Accepted for Publication: June 1, 2021

Author Affiliations: Center for Outcomes Research and Evaluation, Yale New Haven Hospital, New Haven, Connecticut (Mahajan, Caraballo, Lu, Massey, Annapureddy, Murugiah, Krumholz); Section of Cardiovascular Medicine, Department of Internal Medicine, Yale School of Medicine, New Haven, Connecticut (Mahajan, Caraballo, Lu, Annapureddy, Murugiah, Herrin, Krumholz); Division of Cardiovascular Prevention and Wellness, Houston Methodist DeBakey Heart and Vascular Center, Houston, Texas (Valero-Elizondo, Nasir); Center for Outcomes Research, Houston Methodist Research Institute, Houston, Texas (Valero-Elizondo, Nasir); Section of General Internal Medicine, Department of Internal Medicine, Yale School of Medicine, New Haven, Connecticut (Roy, Onuma); Department of Chronic Disease Epidemiology, Yale School of Public Health, New Haven, Connecticut (Roy); Department of Pediatrics, University of Cincinnati College of Medicine, Cincinnati, Ohio (Riley); Division of Critical Care Medicine, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio (Riley); Equity Research and Innovation Center, Section of General Internal Medicine, Yale School of Medicine, New Haven, Connecticut (Nunez-Smith); Department of Radiology and Biomedical Imaging, Yale School of Medicine, New Haven, Connecticut (Forman); Department of Health Policy and Management, Yale School of Public Health, New Haven, Connecticut (Forman, Krumholz).

Author Contributions: Drs Caraballo and Mahajan had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Drs Mahajan and Caraballo contributed equally as co-first authors.
Concept and design: Mahajan, Caraballo, Valero-Elizondo, Massey, Onuma, Nunez-Smith, Herrin, Krumholz.
Acquisition, analysis, or interpretation of data: Mahajan, Caraballo, Lu, Annapureddy, Roy, Riley, Murugiah, Forman, Nasir, Herrin, Krumholz.
Drafting of the manuscript: Mahajan, Caraballo, Annapureddy, Riley.
Critical revision of the manuscript for important intellectual content: Mahajan, Lu, Valero-Elizondo, Massey, Annapureddy, Roy, Riley, Murugiah, Onuma, Nunez-Smith, Forman, Nasir, Herrin, Krumholz.
Statistical analysis: Mahajan, Caraballo, Herrin.
Administrative, technical, or material support: Mahajan, Massey, Annapureddy, Krumholz.
Supervision: Nunez-Smith, Krumholz.

Conflict of Interest Disclosures: Dr Lu reported grants from the National Heart, Lung, and Blood Institute (K12HL138037) and the Yale Center for Implementation Science outside the submitted work. She was a recipient of a research agreement, through Yale University, from the Shenzhen Center for Health Information for work to advance intelligent disease prevention and health promotion. Dr Roy reported being a consultant for the Institute for Healthcare Improvement. Dr Riley reported receiving personal fees from Heluna Health and the Institute for Healthcare Improvement outside the submitted work. Dr Murugiah reported working under contract with the Centers for Medicare & Medicaid Services to support quality measurement programs. Dr Nunez-Smith reported receiving speaker fees from Genentech outside the submitted work. Dr Nasir reported serving on advisory boards of Amgen, Novartis, and The Medicines Company; and his research is partly supported by the Jerold B. Katz Academy of Translational Research. Dr Krumholz reported receiving personal fees from UnitedHealth, IBM Watson Health, Element Science, Aetna, Facebook, Siegfried & Jensen Law Firm, Arnold & Porter Law Firm, Martin/Baughman Law Firm, National Center for Cardiovascular Diseases in Beijing, and F-Prime; contracts from the

Centers for Medicare & Medicaid Services, through Yale New Haven Hospital, to develop and maintain measures of hospital performance; and grants from Medtronic, the US Food and Drug Administration, Johnson & Johnson, Foundation for a Smoke-Free World, State of Connecticut Department of Public Health, and the Shenzhen Center for Health Information outside the submitted work. He is a co-founder of Refactor Health and HugoHealth. No other disclosures were reported.

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JAMA Health Forum™

Research Letter

Analysis of Publicly Funded Reinsurance—Government Spending and Insurer Risk Exposure

Maria Polyakova, PhD; Vinayak Bhatia, BA; M. Kate Bundorf, PhD, MBA, MPH

Introduction

States have received approval from the Centers for Medicare & Medicaid Services to operate publicly financed reinsurance programs through section 1332 state innovation waivers.[1] Reinsurance—insurance for insurers—protects insurers from the risk of unusually high enrollee spending.[2] Publicly financed risk protection for insurers can both promote insurer participation in markets and reduce their incentives to avoid high-risk enrollees.[3] In this study, we compare the design of section 1332 reinsurance policies across states based on their potential for reducing insurer risk exposure and likely level of government spending.

Methods

We used an algorithm (eAppendix in the Supplement) to simulate 12 operational state-based reinsurance programs, 3 federal reinsurance policies adopted as part of the Affordable Care Act, and 2 benchmark commercial stop-loss policies for a standardized population (**Table**[1]).[4] We examined 2 metrics for each program: (1) total government spending on reinsurance claims and average insurer liability (the sum of government spending and insurer liability is a constant), and (2) insurer risk exposure, measured by the coefficient of variation—the standard deviation divided by the mean of per-enrollee insurer liability. Because this study did not meet the definition of human subjects research as defined by the Common Rule (45 CFR §46), it was not reviewed by an institutional review board.

Table. Parameters and Timeline of the Simulated Reinsurance Programs[a]

Reinsurance program	Reinsurance parameters	Approval date	Implementation year
Federal reinsurance policy			
2014	100% Of claims $45 000-$250 000	NA	2014
2015	55.1% Of claims $45 000-$250 000	NA	2015
2016	52.9% Of claims $90 000-$250 000	NA	2016
Alaska	100% Of paid claims of individuals with 1 of 33 conditions	7/7/17	2018
Colorado	Either 45%, 50%, or 85% of claims $30 000-$400 000, depending on the rating area	7/31/19	2020
Delaware	75% Of claims $65 000-$215 000	8/20/19	2020
Maine	90% Of claims between $47 000-$77 000 and 100% afterward; insurers must cede policies	7/30/18	2019
Maryland	80% Of claims $20 000-$250 000	8/22/18	2019
Minnesota	80% Of claims $50 000-$250 000	9/22/17	2018
Montana	60% Of claims $40 000-$101 750	8/16/19	2020
New Jersey	60% Of claims $40 000-$215 000	8/16/18	2019
North Dakota	75% Of claims $100 000-$1 000 000	7/31/19	2020
Oregon	50% Of claims $95 000-$1 000 000	10/19/17	2018
Rhode Island	50% Of claims $40 000-$97 000	8/26/19	2020
Wisconsin	50% Of claims $50 000-$250 000	7/29/18	2019
Commercial individual stop-loss	100% Of claims ≥$250 000	NA	NA

Abbreviation: NA, not applicable.

[a] The Table records reinsurance programs that were simulated in the article. Reinsurance coverage parameters, approval dates, and implementation dates are listed elsewhere.[1]

+ Invited Commentary

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

Results

Each program was associated with greater government spending, lower insurer liability, and greater insurer risk protection compared with no reinsurance (**Figure**). Large differences existed, however, across programs. State and federal reinsurance policies were far from the frontier, defined as a policy that achieves the maximum simulated risk protection for insurers for a given level of public funding. The frontier policy is full insurance above an attachment point.

While program parameters differed across states, they resulted in remarkably similar—and relatively low—simulated insurer risk protection (Figure). The coefficient of variation fell below 4.0 for only 4 states. In most states, insurer risk protection could have been greater for the same level of government spending. For example, Delaware and North Dakota's programs were associated with similar levels of government spending, yet North Dakota's was associated with greater insurer risk protection. Conversely, Rhode Island and Maryland's programs were associated with similar insurer risk protection, yet Maryland's was associated with substantially higher government spending.

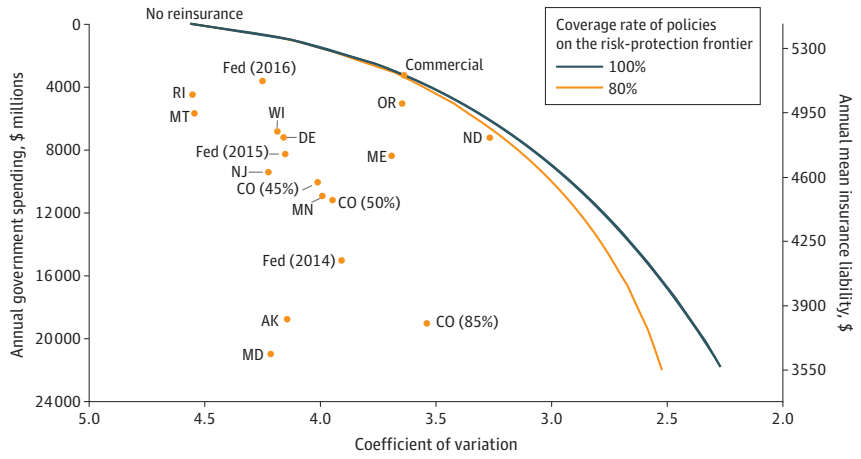
Discussion

Results of this analysis showed that states could modify their reinsurance programs to maintain their level of spending and increase insurer risk protection, strengthening incentives for insurer entry and reducing incentives to avoid high risks. However, greater insurer risk protection has possible downsides. States may not be better positioned to bear catastrophic risk than private reinsurers and may be reluctant to crowd out private reinsurance, a market that has recently been revived by the elimination of the lifetime cap on covered expenditures. More comprehensive reinsurance could also increase spending by reducing incentives for insurers to manage care for the sickest patients.

Public spending on reinsurance can also indirectly subsidize insurance for consumers. Indeed, lowering premiums, particularly for higher-income exchange enrollees who do not receive income-based subsidies, was one of the explicit objectives of reinsurance programs. However, the American Rescue Plan has extended direct premium subsidies to more families, reducing the size of this population by more than 50%.[5] The relative costs and benefits of spending public dollars through direct premium subsidies and publicly funded reinsurance are an open question. A general concern in both cases is whether government-financed payments ultimately reach consumers. Limited insurer competition may lead to limited pass-through of any subsidies to consumers.[6]

A limitation of this study is that it does not provide empirical evidence on the effects of reinsurance programs. Instead, we provide insights into the trade-offs facing policy makers when considering whether and how to provide publicly financed reinsurance.

Figure. Trade-off Between Risk Protection for Insurers and Public Spending



The Figure plots annual government spending against coefficient of variation in insurer liability for each of the simulated reinsurance policies. The lines trace the risk protection that the government could provide for each level of annual public spending if public reinsurance contracts followed the commercial structure with either 80% (dark blue) or 100% (orange) coinsurance rates. Axes are reversed to represent the trade-offs that policy makers face. The association between the mean insurer liability and government spending is mechanical in the simulation because the sum of the 2 is fixed in each simulation. As the government spends more, insurer liability falls. Fed indicates federal reinsurance policy; the Fed and states' positions on the graph and the Colorado (CO) percentages are detailed in the Table.

ARTICLE INFORMATION

Accepted for Publication: June 11, 2021.

Published: August 13, 2021. doi:10.1001/jamahealthforum.2021.1992

Corresponding Author: Maria Polyakova, PhD, School of Medicine, Stanford University, 615 Crothers Way, Stanford, CA 94305 (mpolyak@stanford.edu).

Author Affiliations: School of Medicine, Stanford University, Stanford, California (Polyakova); National Bureau of Economic Research, Cambridge, Massachusetts (Polyakova, Bundorf); Carnegie Mellon University, Pittsburgh, Pennsylvania (Bhatia); Sanford School of Public Policy, Duke University, Durham, North Carolina (Bundorf).

Author Contributions: Drs Polyakova and Bundorf had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: Polyakova, Bundorf.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Polyakova, Bhatia.

Critical revision of the manuscript for important intellectual content: Polyakova, Bundorf.

Statistical analysis: Polyakova, Bhatia.

Obtained funding: Polyakova.

Administrative, technical, or material support: Polyakova, Bundorf.

Supervision: Polyakova, Bundorf.

Conflict of Interest Disclosures: None reported.

Funding/Support: This work was funded by the National Institute for Health Care Management (73782).

Role of the Funder/Sponsor: The National Institute for Health Care Management had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Additional Contributions: We thank the National Bureau of Economic Research for providing data storage and computing support, as well as access to the MarketScan claims database. No compensation was provided for any contributions.

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SUPPLEMENT.

eAppendix. Supplemental materials.

JAMA Health Forum™

Invited Commentary

Individual Health Insurance Market Reinsurance After the Passage of the American Rescue Plan Act

Coleman Drake, PhD; David Anderson, MS

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The American Rescue Plan (ARP) Act of 2021 created the largest changes to the Affordable Care Act's health insurance marketplaces since they were originally implemented in 2014. Chief among these changes is the extension of premium tax credit subsidies to families with incomes above 400% of the federal poverty level ($106 000 for a 4-member family in 2021[1]). Prior to the passage of the ARP by Congress and signed by President Biden in March 2021, such families could face marketplace premiums equal to a quarter of household income or higher. With the passage of the ARP, those premiums are now capped at 8.5% of household income.[2]

Under the previous 2 administrations, policy makers provided relief to families without premium subsidies by implementing reinsurance programs. Two forms of reinsurance exist for individual health plans sold on and off of the marketplaces. The first is a national, catastrophic reinsurance program run by the Centers for Medicare & Medicaid Services that pays 40% of claims in excess of $1 million. This program reduces insurers' risks of covering costly enrollees at a national level, which is particularly beneficial in small states where a few costly enrollees can considerably increase the mean enrollee's health care expenditures. The second form of reinsurance is a set of state-run programs examined by Polyakova and colleagues[3] in this issue of *JAMA Health Forum* that are authorized through the section 1332 waiver process under the Affordable Care Act. Both programs partially offset insurers' claims costs, which allows insurers to lower their premiums.[4] Prior to the ARP, these reductions in premiums increased marketplace plan affordability for enrollees without premium subsidies. By reducing risk to insurers, reinsurance programs also could theoretically increase insurer participation in the marketplaces; however, the literature has not yet demonstrated a causal linkage between reinsurance and marketplace insurer participation.

The ARP's enhanced premium subsidies undercut the logic of state-based reinsurance programs by capping benchmark marketplace premiums at 8.5% of household income for families with incomes above 400% of the federal poverty level. Capping premiums means that premium levels no longer determine the affordability of marketplace plans for these enrollees. While state-based reinsurance programs still reduce premium levels, the expansion of premium subsidies to households means that the ARP severs the relationship between marketplace premium levels and marketplace premium affordability for nearly all enrollees. The premium of the benchmark plan facing previously unsubsidized households now equals 8.5% of their household income; it does not vary with premiums as set by insurers.

Redesigned and more efficient state-based reinsurance programs may still be of use to policy makers under the ARP, as illustrated by Polyakova and colleagues.[3] Risk adjustment is imperfect; there will always be idiosyncratically costly enrollees whose claims are unlikely to be captured by risk-adjustment algorithms (eg, enrollees with rare genetic diseases or those whose treatment costs are far above average). Even with good but imperfect risk adjustment, insurers may have a strong incentive to avoid geographic areas where such enrollees live.[5] Reinsurance can reduce insurers' risk of participating in markets with idiosyncratic, residual costs.[6] Reinsurance can thus act as a complement to risk adjustment in that it helps reduce variance associated with catastrophic costs, whereas risk adjustment reduces risks associated with predictable costs.

If the enhanced subsidies of the ARP are made permanent, states will have the opportunity to reconsider how the section 1332 waiver process can be used to generate revenue to expand

marketplace affordability in creative ways, such as redesigned premium subsidies, lowered cost-sharing, and automatic reenrollment and retention programs.[7,8] However, if the enhanced subsidies of the ARP expire in 2023 as currently planned, a better understanding of how to improve existing state-based reinsurance programs is needed. More cost-effective reinsurance programs could further improve affordability for unsubsidized enrollees without increasing the burden on states' budgets. Policy makers thus are faced with a great deal of uncertainty in modifying state-based reinsurance programs—the path forward is entirely dependent on the future of the ARP's enhanced premium subsidies.

ARTICLE INFORMATION

Published: August 13, 2021. doi:10.1001/jamahealthforum.2021.1614

Corresponding Author: Coleman Drake, PhD, Department of Health Policy and Management, Graduate School of Public Health, University of Pittsburgh, 130 DeSoto St, Pittsburgh, PA 15261 (cdrake@pitt.edu).

Author Affiliations: Department of Health Policy and Management, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, Pennsylvania (Drake); Margolis Center for Health Policy, Duke University, Durham, North Carolina (Anderson).

Conflict of Interest Disclosures: Dr Drake reported grants from the National Institute for Health Care Management outside of the submitted work. Mr Anderson reported grants from the National Institute of Health Care Management for outside of the submitted work.

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Citizen Children with Noncitizen Parents Experienced Health Insurance Coverage Losses between 2016 and 2019

Jennifer M. Haley, Genevieve M. Kenney, Robin Wang, and Clare Wang Pan

By 2016, children's uninsurance had fallen to a historic low, following decades of expansions of eligibility for Medicaid and the Children's Health Insurance Program (CHIP), simplifications to such programs' enrollment and renewal processes, and investments in outreach, as well as implementation of the coverage provisions of the Affordable Care Act (ACA) in 2014.[1] Some of these efforts were also targeted toward children in immigrant families, and gaps in uninsurance and Medicaid/CHIP participation between citizen children with and without noncitizen parents narrowed substantially between 2008 and 2016.[2]

However, federal immigration policy shifts beginning in 2017, including proposed expansion of the "public charge" rule to include use of noncash benefits (e.g., nonemergency Medicaid) in applications for lawful permanent residence,[3] deterred some immigrant families from using public programs out of fear of immigration-related consequences. These chilling effects occurred even before the rule was implemented and even if the rule did not apply to a family's members, including children.[4] Simultaneously, the federal government reduced spending on ACA outreach and enrollment assistance and placed new restrictions on Medicaid enrollment. In this fact sheet, we analyze uninsurance and Medicaid/CHIP participation among citizen children living with one or more noncitizen parents from 2016 to 2019, building on our analysis of overall coverage trends among children and parents over that period.[5]

Findings

Uninsurance among citizen children with noncitizen parents rose from 6.0 to 8.0 percent between 2016 and 2019 (figure 1).[6] This increase reversed much of the coverage gains they had experienced between 2013 and 2016 and was larger than that for citizen children with only citizen parents.

The Medicaid/CHIP participation rate among eligible citizen children with noncitizen parents fell from 93.1 to 90.8 percent, likely contributing to these children's increase in uninsurance. Citizen children with noncitizen parents faced a larger decline in Medicaid/CHIP participation than citizen children with only citizen parents (−2.3 percentage points versus −1.2 percentage points).

These changes widened coverage gaps for citizen children with noncitizen parents relative to other citizen children; in 2019, 8.0 percent were uninsured, a rate twice that for citizen children with only citizen parents (4.0 percent). Medicaid/CHIP participation gaps also grew; citizen children with noncitizen parents' participation rate was 90.8 percent in 2019, compared with 92.7 percent for those with only citizen parents.

Policy Implications

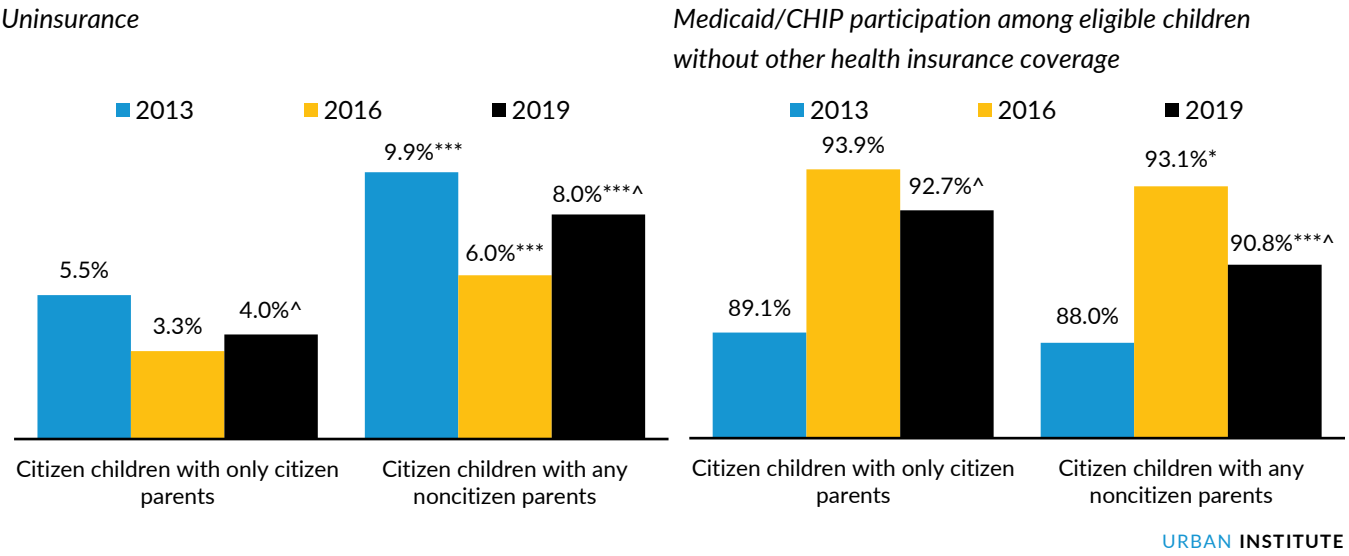
Increases in uninsurance and declines in Medicaid/CHIP participation among citizen children with noncitizen parents from 2016 to 2019 align with findings that the public charge rule and related concerns caused immigrant families to avoid public programs for fear of immigration consequences over that period. This included not

enrolling citizen children in Medicaid/CHIP, though their eligibility was unchanged by the rule and their participation in Medicaid/CHIP would not have affected their parents' immigration statuses.

Though the expanded public charge rule has been rescinded nationwide, these results highlight the importance of communicating to immigrant families that enrolling eligible children in Medicaid/CHIP will not risk their family's immigration status. Maintaining coverage and access to needed health care for children in immigrant families is especially critical during the pandemic, given the adverse economic and health fallout that has resulted.[7]

FIGURE 1

Uninsurance and Medicaid/CHIP Participation among Citizen Children, by Parents' Citizenship Status, 2013, 2016, and 2019



Source: Urban Institute analysis of 2013–19 American Community Survey (ACS) data from the Integrated Public Use Microdata Series.
Notes: CHIP = Children's Health Insurance Program. Children are ages 18 and younger. Estimates are adjusted for potential misreporting of coverage on the American Community Survey. See Haley and colleagues (2021) for definitions of uninsurance and Medicaid/CHIP eligibility. All estimates for 2016 and 2019 are significantly different from 2013 estimates at the 0.01 level.
*/**/*** Estimate for citizen children with noncitizen parents is statistically different from that for citizen children with only citizen parents at the 0.10/0.05/0.01 level.
^ Estimate for 2019 is significantly different from 2016 estimate at the 0.01 level.

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This work was funded by the David and Lucile Packard Foundation. The views expressed are those of the authors and should not be attributed to the Urban Institute, its trustees, or its funders. Further information on the Urban Institute's funding principles is available at urban.org/fundingprinciples.

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THE AFFORDABLE CARE ACT AFTER A DECADE: INDUSTRIAL ORGANIZATION OF THE INSURANCE EXCHANGES

Benjamin R. Handel
Jonathan T. Kolstad

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NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 2021

This paper was produced as an invited manuscript for the Annual Review of Economics, Volume 14, to be published in 2022 with DOI https://doi.org/10.1146/annurev-economics-051420-114714. We thank Sofya Shchukina for valuable research assistance. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

The Affordable Care Act After a Decade: Industrial Organization of the Insurance Exchanges
Benjamin R. Handel and Jonathan T. Kolstad
NBER Working Paper No. 29178
August 2021
JEL No. G22,H2,I11,I13

ABSTRACT

The regulated insurance exchanges set up in the Affordable Care Act (ACA) were designed to deliver affordable, efficient health coverage through private insurers. It is crucial to study the complex industrial organization (IO) of these exchanges in order to assess their impacts to date, during the first decade of the ACA, and in order to project their impacts going forward. We revisit the inherent market failures in health care markets that necessitate key ACA exchange regulations and investigate whether they have succeeded in their goals of expanding coverage, creating robust marketplaces, providing product variety, and generating innovation in health care delivery. We discuss empirical IO research to date and also highlight shortcomings in the existing research that can be addressed moving forward. We conclude with a discussion of IO research-based policy lessons for the ACA exchanges and, more generally, for managed competition of private insurance in health care.

Benjamin R. Handel
Department of Economics
University of California, Berkeley
508-1 Evans Hall #3880
Berkeley, CA 94720
and NBER
handel@berkeley.edu

Jonathan T. Kolstad
Haas School of Business
University of California, Berkeley
Berkeley, CA 94720
and NBER
jkolstad@berkeley.edu

The Affordable Care Act After a Decade: Industrial Organization of the Insurance Exchanges*

Ben Handel† Jonathan Kolstad ‡

August 17, 2021

Abstract

The regulated insurance exchanges set up in the Affordable Care Act (ACA) were designed to deliver affordable, efficient health coverage through private insurers. It is crucial to study the complex industrial organization (IO) of these exchanges in order to assess their impacts to date, during the first decade of the ACA, and in order to project their impacts going forward. We revisit the inherent market failures in health care markets that necessitate key ACA exchange regulations and investigate whether they have succeeded in their goals of expanding coverage, creating robust marketplaces, providing product variety, and generating innovation in health care delivery. We discuss empirical IO research to date and also highlight shortcomings in the existing research that can be addressed moving forward. We conclude with a discussion of IO research-based policy lessons for the ACA exchanges and, more generally, for managed competition of private insurance in health care.

1 Introduction

The Affordable Care Act (ACA) was a generational change in health policy as well as one of the most politically divisive issues in recent U.S. history. At its heart, the ACA leverages the development of insurance markets to achieve the

*This paper was produced as an invited manuscript for the Annual Review of Economics, Volume 14, to be published in 2022 with DOI https://doi.org/10.1146/annurev-economics-051420-114714

†UC Berkeley and NBER, handel@berkeley.edu

‡UC Berkeley and NBER, jkolstad@berkeley.edu

goals of expanding insurance coverage to near-universal levels and facilitating cost-reducing and quality-enhancing innovation in health care delivery. Accomplishing these twin aims depends critically on creating appropriate incentives, regulatory structures and market designs. Accordingly, industrial organization (IO) questions lie at the heart of both evaluating the ACA over its first 10 years and identifying avenues for improving upon it going forward.

In this piece we analyze and interpret some of the central research findings that relate to IO and the ACA. A comprehensive assessment of the implications of the ACA, even limiting ourselves to one corner of economics, is beyond the scope of this article. Instead, we focus our attention on a subset of issues where we believe critical questions that have captured the attention of IO economists have an important role to play in understanding the experience of the ACA to date and ways to improve upon it in the future. While the ACA is a wide-ranging, multi-faceted law, we concentrate our attention on one particular aspect: the operation of the ACA exchanges, and the non-group insurance market more generally.

The exchanges are a centerpiece of the ACA and represent a valuable case study for considering the application of IO tools to manage competition in health insurance markets. Appropriately designing and supporting competition is the central issue facing any market-based health care system, making insights from evaluating the ACA exchanges valuable beyond the ACA context itself (Arrow (1963), Enthoven (1993)). Some of the specific IO topics we emphasize include (i) facilitating price competition in insurance markets through subsidy and product regulation (ii) contending with adverse selection without exacerbating reclassification risk (iii) consumer choice frictions and market function and (iv) insurer entry and product innovation.

In order to put these IO questions in the appropriate context, we begin by asking why regulation in general, and the ACA specifically, was introduced to facilitate market function in the health insurance market. For example, was the individual mandate necessary? What role do subsidies play in market function? How effective were risk sharing policies (e.g., risk adjustment)? These questions are central to understanding the effectiveness of the exchanges and also have broader implications for understanding selection markets where firm costs depend directly on which type of consumers purchase a product. We present a conceptual discussion of these issues and then investigate the burgeoning empirical evidence on these key questions.

In addition to studying the ACA regulations that are tailor-made to en-

sure effective insurance market function, we discuss the potential benefits from facilitating competitive insurance markets (as opposed, e.g., to a single-payer system). These more traditional IO questions include, (i) how competitive have the ACA exchanges been? (ii) did competition lower prices? (iii) did competition improve variety? and (iv) did the competitive landscape lead to innovation in insurance or health care delivery? For the first three questions, we present some motivating empirical cases and cover the evidence available to date. For the latter question — one we argue is central to the rationale for relying on market-based provision of insurance — we discuss the limited research to date and highlight insurer product innovation as a key understudied area where there is significant room for new impactful research going forward.

The remainder of this article proceeds as follows. Section 2 discusses the IO underpinnings of ACA exchange market design. Section 3 discusses existing conceptual and empirical IO research on the ACA exchanges, with an emphasis on the specific regulations that relate to selection markets. Section 4 focuses on the classical IO questions of product entry and innovation with the goal of assessing the benefits from competitively provided insurance. Section 5 concludes with discussions of (i) how existing research informs ACA modifications going forward and (ii) how new research can fill in our knowledge gaps on the industrial organization of the ACA.

2 Health Insurance Market Design and the ACA

We begin by revisiting the features that make health care markets unique (Arrow (1963)). Typical textbook product markets require little regulation to efficiently allocate products to consumers. Production costs and pricing strategies determine market supply and consumer willingness-to-pay determines demand. In a free market, supply and demand equilibrate and consumers who value products more than the cost of their production purchase them.

In contrast, there are at least three key ways that health insurance markets differ from typical product markets:

1. **Consumer Right to Health Care and Affordability:** in a typical product market, if consumers cannot afford to buy the product, then they are not able to access it. Health care is almost universally viewed as an intrinsic "right" for consumers to have access to. If consumers cannot afford the price of health care services, in many cases, society wants to

find a way to fund those services. This motivates the existence, e.g., of Medicaid for low-income consumers, subsidies in the ACA health insurance exchanges, and policies that require hospitals to treat patients who show up at the emergency department, regardless of their ability to pay. Thus, while economists often neglect underlying moral arguments or imperatives, market regulation and market function are inextricably linked to the need to provide basic health care to all individuals in society.

2. **Adverse Selection:** In a typical product market, firm production costs are completely independent of the characteristics of consumers purchasing the product. This is not true in health insurance, where the health status of the person purchasing insurance directly determines insurer costs.

   This issue manifests in a variety of ways in health insurance markets. First, consumers purchasing insurance may have asymmetric information and know more about their health risk than insurers (see e.g., Arrow (1963)). This can lead to market unravelling where high cost consumers purchase more generous insurance, driving up prices and in turn making the product attractive to only very high cost consumers. This further increases prices again, potentially leading to an unravelling in the market for generous insurance where healthier consumers who want greater risk protection cannot obtain it because they do not want to pay the cost to pool with sicker consumers (see, e.g., Akerlof (1970), Rothschild and Stiglitz (1976), Cutler and Reber (1998), Cutler and Zeckhauser (2000)).

   Second, in health insurance markets affordability and the desire to remove long-run premium risk necessitates regulation prohibiting or severely limiting price discrimination. If affordability were not a concern, market regulators could potentially remove issues related to adverse selection by allowing price discrimination based on individual-level projected costs (see, e.g., Handel et al. (2015)). However, in practice, when health insurance contracts are one year in duration, as is typical, it is generally better for both efficiency and equity to limit price discrimination.

   This, in turn, can generate adverse selection "on observables" where consumers do not have asymmetric information about their health status but they still generate adverse selection because insurers cannot tailor prices to health status (Finkelstein and Poterba (2008)). Even if the insurer and consumer both know that the consumer is likely to spend a lot, if price

discrimination prohibits charging that person different prices, that person's plan choice can generate adverse selection and a negative externality on healthy consumers interested in purchasing more generous coverage. In practice, adverse selection based on "unpriced observables" is a much more pressing concern in health insurance markets than adverse selection based on asymmetric information.[1]

As we will discuss in more depth below, in markets like the Affordable Care Act exchanges, adverse selection can be a pressing concern both on the intensive margin (selection of different plans within a market) and on the extensive margin (whether or not a consumer purchases in the market at all).

3. **Moral Hazard:** In a typical product market, how consumers use the product does not determine supplier costs. In health insurance, when consumers typically pay only a small portion of care costs, over-consumption or "moral hazard" is a significant concern. A large body of research shows that, when consumers face lower copayments for health care, they consume more health care (see, e.g., Newhouse (1993) and Brot-Goldberg et al. (2017)). This generates a tradeoff for insurance contract design between risk protection and moral hazard (Zeckhauser (1970)): more coverage means greater financial risk protection for consumers but also means greater moral hazard and more consumption of potentially unnecessary care.[2]

   Given this trade-off, regulators and insurers have focused on the level of cost-sharing in insurance contracts, with a goal of limiting over-consumption and costs without severely eroding risk protection. In addition to navigating this trade-off with cost-sharing, insurers and regulators can work outside of this trade-off and ration care subject to a given level of cost-sharing. These non-price mechanisms include:

[1] Contrary to the theory of asymmetric information as implemented in many models, it is plausible that an insurer knows more about an individual's health status than they do, at least on many dimensions. Insurers have huge volumes of data on health and increasingly use this to understand risk.

[2] The welfare consequences of moral hazard are ambiguous since there is now a significant body of work showing evidence for "behavioral hazard" whereby consumers forego needed / valuable care when faced with higher costs on the margin (see, e.g., Baicker et al. (2015a)). Since the classic welfare trade-off between moral hazard and risk protection underlies much of the discussion related to contract design and the Affordable Care Act, throughout this article we primarily discuss the possibility of efficiency-reducing moral hazard, though these efficiency consequences could be mitigated or reversed depending on the extent of behavioral hazard.

- **Provider Networks:** in the ACA exchanges, most insurers form provider networks that only pay for health care delivered at an in-network provider, determined via ex ante insurer-provider contracting. This restricted access allows insurers to secure lower prices from providers and also to steer consumers towards more efficient providers generally (see, e.g., Ho (2009). Drug formulary design is an analogous restriction used by health plans in the prescription drug space.
- **Gatekeeping:** many insurers restrict access via gatekeeping that requires consumers to gain permission from the insurer to obtain specific kinds of care. This can manifest, e.g., by insurers requiring primary care provider authorization for specialty care, or, e.g., via prior authorization that requires insurer review of a patient's case before care is obtained (Dunn et al. (2021)).
- **Queuing:** some insurers also ration care via queuing or waitlists, a form or rationing that is often paired with gatekeeping and/or network restrictions. Systems with queuing deliver care at slower rates and often prioritize more vs. less necessary care when determining waiting times. Queuing also introduces hassle costs to consumers that may screen out less-needed care.

Overall, while insurers in the Affordable Care Act exchanges have limited flexibility to alter cost-sharing, they have significantly more flexibility to alter non-price rationing strategies such as network / formulary design, gatekeeping, prior authorization, and queuing. Consequently, these avenues are some of the primary potential avenues for private insurers to deliver value in a competitive landscape, something that we discuss in more depth below.

Clearly, health insurance markets face a number of impediments to function effectively. Key alternatives to market-based health insurance provision include single-payer systems where the government pays private providers to deliver care (e.g., Canada) or nationalized health systems where the government pays and provides for care (e.g., the UK). While it is not our purpose in this article to cover these alternative health system designs, it is instructive to briefly discuss the potential advantages of market-based provision in order to evaluate whether these advantages have materialized in the Affordable Care Act exchanges.

Markets offer a number of potential key advantages in health insurance provision (Enthoven et al. (2001)). These include:

- **Innovation:** it is possible that many private insurers competing for market share will enact efficiency-enhancing interventions at a faster rate than government-funded care. The underlying premise draws from the classical argument that the incentive to profit and the ability to pursue different products will lead to the best products materializing and rising to the top. Then, in a competitive market, insurers will lower premiums to attract market share and pass through most of their cost-advantages to consumers.

  In health insurance, there are myriad potential opportunities to innovate. Methods for rationing care are the most important area. Insurers in the ACA exchanges have meaningful flexibility to ration care in the different ways discussed above including, e.g., network design, formulary design, prior authorization restrictions, and gatekeeping. Insurers could also develop alternative organizational structures, such as vertical integration into so-called Integrated Delivery Networks (IDNs). In addition, insurers could innovate in terms of consumer non-health experience, through simple, clear and effective plan administration.

- **Matching:** having many private insurers offering coverage also allows for better potential matching of consumers to insurance products. Single-payer health systems typically provide consumers with limited options while markets can let consumers choose between high-cost less restrictive and low-cost more restrictive options, according to their preferences. Since consumers can freely choose products and insurers can freely offer them, there are potentially meaningful efficiency gains to be had from effective matching of consumers to differentiated products.

An important potential impediment to realizing these value propositions is consumer choice frictions. Active and well-informed consumers are a key ingredient into effective market function. As we discuss in depth in the next section, there is now substantial evidence that consumers struggle to make choices in insurance markets. With this impediment in mind, we also discuss the empirical evidence on whether private insurance markets such as the ACA exchanges actually deliver significant value in terms of product innovation and matching.

2.1 ACA Exchange Regulations

The ACA exchanges were set up as a market-based system with significant regulation designed to avoid the pitfalls of market-based insurance provision without removing its potential benefits (Kaiser Family Foundation (2011)). This "managed competition" model was proposed and advocated for by Enthoven et al. (2001) and underpins many important health care markets in addition to the ACA exchanges such as, e.g., Medicare Part D prescription drug insurance, privatized Medicare health coverage (Medicare Advantage) and nationally regulated exchanges in the Netherlands and Switzerland. The key regulations underpinning the ACA include:

- **Consumer Subsidies:** In order to make coverage accessible and affordable for all, the Affordable Care Act set up subsidies for individuals purchasing coverage with a sliding income-based scale. Subsidies are set so that the lowest income consumers in the market (starting at 138% of the Federal Poverty Line (FPL)) can obtain coverage at essentially no cost. As consumer income increases (up to 400% of the FPL) their subsidies decrease. The subsidies are given as a lump sum payment designed to make a certain class of care (Silver, 70% actuarial value) affordable (at most 8.5% of income). If consumers want to purchase additional coverage with more financial generosity or greater provider access, they are responsible for the full marginal contribution between their subsidy and the full plan premium.

  In addition to premium subsidies, lower income consumers (those below 250% of the FPL) receive cost-sharing subsidies so that when they purchase a baseline Silver option they are responsible for a much lower portion of cost-sharing than what is quoted in the plan design.

- **Limits on Price Discrimination and Guaranteed Issue:** In order to ensure that coverage is affordable and accessible for sicker consumers, the ACA prohibits price discrimination, except in a few cases such as limited age-rating and extra charges for smokers (see Kaiser Family Foundation (2011)). This is paired with "guaranteed issue" regulation that requires insurers to allow anyone who wants to buy coverage at the quoted premium rate. Conditional on other market characteristics, these regulations help ensure affordable coverage for sick consumers and protect consumers from premium reclassification risk. However, limiting pricing on health status

can lead to market-crippling adverse selection if not paired with other complementary regulations. Consequently, the ACA designers included myriad provisions to protect against adverse selection.

- **Individual Mandate:** To protect against extensive margin adverse selection (selection into or out of the market based on health status) the ACA contains an individual mandate that requires all individuals to hold minimum coverage. Individuals can have creditable coverage through any source including, e.g., employer markets, Medicare, Medicaid, an ACA exchange or a non-ACA individual marketplace. The mandate has been enforced as a tax penalty given to those who do not show evidence of minimum coverage. The mandate is important because it requires both healthy and sick people to have coverage at all times. Without it, the concern is that the market could become severely adversely selected, driving up premiums, limiting coverage options and, in the extreme, leading the exchanges to unravel entirely (see e.g., Cutler and Zeckhauser (2000)). In practice, the individual mandate was set to $0 in 2017.

- **Actuarial Design Regulation:** the ACA sets up four permissible tiers of coverage levels that insurers can offer Platinum (90% actuarial value), Gold (80% AV), Silver (70% AV) and Bronze (60% AV). Actuarial value is the proportion of total health spending a plan covers for an average consumer in the market. There are several reasons to restrict the contract space insurers can offer. First, it makes it very hard for insurers to offer financial features with the goal of selecting primarily healthy consumers (Layton et al. (2015)). This is a significant aid in preventing adverse selection via contract design. Second, it makes consumer shopping experiences much simpler: they can choose a level of financial protection first and then choose which insurer they want without worrying that they are missing an opportunity on the financial dimension (see, e.g., Ericson and Starc (2016a)). This, potentially, helps unlock value creation in the market by allowing shoppers to be more informed and more price sensitive to efficiency-enhancing innovation and/or matches.

- **Risk-Adjustment Subsidies, Reinsurance and Risk Sharing:** in addition to consumer incentives to select certain plan based on their health status, insurers have the incentive to "cream-skim," i.e., select healthy consumers. While the contract design regulation mentioned above helps

restrict insurers' ability to do this, they still have a lot of leeway in product design (which is potentially valuable) and they can still use these less regulated dimensions to attract certain types of consumers.

Risk-adjustment subsidies and reinsurance subsidies limit insurer profits from selecting consumers based on their health status. Risk-adjustment subsidies are transfers between insurers that send money from insurers enrolling healthier consumers on average to those enrolling sicker consumers on average. These transfers are arranged by the regulator and health status is typically assessed on an ex ante basis in order to limit the impact of insurer treatment effects on consumer risk scores. When implemented effectively, these transfers can greatly limit intensive margin (within market) adverse selection: insurers have dulled incentives to attract healthy consumers vs. sick consumers and insurers enrolling sicker consumers on average can pass through positive risk-adjustment transfers into lower premiums. In this case, risk-adjustment transfers sever the link between premiums and the average cost of enrollees, removing the key mechanism causing adverse selection in insurance markets. Reinsurance subsidies insure insurers against especially high ex post enrollee costs, limiting their concerns about selecting consumers with the potential for especially high ex post spending. Finally, risk sharing limited the potential losses facing insurers with the government covering a portion of losses beyond specific thresholds. Risk sharing is symmetric meaning profits are also limited for insurers.

These are the core regulations for understanding the industrial organization of the ACA exchanges.[3] We now turn to a discussion of the empirical evidence on ACA exchange performance, drawing on the conceptual discussion in this section.

[3]There are many other important ACA regulations that impact exchange function including (i) the mandate for employers to offer coverage or pay a fine (employer mandate) (ii) whether a state regulator provides additional curation for plans allowed to enter the market (regulator curation) (iii) Medicaid expansion, which had an important impact on the types of consumers likely to select into the ACA exchanges and (iv) website regulation designed to make plan comparisons simple. We discuss these additional regulations further as needed in the next section, in the context of existing empirical research.

3 Empirical Evidence

It is instructive to consider the evolution of ACA enrollment in the individual markets as a whole, before turning to particular regulations and market design questions. Enrollment increased initially, growing from 10.6 million insured through the individual market prior to the ACA in 2013 to 15.5 million in 2014 and a peak of 17.4 million in 2015 across both ACA- and non-ACA-marketplaces (Fehr et al. (2019)). Over the same period, premiums were also relatively low. From 2014-2016 premiums were lower than Congressional Budget Office forecasts (Adler and Ginsburg (2016), Layton et al. (2018)). The complexion changed appreciably beginning in 2017, following a concerted effort by the Republican Congress and the Trump Administration to remove key aspects of ACA regulations and broader uncertainty about a full repeal. (Fehr et al. (2019)) In 2017, 44 states saw a decline in enrollment, with the largest declines among those above 400% of FPL who did not receive subsidies. Enrollment in 2017 fell to 15.2 million and declined further, to 13.8 million in 2018, after which enrollment grew. Premiums on exchanges also grew significantly in 2017 but subsequently leveled off in 2019 and have fallen since. The ACA, and individual market coverage, has fluctuated since 2014 but, overall, coverage levels in the U.S. remain dramatically higher than they were in 2013. In 2019 9.2% of the US population was uninsured compared to 14.6% in 2013 prior to the introduction of the ACA-marketplaces and regulations.

3.1 Subsidies

A central pillar of the ACA is the provision of subsidies to make coverage affordable for all and to encourage enrollment more generally. As of 2015, among the uninsured approximately 22% (around 7 million people) qualified for some form of premium tax credit (Garfield and Cox (2021)). The decomposition of policy impacts on the ACA by Frean et al. (2017) finds that among those qualifying for subsidies, the entirety of increased coverage can be attributed to subsidies. This is approximately 40% of the entire coverage increase due to the ACA and the entire coverage increase coming from ACA exchange enrollment, underscoring the central role played by subsidies.[4]

The important role played by subsidies is demonstrated by Tebaldi (2017) using data on California's exchange and a rich model of insurance demand. He

[4]Frean et al. (2017) find that the Medicaid expansions account for the remaining 60% of the coverage increase due to the ACA.

shows that younger enrollees are both healthier and more price elastic. Therefore, by reducing prices through subsidies adverse selection is reduced, further lowering premiums (though savings largely accrue to the government because they are paying subsidies). However, because subsidies are linked to affordability criteria while premiums are age-rated, there is a countervailing effect noted by Graetz et al. (2018). As premiums increase, subsidies rise more for older enrollees potentially exacerbating adverse selection. In either case, these papers make clear that the existence of subsidies played a key role in enrollment, selection and prices under the ACA.

One of the biggest pieces of evidence for the importance of subsidies is the simple observation that by 2020 almost the universe of ACA exchange enrollment occurred amongst those with some subsidy. From 2017 to 2020 the share of exchange enrollees with a premium tax credit began at 84% and increased to 87%, reflecting both the level and trend for the ACA exchanges to largely cater to subsidized coverage. There are a number of plausible causes for these patterns. Coverage through the non-ACA individual market may offer those not receiving subsidies access to plans they prefer, though concerns exist about the quality of those plans that are able to skirt product standardization and coverage minimums on ACA exchanges. For federal exchanges not supported by states it is also plausible that the outreach and marketing affected demand or, worse, exacerbated partisan views of insurance marketplaces. Bursztyn et al. (2021) demonstrate an important pattern of partisan selection out of ACA exchanges towards private non-group coverage. Not only do they find that the Republican's differentially substitute away from ACA coverage towards non-ACA marketplaces, but also that this occurs primarily amongst healthier Republicans, leading to adverse selection on ACA exchanges that raises the price of coverage and, thereby, the amount paid for subsidies.

The structure of subsidy design also presents important trade-offs for policy makers. The premium tax credits adopted in the ACA are "price-linked subsidies." That is, they increase as the price of insurance rises. The use of price linked subsidies, as Jaffe and Shepard (2020) show, has the advantage that enrollees are protected from the uncertainty associated with the cost of insurance over time. However, this comes at a cost. By linking subsidies to price, price competition on the exchanges is softened. Using data from the Massachusetts insurance exchange Jaffe and Shepard (2020) estimate that the subsidies increased prices by 1-6% due to softening price competition and more so in less competitive markets.

The tension present in subsidy design is one we find consistently in considering the IO of the ACA and its implementation. One needs to carefully evaluate what might be gained from competition (e.g., lower prices, innovative new products) and the degree to which policy decisions, particularly those that insulate consumers from costs, facilitate or mitigate competition.

In addition to the positive impacts of subsidies on coverage and adverse selection it is crucial to assess to normative impacts of subsidies, i.e., the overall social value they deliver via these mechanisms. Doing so raises a critical issue in assessing demand for insurance. In a standard market, we might simply assess underlying willingness-to-pay for coverage and compare that to the cost of subsidies. In fact, in a standard market without any market failures it must be the case that subsidies distort demand and lower welfare. Health insurance, however, differs substantially from standard markets.

As we have discussed, health insurance deviates for at least two important reasons. First, policy makers and society have a number of reasons to increase insurance coverage reflecting the externalities of uninsurance. These externalities include the fact that, as a society, we generally want to provide care when people are sick, regardless of insurance status. Thus, the cost of care for the uninsured is born primarily through uncompensated care and through other related mechanisms. In addition to this inefficient 'tax', which makes care for the insured more expensive and causes significant stress to the uninsured, there are additional reasons to be concerned about insurance coverage being unaffordable to low income populations. For example, insurance is a critical gateway to care in the United States, particularly for preventive care. As a result, expanding insurance coverage can reduce costs later and may also correct so called "internalities" in which consumers under-utilize valuable medical care (Baicker et al. (2015b), Brot-Goldberg et al. (2017)). Second, insurance markets are subject to widespread information frictions and poor consumer choices making the typical IO toolkit for welfare analysis that relies on revealed preference more challenging (see, e.g., Handel and Schwartzstein (2018)).

Tebaldi et al. (2019) develop a rich model of demand for ACA plans offered in California and use it to consider the role of subsidies in demand on coverage choices, consumer surplus, and government spending. They find that a \$10 decrease in monthly premium subsidies would cause between a 1.6-7% decline in the proportion of low-income adults with coverage. Based on their demand estimates, this would generate a reduction in total annual consumer surplus between \$63 and \$78 million, while the savings in yearly subsidy outlays would

be between $238 and $604. million. The demand estimates used for welfare depend on the assumption that plan choices reflect underlying utility.

The other important type of ACA subsidies is cost-sharing reduction (CSR) payments that were available to those with incomes between 100 and 250% of FPL. Before they were eliminated in 2017, CSRs made plans far more valuable for those who qualified. Lavetti et al. (2019) link all-payer claims data from Utah to income data that determine CSRs. The authors demonstrate that cost sharing subsidies were associated with higher spending for those who qualify. Shi (2016) also finds some evidence for income manipulation to qualify for CSRs. Despite these potential distortions, there are arguments for CSRs, particularly if policy makers and market designers believe that there are important liquidity constraints or internalities that may mitigate effective demand for care when facing high cost sharing. These effects have been shown to be important in high deductible health plans offered to employee populations and the same effects seem plausible in ACA exchanges (see Baicker et al. (2015b), Brot-Goldberg et al. (2017)). Despite the importance to policy and intrinsic interest to IO economists, there is little work assessing the degree to which CSRs, either as implemented or in some optimal form, improve plan design and welfare, for low-income enrollees by balancing moral hazard and risk protection.

When CSR payments were eliminated by the Trump Administration in 2017, insurers responded by "silver loading" in which they increased premiums on silver (70% actuarial value) plans. Since those plans had more generous coverage and are used to set subsidies, this increased the cost of premium subsidies, even though CSR subsidies were reduced. Thus, it is not clear that reducing CSR payments lowered the cost of the ACA nor improved the efficiency of plan design. It does make clear that accounting for the strategic response of firms is critical to policy design.

3.2 Individual Mandate

Subsidies are a crucial tool for making coverage affordable. This in turn makes is possible to introduce an individual mandate to require that everyone hold coverage, with the explicit goal of eliminating extensive margin adverse selection. How well did the individual mandate accomplish this goal?

In practice evidence is mixed on the impact on mandate on enrollment. Survey based approaches projected the mandate would reduce uninsurance by 8-23% (Fiedler (2017)). Microsimulation models using pre-ACA data projected

much larger effects of the mandate ranging from 30 to 35%. These projections proved to be substantially larger than the observed magnitude attributable to the mandate. Updated CBO microsimulation estimates using post-ACA data improved the predictive performance and project that the mandate reduced uninsurance by 21% (Office (2019)). Frean et al. (2017) find no effect of the mandate itself on enrollment, with the entirety of coverage expansion due to subsidies and Medicaid expansion. Aizawa and Fang (2020) also show that the individual mandate was not critical to coverage expansions using a model of the interactions between the labor market and the ACA. Additionally, survey studies of the mandate's impact show limited impacts of the mandate on enrollment. For example, only 19% of Californian's enrolled through the exchange say that the mandate/penalty influenced their decision to get coverage (Fung et al. (2019)).

We are also interested in the elasticity of enrollment with respect to the mandate penalty *level*. Lurie et al. (2021) use detailed administrative tax data to assess the impacts of the mandate penalty on demand. They find a relatively small impact of penalty level on coverage with every $1 increase in monthly penalty increasing coverage by .2-.3 percentage points.

A subset of papers have, however, find an important role for the mandate penalty, particularly the existence of the penalty at the extensive margin. Saltzman (2019) explores detailed data for Washington and California and finds that the mandate had a large effect, though most of the effect is at the extensive margin. Jacobs (2018) studies the response to the mandate for those above 400% of the FPL who, therefore, did not qualify for any subsidized coverage. This population is of intrinsic interest and also allows further isolation of the mandate alone because premium subsidies are not relevant (though all of the other market reforms obviously apply). Using a variety of sources of variation and data from the ACS Jacobs (2018) estimate that mandate penalties account for a 7-12 percentage point coverage increase (of 13 percentage points in total).

Taken together, the evidence points towards a limited mandate impact, though there remains some disagreement that further research could help resolve. It is important to note that, to the extent that there is a gap between the earliest microsimulation estimates and the empirical findings quoted above, this likely demonstrates the important role played by perceptions of the mandate and general "taste for compliance" in practice (Frean et al. (2017), Saltzman (2019)). That is, requiring insurance was important for increasing enrollment, but the particular magnitude was less important in practice.

Most of the work on the individual mandate's impact has focused on coverage. As discussed earlier the mandate was also specifically intended to play a critical role in market function by encouraging healthier/lower cost enrollees to join the market. Therefore, researchers have also studied the degree to which the mandate reduced adverse selection.

Hackmann et al. (2015) study this question in depth using data from the Massachusetts reform, a direct predecessor to the ACA exchanges. They find that, following the introduction of the individual mandate, coverage increased substantially and that the average cost of those covered fell, suggesting that the individual mandate was effective at reducing adverse selection in Massachusetts. Because Massachusetts had guaranteed issue and community rating prior to the introduction of the mandate, it is a useful setting to study the individual mandate against the regulatory backdrop introduced by the ACA. Using their model, Hackmann et al. (2015) compute the optimal individual mandate penalty given observed selection and find that it is close to the magnitude of the ACA penalty. It is worth noting, however, that this finding does not account for the later empirical results suggesting that the precise magnitude of the mandate penalty had less bearing on demand than a fully informed, rationale model would suggest.

3.3 Contract Design Regulation

Contract design regulations and limitations are a key policy variable in the ACA. In general, the ACA both increased standardization of plan designs and increased regulation of included plan benefits. As discussed earlier, product standardization has implications both for the ease of consumer choice in the market and for the ability to insurers to cream skim the best consumers through plan design.

There is now a meaningful body of work investigating the impacts of limiting the contract space on consumer choice ease. This work encapsulates a key trade-off: one the one hand, limiting contract designs reduces the variety available to consumers and may also constrain tools insurers can use to innovate to lower prices, raise quality or both (Ericson and Sydnor (2017)). On the other hand, plan standardization can have important benefits in facilitating choice among plans. When plans are standardized shrouded attributes — aspects of plans that are hard for consumers to observe — play a smaller role in choice and, therefore, make choice easier for consumers and are less of a focus in product

design by the supply side (Gabaix and Laibson (2006), Marzilli Ericson (2014), Ericson and Starc (2016b)). Plan standardization also serves to increase price competition, as has been shown in other markets relying on managed competition (Frank and Lamiraud (2009), Ericson and Sydnor (2017), Handel et al. (2020)). More generally, the value of offering additional choice in terms of vertical differentiation — varying levels of coverage generosity (e.g., Bronze, Silver, Gold and Platinum) — depends on the degree to which preferences for risk protection and the degree of potential moral hazard correlate with demand and costs (Marone and Sabety (2021)). Empirically, the value of offering substantial vertical choice has been found to be limited though the studies in this space typically study employer-insured populations, rather than ACA-insured populations (e.g., Marone and Sabety (2021), Ericson and Sydnor (2017), Ho and Lee (2021)).

Standardization and regulation of the ACA markets also served to shift the types of plans offered. The additional regulatory constraints — standardization and underwriting requirement – led to exit by more traditional insurers who focus on employer-sponsored markets. In contrast, Medicaid-focused plans (e.g., Centene) entered ACA marketplaces, at least in part due to their experience in working in regulated environments and managing narrow networks and managed care products (Miller and Moffitt (2018)). Thus, constraining offerings on the financial side and emphasizing other cost-reducing dimensions may have naturally favored certain kinds of insurers over others. For example, ACA plans have been characterized by the consistent use of narrow networks, likely in part due to the standardization on the financial aspect of coverage. In 2019 72% of ACA plans had some form of narrow network, compared to 7% in the employer-sponsored market in 2018 (Carpenter and Chris (2018), Miller and Moffitt (2018)).

In addition, as the ACA was implemented there were increasing demands to allow certain types of plans that would not comply with minimum coverage requirements of the ACA to be "grandfathered" or "grandmothered" in. The extent of such plans varied across states depending both on regulation and coverage types before the ACA. Allowing grandfathered plans as well as alternative benefit designs that relax ACA exchange requirements trades-off the potential benefits of more choice with the potential costs of lower consumer protection, worse decision-making and cream skimming of healthy patients by insurers. For example, Sacks et al. (2020) demonstrate that allowing for more non-compliant coverage resulted in adverse selection into, and undermined, the

ACA-compliant market. This suggests that for the managed competition format of the ACA exchanges to work well, preventing leakage to parallel products with lower requirements is crucial, especially in preventing extensive margin adverse selection.

3.4 Risk Adjustment, Risk Corridors and Reinsurance

One of the most important policy levers in ACA insurance markets — and more generally in managing insurance competition — is the use of tools to mitigate risk facing insurers by risk sharing. The need is somewhat counterintuitive if we think of insurers as firms who are supposed to be in the business of pooling and managing risk. In practice, however, these tools are critical to mitigating price swings, reducing welfare loss from adverse selection and facilitating entry and competition. Commonly referred to as "premium stabilization" tools in the ACA, they include risk adjustment, reinsurance and risk corridors. All were instituted at the inception of the ACA-marketplaces. The latter two components, however, were eliminated by the Trump Administration and Republican Legislative Branch in 2016.

Risk adjustment was included as a permanent component of the ACA. The approach relies on concurrent conditions to compute risk (i.e., expected cost). Plans then receive or provide transfers based on their enrollees relative to that market average such that are net zero. The ACA's reinsurance program provided payments to plans for particularly high cost enrollees. Plans received the incremental cost of an enrollee whose annual cost exceeds the so-called "attachment point," $45,000 in 2014 and 2015 and $90,000 in 2016. In this way, reinsurance minimizes the incentives to avoid specifically high cost conditions and enrollees as well as limits the potential for premium growth or variation over time based on small numbers of very high cost individuals. The reinsurance program was funded through a pool into which insurers from both the individual and group insurance market contributed. Thus, the reinsurance program represents a net inflow of funds to the individual market, a subsidy (Layton et al. (2018)). The third leg of the "premium stabilization" stool was the risk corridor program. The risk corridor program effectively limited the potential losses a plan could make in a year as well as the possible profit. The ACA risk corridor program covered 50% of losses(profits) above 103% medical loss ratio (MLR) (below 97%) and 80% beyond 108% MLR (below 92% MLR) (Sacks et al. (2021)).

Risk sharing design and implementation has received substantial attention

from economists, due at least in part to the fact that it is a mainstay of numerous managed competition models of insurance markets (e.g., Medicare, the Netherlands). Risk sharing in general requires an important trade-off between greater risk sharing that reduces selection, lowers premiums and facilitates entry versus incentives to innovate in reducing enrollee costs — a critical form of innovation in insurance markets (Geruso and McGuire (2016), Layton et al. (2016)).

Risk sharing, in its different forms, also leads to strategic responses by the supply side of the market, a central consideration in designing market policies, and even in deciding to rely on market-based provision. Brown et al. (2014), Carey (2017) and Geruso and Layton (2020) provide evidence on how risk adjustment alters plan design and innovation as well as coding practices in Medicare, a setting with a mature and, arguably, successful risk adjustment programs.

In the ACA, Geruso et al. (2019b) find that the combined premium stabilization tools largely mitigated incentives to select against unhealthy enrollees. Despite the overall impact, though, they find distortions on the supply side targeting high cost enrollees where feasible, conditional on risk sharing. These individuals can be identified based on demand for specific drugs that make them consistently unprofitable leading to distortions in formulary design consistent with theories of adverse selection. The paper is particularly important in considering the ACA insofar as they are able to show the distortions due to adverse selection — both in supply and demand — but, more importantly, the limited degree to which it occurs given the "premium stabilization" tools in the ACA.

Sacks et al. (2021) study the risk corridor program specifically, exploiting the rapid removal of the program in 2016 empirically. Their model demonstrates the role played by risk corridors in determining pricing by insurers. When insurers are protected from losses they have greater incentive to bid lower. Sacks et al. (2021) show that, consistent with their model, premiums increased following the removal of risk corridors in 2016. They do, however, face the common challenge that policy evaluation of the ACA must be done against the backdrop of tremendous political uncertainty about the existence of the program and marketplaces and large concurrent policy shifts. Nevertheless, their paper makes an important point that risk sharing programs interact with competition and supply side decisions in critical ways in the ACA, and in managed competition in insurance markets more generally.

An additional important source of adverse selection is the extensive margin decision to insure through an ACA exchange. As Geruso et al. (2019a) demonstrate, the extensive margin and the intensive margin selection across plan types of the kind targeted by premium stabilization tools are inextricably linked. Subsidies and the individual mandate were the primary tools focused on the extensive margin but the ACA did address this potential, at least partially, by making premium rating rules, minimum benefit standards and cost sharing rules cover both on-Marketplace and off-Marketplace plans. Furthermore, risk adjustment transfers were for all individual plans and premiums had to be the same on- and off-Marketplace. Insurers also had to offer off-Marketplace plans if they chose to participate in the ACA Marketplaces, though the reverse was not true. Whether, and how, off-exchange marketplaces functioned and interacted with ACA-marketplaces in practice is not well studied empirically. Given the important interaction, both through competition and as a result of regulation, this is a fruitful area of research.

3.5 Exchange Structure and Market Design Lessons

In theory, the delegation of market design to the states represents an opportunity to empirically evaluate and learn from the ACA due to the variation in state level market operations and decisions. Like many aspects of the ACA, however, the practical realities deviated. Many states did not develop their own exchanges and, instead, relied on federally operated Obamacare exchanges. As with almost every aspect of the ACA, policy decisions and market outcomes took place against a backdrop of significant political uncertainty at the Federal level making identification difficult. Despite this, we can make some general assessments about market design and exchange operations that seem to have been effective, and vice versa. We can also learn from states that did develop robust marketplaces (e.g., Covered California) (Enthoven and Baker (2018)).

A critical goal for marketplace designers is facilitating entry to support price competition. There is consistent evidence that price competition has been successful in ACA marketplaces, particularly as insurers compete to be the lowest or second lowest silver plan (Burke et al. (2014), Jacobs et al. (2015), Frank (2019)). For example, Jacobs et al. (2015) estimate that an additional entrant lowers average premiums by 1.2% and, perhaps more importantly, benchmark premiums by an average of 3.5%. Parys (2018) finds that monopoly insurers increase silver premiums by an average of 50% in 2018, primarily due to increased

costs for the lowest cost plans offered.

An important design decision facing state exchanges was how to define the geographic rating areas in which insurers compete; essentially determining the market. Different states took very different approaches to this with important implications for entry, competition and price. States that defined markets (i.e., rating areas) based on population, usually by anchoring markets in an urban area and tying surrounding suburbs and rural areas, were far more successful in attracting entry and offering consistent choice of insurance options. Dickstein et al. (2015) estimate that this combination approach increased the number of insurers in a market by 27-37% and resulted in annual premium reductions of $200-300 (3.3-5.4% lower). Florida and Texas offer a notable contrast. Florida defined markets as counties, regardless of population, whereas Texas defined markets based on urban areas and included surrounding geographies. These decisions resulted in the 254 counties in Texas consolidating into only 26 markets while Florida allowed insurers to enter each of 67 different options at their discretion (Frank (2019)).

California also offers an instructive model for a successful exchange operation. Enthoven and Baker (2018) demonstrate key features that have made managed competition successful in California. Notably, Covered California — the State's exchange — took on a role as an active purchaser, negotiating detailed plan designs and standardizing aspects of the benefit even within cost sharing tiers. Covered California also invested heavily in marketing outreach and focused on consumer enrollment tools to facilitate search and simple plan comparison. These efforts have resulted in a robust and relatively stable market with 95% of state residents offered two or more insurers and 80% with three or more (Enthoven and Baker (2018)).

Future work that focuses on how states developed exchanges as a whole, not just on one aspect of their policy decisions, would be valuable to policy makers as well as contributing to broader questions of market design that concern IO economists.

3.6 Interaction with Other Markets: Medicaid Expansion and Employer-Sponsored Insurance

While our primary focus is on the individual-market ACA exchanges, because these exchanges are typically the residual claimant for the uninsured, they have important interactions with other parallel insurance products. Two key inter-

actions to consider are with (i) Medicaid coverage for low income populations and (ii) employer-sponsored markets, which insure the majority of Americans.

A central pillar of the ACA was the expansion of Medicaid to cover the universe of individuals under 138% of the FPL. If this had been implemented as initially envisioned, it would have dramatically increased coverage for low income populations nationwide. In reality, the 2012 Supreme Court decision that allowed states to opt out of Medicaid expansion led to a division where blue states expanded Medicaid as intended and many red states did not. To date, 39 States have expanded Medicaid, 14 of which only did so after 2014. Given the magnitude of fiscal support for Medicaid the lack of expansion represents a remarkable role for political economy in determining outcomes and reflects the partisan divide around the ACA.

While the ACA Medicaid expansion was a core part of the ACA, its implications for the IO of the ACA exchanges is mostly limited to its impact on individual participation in the exchanges. In states where Medicaid was expanded, generally, fewer lower income people entered the exchanges, with implications for the market shares and costs of exchange insurers. Notably, recent work by Holmes (2021) finds that the Medicaid expansions under the ACA dramatically lowered prices on ACA individual insurance exchanges by reducing the risk of those enrolling on the exchanges. In states that did not expand, those under 138% of FPL had the option to enroll through ACA exchanges. Because those who were sickest were more likely to enroll, not expanding Medicaid served to raise the average price of on exchange insurance, even for enrollees far above the income threshold for Medicaid. The effects are large. Holmes (2021) estimates that expanding Medicaid under the ACA lowered average premiums by approximately 9%. This cross-market selection thus has a meaningful impact on extensive margin adverse selection and underscores the important interactions between firms operating in the ACA and regulation of parallel insurance markets.

In addition to Medicaid, the ACA exchanges have potentially important interactions with employer-sponsored coverage. The ACA designers understood that generous ACA exchange subsidies and robust markets could lead to employers dropping coverage, moving employees towards the exchanges and subsidies, and reducing their costs in the process. Consequently, the ACA included an employer mandate designed to ensure that employers either maintained coverage or pay a large fee per employee substituting to an ACA exchange. In practice, however, the implementation of the employer mandate was repeatedly delayed,

first from 2014 to 2015, and then from 2015 to 2016, when it was introduced with much less bite than originally intended.

Despite the potential dangers from a weak employer mandate, the broad patterns of insurance coverage follow the ACA suggest employer-sponsored coverage was largely unaffected (Abraham et al. (2016). A number of studies find a significant *increases* in employer-sponsored coverage following the Massachusetts Reform (Lyons (2017), Long et al. (2012), Kolstad and Kowalski (2016)) as well as a decline in ESHI when the employer mandate was removed to comply with the ACA rules in 2014 (Sommers et al. (2018)).

Such "crowd-in" runs counter to the concerns expressed by policy makers as well as the predictions based on existing models of the interaction of the labor market with insurance markets. Kolstad and Kowalski (2016) develop a simple model demonstrating that crowd-in occurs when an individual mandate makes demand for insurance as a part of the benefit package greater. Insofar as an employer has a comparative advantage in offering benefits directly they may prefer to offer ESHI rather than pay the incremental wages to purchase insurance on the individual market. Kolstad and Kowalski (2016) estimate that in Massachusetts, after including the individual mandate penalty the average worker valued almost the entire compensating reduction in wages for jobs offering ESHI.

These results have also largely been born out, at least in aggregate, with the ACA. Early microsimulation models predicted significant reductions in ESHI given the weakened employer mandate. In practice, there has been little reduction in ESHI and, if anything, an increase in coverage through employers, even with delayed and small penalties for employers for not offering insurance. There are several possible hypotheses for why reductions in ESHI did not occur including, notably, (i) the tax advantage for ESHI premiums relative to individual market premiums (ii) individuals viewing exchange plans as a poor substitute for ESHI (ii) higher exchange plan costs due to limited insurer participation. As noted earlier, the exchange plans have primarily catered to the lower income populations receiving federal subsidies, potentially leading to higher premiums than would occur for an individual market with consumers without subsidies who are likely to be more price sensitive.

Overall, because the ACA exchanges comprise a relatively small portion of the insured population and are the residual claimant of parallel markets, cross-market interactions are important for studying the IO of these exchanges. While current evidence suggestions meaningful interactions in practice with Medicaid

and less meaningful interactions with ESHI, more evidence is needed to assess the implications of these cross-market interactions, both as they have occurred thus far and how they might occur in different potential environments going forward.

3.7 Behavioral Economics of Demand and Market Design

The architects of the managed competition paradigm typically envision consumers acting as rational agents, selecting the best coverage for themselves and, in the process, disciplining the market, leading to lower premiums and insurer innovation. In practice, there is now ample evidence that consumers have a hard time effectively selecting among health plans, often leaving significant sums of money and significant consumer surplus on the table (see, e.g., Domurat et al. (2021), Handel and Kolstad (2015b), Handel and Schwartzstein (2018), Spinnewijn (2017), Handel (2013), Chandra et al. (2019)).

One example of an important documented decision making heuristic in health insurance markets is the propensity of consumers to focus on premiums as opposed to other plan costs when making choices. Such behavior has been documented in many settings (see, e.g., Abaluck and Gruber (2011) in Medicare Part D, Gruber et al. (2020) in Medicare Advantage) including, importantly for the ACA, choices on individual insurance exchanges (see, e.g., Ericson and Starc (2012)). One consequence of consumer premium minimization is enrollment by individuals in plans with lower premiums and higher cost-sharing (e.g., Bronze plans). This gives insurers the incentive to compete on premiums but not as much on product design otherwise, removing some of the intended benefits of competition. Additionally, the focus on premiums may lead to poorer matches of consumers with products, limiting a benefit of having a market with variety as opposed to a single-payer market. Research has shown that decisions in general, and with respect to this specific bias, can be improved in a number of ways including plan standardization (Ericson and Starc (2016b)) and decision aids (e.g., Politi et al. (2016), Gruber et al. (2020)).

In addition to within-market choice frictions, consumer choice difficulties are also present on the extensive margin when enrollees, particularly those who have access to subsidies, do not enroll through ACA exchanges. Broadly, marketing efforts have been shown to be essential in increasing enrollment. Domurat et al. (2021) present compelling experimental evidence on the role for informational interventions in overcoming frictions to enrollment on California's ex-

change. They also demonstrate an important relationship between underlying health/cost and frictions. Those newly enrolled by the intervention were on average 37% less expensive. This study shows that reducing consumer choice frictions on the extensive margin may be especially important to facilitating effective ACA exchange function, both by lowering average costs and premiums and by increasing market share, allowing insurer fixed costs to be spread out over a larger patient base.

In addition to the classical IO avenues through which choice frictions impact market function, there is also an important potential interaction between choice frictions and adverse selection. The Domurat et al. (2021) study shows this on the extensive margin for the ACA exchanges while there is a now a significant body of research in health insurance generally showing the potential for complex interactions between choice frictions and risk selection. For example, as discussed in depth in Handel et al. (2019) and Handel (2013), if consumers choice frictions lead to lessened connection between risk and coverage generosity, choice frictions can actually mitigate adverse selection and improve market function. Handel et al. (2019) characterize the market foundations that determine whether policies to improve consumer choices increase or decrease adverse selection. The paper demonstrates that as heterogeneity in consumer surplus increases relative to heterogeneity in costs, improving choices at the individual level is more likely to be beneficial in aggregate as well, once the downstream effects of selection on premiums are accounted for. The paper also highlights the complementarity between friction reducing policies and the effectiveness of risk-adjustment policies. One consequence is that the relative success of risk-adjustment policies in the ACA exchanges makes policies to improve consumer choices more effective and less likely to negatively impact markets through increased adverse selection.

It is important to note that, in addition to the economic implications of choice frictions, the presence of choice frictions can potentially bias measurement of consumer surplus if a neoclassical revealed preference approach is used. Handel and Kolstad (2015b) and Handel and Schwartzstein (2018) discuss this potential bias and note ways that researchers can overcome these biases through alternative empirical welfare criteria.

4 Entry and Innovation in Insurance Markets

Section 3 focused on how specific ACA regulations, especially those set up to deal with issues of affordability and adverse selection, impact the IO of the ACA exchanges. We now turn to a discussion of whether the ACA exchanges deliver on the potential benefits of competitive insurance markets, such as product variety and innovation, in practice.

While the potential for competition to induce product entry and innovation is clear conceptually, there is a relative paucity of research actually measuring product variety and insurer innovation. A likely reason is that innovation can be subtle and multi-faceted, making it hard to measure in practice, especially without clear characterizations of how insurers can innovate.

In general, by innovation, we refer to changes to insurance product design that lower cost and/or raise quality in a way that moves at least some individuals towards an ideal cost-quality frontier. The ACA exchanges were specifically set up to encourage innovation on the non-financial aspects of coverage, e.g., network design, formulary design, prior authorization, gatekeeping, and other dimensions discussed in Section 2. If insurers innovate in this manner then, depending on the extent of consumer choice frictions, consumers will gravitate towards more attractive plans, hopefully leading to a more efficient health care system than what could be achieved with a more centralized single-payer system.[5].

A key question is, therefore, whether ACA created conditions in which welfare enhancing innovations by insurers were rewarded. Despite that, there is relatively little evidence. Handel et al. (2021). They study the employer-sponsored insurance market using all-payer claims data from Utah. Using situations in which entire employers switch from one plan to another they are able to decompose the contributors to health care utilization, including total cost as well as specific high and low value types of care. They find a limited role for specific insurance brands in differences in care delivery and cost. E.g., moving from AETNA to Select Health Care (an affiliate of Intermountain) has only small impacts on the care received or cost overall. To the extent that there are differences, they decompose those differences into the impacts of bargaining, network

[5]While innovation is a key potential benefit of delivering health insurance through private markets, there is meaningful evidence that, in the U.S., Medicare is another critical source of innovation. Though beyond the scope of this paper, evidence suggests that Medicare has played a more important role in pricing innovation than private plans, at least for the private employer-sponsored market (Clemens and Gottlieb (2017)

design, consumer steering within network, and other factors that impact prices and quantities. They argue that one impediment to innovation is that there is little demand response to high value offerings. Employers do not seem to adopt plans that offer *their* employees better options.

Another paper that makes progress on this topic outside of the ACA exchanges is Abaluck et al. (2020), which studies differences in mortality effects for Medicare Advantage plans. They use a design that leverages plan exits from the market to show meaningful heterogeneity in plan mortality effects across plans. They show that consumers place little weight on these differential mortality effects in plan choices, potentially because these effects are not generally known to consumers. They show that moving beneficiaries away from the bottom 5% of plans by mortality effects could save tens of thousands of elderly lives every year.

Perhaps most relevant for the ACA exchanges, Geruso et al. (2020) show that, holding cost-sharing equal, when beneficiaries are randomly assigned to plans that the plans can impact overall spending by up to 30% relative to one another. They show that the effects come through quantities rather than price differences and that consumers lower quantities across the board, including likely wasteful and likely valuable care. Since, as we discuss below, Medicaid managed care plans have some similarities with ACA exchange plans, this study provides some insight into the potential range of cost differences induced by non-price insurer strategies. While the papers described here start to characterize how insurers differ from one another in terms of product offerings, they are not really able to assess the welfare implications of different plan designs. In a typical product market, consumer choices would reveal those implications, but due to choice frictions in insurance markets it is unlikely to be the case in the ACA exchange context. In this vein, both the Abaluck et al. (2020) study and the Geruso et al. (2020) study show meaningful insurer differentiation in terms of effects on quantities but find limited consumer response to that differentiation.

4.1 Entry and Exit by Different Types of Insurer

As the discussion above shows, rigorous research on value creation in private insurance markets is limited, despite the importance of measuring this for assessing the success of the ACA exchanges and other managed competition markets. Future work that unpacks the different potential domains for insurer innovation and investigates the micro-foundations for why consumers seem not to respond

to these differences will be quite valuable. The papers discussed in the prior section are relevant for measuring private insurer differentiation but do so in markets that are not the ACA exchanges. In this section, we present some simple cases from the ACA exchanges that are suggestive of competition generating entry and innovation by insurers. We note, however, that these examples are, just that, examples, but hopefully will help motivate research on these questions going forward.

Prior to the ACA, individual insurance markets were highly concentrated. In 2011, the average HHI was 4,200 (Dafny et al. (2015)). At inception, ACA Marketplaces were also relatively concentrated, more so than the outside individual insurance market (Layton et al. (2018)). In 2014, roughly a third of marketplaces had one or two insurers and the average marketplace offered products from approximately 4 insurers (Dafny et al. (2015)). Subsequent entry, however, led many exchanges to offer a variety of products, by insurer brand, as well as offer competitive exchanges. In 2016 the average state exchange offered 6 different insurers' products (McDermot et al. (2016)). As with many of the policy tools in the ACA, competition declined from there through 2017 and 2018. At the low point in 2018, the average state only offered 3.6 insurers. Entry then returned, from 2018 on, leading to a relatively broad set of offerings as of 2021 with the average exchange offering 5 insurers' products, 46% of states offering more than 3 insurers and less than 10% with a monopolist (McDermot et al. (2016)).Given these broad patterns, what do we know about the underlying differences in the plans that entered (and exited) the ACA exchanges over time?

There is limited evidence on this topic but there is some evidence on use of narrow networks, an important potential area for insurer innovation. Narrow networks have the potential to facilitate a number of valuable new models for insurers including the ability to negotiate lower prices, more effectively managed care and improve quality by selecting higher quality providers and more easily steering patients to those providers (Ghili (2016), Ho and Lee (2019)). Dafny et al. (2017) studies narrow networks in ACA exchange plans and finds that narrow networks for ACA plans have been shown to lower cost by an estimated 16% and have served to hold down benchmark premiums for Silver plans, lowering the cost of federal subsidies by approximately 10.8%. Lower cost, however, is not sufficient to demonstrate welfare gains. Lower cost could come from reductions in quality or steering patients away from high value care (see e.g., Cutler et al. (2000) for a discussion of prices and quantities in generating welfare gains

in insurance and Brot-Goldberg et al. (2017) for a discussion of demand for high and low value care in response to insurer plan designs). Wallace (2019) study the function of narrow networks using random assignment to Medicaid managed care plans, a setting relatively similar to ACA-marketplaces. He finds that narrow networks reduce cost but due so in relatively blunt ways, largely by creating hassle costs that lower quantities of both high and low value care in equal measure without lowering prices substantially. He then considers an alternative assignment mechanism that can improve welfare, underscoring the linkage between exchange design, consumer choice and the gains from insurer innovation. The research to date makes clear the need for more work determine whether insurer innovation on this dimension has actually generated value in ACA marketplaces, as opposed to reducing access to care for consumers with high choice frictions.

Risk adjustment, reinsurance payments and risk sharing also played an important role in facilitating entry and determining the types of plans that entered. These policy/market design tools limit the need for an insurer entering an ACA exchange to manage large swings in risk due to small numbers of high cost enrollees as well as effort required to design benefits to mitigate adverse selection. However, risk corridors and MLR restrictions can also have the effect of limiting upside in high profit years, an effect which disproportionately impacts smaller carriers that may smooth over years rather than across a large book of business. Abraham et al. (2014) show that in the first year of exchange operation (2014) these factors seemed to matter. Less than 10% of incumbent insurers offered products on an ACA exchange and those that did were disproportionately larger and had experience operating in the individual market in that state.

One additional interesting trend in entry following the ACA was the introduction of plans by insurers who had previously only served the Medicaid population (e.g., Centene). These entrants had relatively distinct operating models with a greater focus on care management and networks that were better set to serve lower income populations. Furthermore, churn between Medicaid offerings and marketplace plan following changes in income meant that a Medicaid operator may be better positioned to internalize switching and minimize switching costs to enrollees. The patterns of growth for traditional Medicaid plans are interesting: in 2016 Medicaid insurer enrollment had approximately 15% market share. By 2017 that had grown to 26 percent and held at 27 percent in 2018. This growth was concurrent with the decline in enrollment in national and regional insurer plans not active in the Medicaid market. Their market

share fell from roughly a third of the market in 2016 to 14% in 2018, suggesting a pattern of substitution from traditional national insurers (including United who exited the market in 2017) to Medicaid managed care plans (Holahan et al. (2020b), Holahan et al. (2020a)). This suggests that the non-price rationing tools typically used by privatized Medicaid insurers naturally lent themselves to the ACA exchanges, though whether these product differences lead to efficient care is an open question (Wallace (2019)).

It is also important to note that insurers also had to learn to adapt to the ACA environment and that firm learning likely played an important role in product offerings over the first several years of the exchanges. While evidence on this point is limited, recent work by Lucarelli and Saltzman (2021) suggests that insurer pricing strategy improved over time in California from 2014 through 2016. While their study focuses on pricing, it is likely that similar learning occurred on other product dimensions as well.

5 Going Forward: IO and the ACA

The ACA exchanges have now been enrolling consumers for over 7 years. We have learned a lot about the industrial organization of these markets, especially in regard to how the key regulations underlying the managed competition paradigm impact insurance market outcomes. There is a significant body of research studying the impacts of subsidies, the individual mandate, contract design regulation, and the three Rs implemented to directly counteract adverse selection (risk-adjustment, reinsurance, risk corridors). We also have some evidence on the importance of cross-market interactions, e.g., how Medicaid expansion and employer-market policies impact the exchanges.

In addition, we have ample evidence that consumers generally have difficulty making choices in the exchanges (and in insurance markets in general). This calls into question the assumption that competition will generate value by having consumers select the most innovative and efficient plans, directly leading to success for those plans. While researchers have begun to investigate whether and how private insurers innovate, we are still at the beginning of understanding if and how insurers create value. Much of the related existing research occurs in non-ACA managed competition markets (e.g., Medicaid managed care, Medicare Advantage, Medicare Part D) and even this research only looks at small slices of the value creation problem.

Given this, we feel that new research on the value generated by competition via private insurers will be especially useful. There are a number of directions to proceed. First, it is important to leverage tools from other research on product innovation and productivity that may not be central to the IO literature. The organizational economics literature may provide insights into how organizations like insurers can/do innovate, allowing us to measure innovation from a different perspective (see, e.g., Cutler (2011) and Bloom and Van Reenen (2007)). Additionally, the productivity literature, which spans multiple traditional fields in economics, may help to more precisely determine the factors of production for private insurance plans and, in turn, tell us how these factors vary across insurers over time (see, e.g., De Loecker and Syverson (2021) for a recent survey).

Related to this is the issue of whether modifications to the traditional managed competition setup can help deliver additional value. In the ACA exchanges, some states operate in this traditional setup, allowing free insurer entry and having consumers be the main disciplining force. Alternatively, many states have used a curated exchange setup where a state agency determines whether or not each plan meets sufficient quality criteria before allowing them to enter the market. The regulator acts as an intermediary for consumers and plans, often bargaining down premiums with insurers and ensuring adequate network quality before allowing an insurer to participate in the exchange. To date, there is limited rigorous research that we are aware of that studies the impact of this kind of market curation on market outcomes and, especially, on value creation by private insurers (e.g., Enthoven and Baker (2018) point to the important role of these tools in California). If the state regulator, acting as an intermediary, can help step in for consumers with choice frictions, this is another avenue to discipline the market and, potentially, lead to value creation via private insurers.[6]

Overall, the ACA exchanges have been successful in navigating the difficulties inherent to health insurance markets. Plans are affordable to consumers and adverse selection has been limited due to the subsidies, mandate, contract regulation, and risk-adjustment policies. We hope that the next decade of IO research on the exchanges will help us understand whether this great effort to set up a well-functioning market is worth the difficulty of doing so, relative

[6] An alternative approach, which hasn't been implemented in practice, is to set up more aggressive consumer steering by regulators, via tools like smart defaults (e.g., Handel and Kolstad (2015a)).

to different common models of public or quasi-public insurance provision, and point to ways to further improve markets to foster welfare enhancing innovation.

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INDUSTRIAL ORGANIZATION OF HEALTH CARE MARKETS

Benjamin R. Handel
Kate Ho

Working Paper 29137
http://www.nber.org/papers/w29137

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 2021

This manuscript is an invited chapter for the forthcoming volume of the 4th Handbook of Industrial Organization by Elsevier. We are grateful to Jason Abaluck, Zarek Brot-Goldberg, David Dranove, Martin Gaynor, Soheil Ghili, Gautam Gowrisankaran, Michael Geruso, Jonathan Holmes, Robin Lee, Mark Shepard, Amanda Starc and Robert J Town, for very helpful comments on earlier drafts. We thank Catherine Che, Yuki Ito, Yikun Jiang and Matteo Saccarola for excellent research assistance. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

Industrial Organization of Health Care Markets
Benjamin R. Handel and Kate Ho
NBER Working Paper No. 29137
August 2021
JEL No. I11,L13,L2

ABSTRACT

In this paper we outline the tools that have been developed to model and analyze competition and regulation in health care markets, and describe particular papers that apply them to policy-relevant questions. We focus particularly on the I.O. models and empirical methods and analyses that researchers have formulated to address policy-relevant questions, although we also provide an overview of the institutional facts and findings that inform them. We divide the chapter into two broad sections: (i) papers considering competition and price-setting among insurers and providers and (ii) papers focused specifically on insurance and market design. The former set of papers is largely concerned with models of oligopolistic competition; it is often focused on the US commercial insurance market where prices are market-determined rather than being set administratively. The latter focuses on insurance market design with an emphasis on issues raised by asymmetric information, leading to adverse selection and moral hazard. In addition, we discuss the literature on consumer choice frictions in this market and the significant implications of those frictions for I.O. questions.

Benjamin R. Handel
Department of Economics
University of California, Berkeley
508-1 Evans Hall #3880
Berkeley, CA 94720
and NBER
handel@berkeley.edu

Kate Ho
Princeton University
Department of Economics
237 Julis Romo Rabinowitz Building
Princeton, NJ 08544
and NBER
kate.ho@princeton.edu

The Industrial Organization of Health Care Markets*

Ben Handel† Kate Ho‡

August 2021

1 Introduction

The health care sector worldwide is large and growing at a fast pace. In 2018, health care spending in the U.S. amounted to $3.6 trillion, or 17.7% of GDP, an increase of 4.6% compared to the previous year. Each of the major components of the sector—hospital services; physician services; and health insurance—is larger than most other industries in the U.S. economy. Private health insurance spending grew 5.8% in 2018 to $1.24 trillion; hospital expenditures grew 4.5% to $1.19 trillion; while physician and clinical services expenditures grew 4.1% to $726 billion.[1]

The last decade has seen an explosion of papers considering industrial organization questions in health care markets. Rather than importing methods from previous studies of other industries, researchers have developed models that have later been exported to consider similar questions outside health care. The sheer size of the industry helps explain this level of interest by IO researchers. Beyond this, the health care market has several distinguishing features which present new challenges for economists and policymakers and which are the subject of the substantive conceptual and empirical literature reviewed in this chapter.

Perhaps the most important feature that separates health care markets from typical product markets is that health care as a product is often viewed as a "right" or moral imperative. This facilitates a large role for the public sector in regulating health care markets, borne out primarily through policies to promote access to care. Examples include the provision of subsidies for insurance, subsidies for care, and market regulations that seek to limit inequities (e.g. limiting

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†UC Berkeley and NBER, handel@berkeley.edu

‡Princeton University, NBER and CEPR, kate.ho@princeton.edu.

[1]Source: Centers for Medicare and Medicaid Services, https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NHE-Fact-Sheet

price discrimination based on health status). More broadly, the notion that consumers have at least a partial "right" to high-quality health care implies that unfettered free markets are unlikely to succeed in achieving social goals regarding health care provision. Other tools to deal with care rationing through regulation are likely to be needed and, in practice, lead to myriad regulatory institutions that are important to understand when assessing the industrial organization implications of different policies.

There are also several direct market-related issues that arise in health care markets but not in typical product markets. First, health insurance markets must contend with adverse selection: the situation where consumers who are less healthy select into more generous insurance, driving up the price of that insurance and rendering it less accessible for others. Health insurance markets are among the primary markets where adverse selection is an empirical concern and the health literature leverages insights on selection markets more broadly, dating back to Akerlof (1970) and Rothschild and Stiglitz (1976) and summarized in a companion chapter in this handbook by Einav, Finkelstein and Mahoney (2020). Adverse selection may be especially acute in health insurance settings relative to other selection markets (e.g. car insurance, credit markets) because limits on price discrimination, imposed due to concerns about equity, enhance the likelihood of such selection.

Second, the health care sector is a classic example of a vertical market structure, where various segments of suppliers operate in the supply chain to deliver and pay for consumer care. Health care providers source medical devices and pharmaceutical products from upstream providers and work across specialties to provide care for consumers with heterogeneous conditions and needs. While the interaction between health care providers is complex in itself, providers also negotiate with private insurers to determine payments for their services under the threat of exclusion from the insurer's network. Consumers typically only pay a small portion of these negotiated prices out of pocket, and consequently, do not substantially discipline markups via demand responses as they would in a typical market.

In this chapter we outline the tools that have been developed to model and analyze competition and regulation in health care markets, and describe particular papers that apply them to policy-relevant questions. We focus particularly on the IO models and empirical methods and analyses that researchers have formulated to address policy-relevant questions, although we also provide an overview of the institutional facts and findings that inform them.[2] We also assess key opportunities for future research.

We divide the chapter into two broad sections: (i) papers considering competition and price-setting among insurers and providers and (ii) papers focused specifically on insurance and market

[2]Readers who are interested in learning more about institutional details and data are directed to other survey papers such as Gaynor and Town (2011) and Gaynor, Ho and Town (2015).

design. The former set of papers is largely concerned with models of oligopolistic competition; it is often focused on the US commercial insurance market where prices are market-determined rather than being set administratively. We provide an outline of recent papers in this literature that is centered around a model of price negotiations between insurers and providers. For earlier surveys that are less tightly focused on a single framework, see Gaynor and Town (2011) and Gaynor, Ho and Town (2015).[3] In addition, in this section we study issues related to (i) price regulation and gaming by medical providers and (ii) vertical integration across different parts of this supply chain.

The second component of the literature focuses on insurance market design with an emphasis on issues raised by asymmetric information (Arrow (1963), Pauly (1968)) leading to adverse selection and moral hazard. In addition, we discuss the literature on consumer choice frictions in this market and the significant implications of those frictions for IO questions. These factors are relevant to almost all health insurance markets: the recent literature often uses data from the health insurance exchanges set up by the Affordable Care Act (see, e.g., Kaiser Family Foundation (2010)) but also studies other regulated exchanges such as Medicare prescription drug markets and Medicare Advantage privatized health plans. In addition, we discuss the industrial organization of employer-sponsored insurance markets, which cover over half of the U.S. population. We also discuss (i) international contexts that rely on regulated markets to provide health insurance and (ii) the interplay between the time-horizon of insurance contracts and efficient provision of coverage.

These two broad sections follow the evolution of the literature closely. Few existing papers combine insights and models across the two broad areas we consider, due to the significant complexity of simultaneously considering the key elements across both. We follow the structure of these literatures in this chapter with the understanding that, in many cases, it makes sense to focus on methods and ideas from one part of the literature or the other. With that in mind, we do discuss connections between these two components of the literature throughout and note opportunities for future work that brings them together.

Of course, given the complexity and breadth of the health care sector, we omit some topics that are relevant and interesting. We cover the extensive literature on moral hazard and consumer price sensitivity only to the extent that it is relevant for market competition and regulation. We include a focused and limited discussion of issues related to pharmaceutical markets though, clearly, there are many important and rich IO questions related to advertising, patents, and the complex supply chain in these markets. These topics are covered in more depth in a companion chapter on innovation and I.O. by Bryan and Williams (2021) as well as in a recent handbook chapter by Scott Morton and Kyle (2011). The literature on productivity is covered in a separate chapter by

[3]There is also a literature considering quality competition when prices are set by regulators, for example in the US fee-for-service Medicare or in the UK National Health Service. A different model is needed here: e.g., the extent to which increasing competition leads to quality improvements depends partly on whether provider fees are greater than their costs. We consider these papers briefly in Section 2 but leave detailed discussion to other authors.

De Loecker and Syverson (2021), while that on matching markets (including kidney exchanges) is in a chapter by Agarwal and Budish (2021). While we discuss recent developments in competition policy in the UK and some aspects of market design in other countries, we largely focus on U.S. health care markets. Finally, the chapter focuses on the formal health care sector and does not discuss other issues that relate to health, such as nutrition, exercise, and addiction, all of which are linked to important I.O. questions.

The rest of this chapter proceeds as follows. Section 2 discusses competition and market function for health care provider and health care service markets, including how those markets relate to and interact with health insurance. Section 3 discusses consumer demand in health insurance markets while Section 4 covers market design and regulation of these markets. Section 5 concludes with a discussion of new promising directions for research.

2 Insurers and Providers: Competition and Antitrust

The recent literature covering provider and commercial insurer competition and price-setting behavior is largely focused on modeling price negotiations in the context of a vertical market. Our objective in this section is to outline these papers and provide a common framework to help readers understand the way the literature has developed over time and the opportunities for future research.

One might reasonably ask why IO economists have focused so heavily on developing empirically relevant models of bilateral bargaining to apply to the U.S. commercial health care market. The reason is clear when we view the market through the lens of a multi-stage model of firm and consumer behavior. It is characterized by bilateral oligopoly: providers are the upstream firms; insurers are downstream; and (with the exception of small physician groups) provider payments are often determined through bilateral negotiations. The outcomes of these price negotiations are critically important for the level of spending and spending growth, which as discussed are very high in the U.S., and for provider incentives to invest in technology or quality. They are also directly relevant for premium setting, and hence also for the demand system that determines the match of consumers to plans. It is difficult to make statements about optimal policy or market design without a good understanding of how prices are determined. A bargaining model must therefore necessarily form the core of any model of the market. We provide the "Nash-in-Nash" model that has been adopted by most papers in this literature and then discuss its implications and limitations in health care and the steps recent authors have taken to extend it.

The timing of the multi-stage model is as follows[4]. In the first stage providers make invest-

[4]Our discussion focuses on the commercial health care market. A variant on the model would apply to other US health care markets where private insurers compete for enrollees, such as Medicare Advantage and Medicare Part D. Papers considering these markets are discussed in Section 5.

ments that determine their quality. Second, when the outcomes of these investments have been realized, they negotiate with insurers to determine insurers' provider networks and the prices paid to providers. Third, insurers choose their premiums to maximize their objective functions, taking into account their expected payments to providers, their own characteristics and those of competing insurers. The final two stages account for consumer behavior. Consumers observe each insurer's provider network and other characteristics, including premiums, and choose their plans. Finally, when the enrollment process is complete, some consumers become sick and utilize providers either from within their insurers' networks or (facing a higher out-of-pocket price) from outside.

We discuss the stages of the model in reverse order. Each stage has an impact on the overall equilibrium outcome, and therefore on welfare. Clearly every stage is related to the others: optimal choices in one stage are functions of expectations regarding the rest. The functioning of the market in each stage also has independent policy relevance. For each we provide a model that has been estimated empirically. We adopt the notation from one paper, Ho and Lee (2017), so that the model follows smoothly from demand through price negotiations and premium setting to implications for quality investment incentives. We discuss the different modeling assumptions made by different authors, which are often constrained by data availability, and their relative advantages and disadvantages.[5] We also review issues that have not been factored into the overall framework but where (often model-based) empirical evidence exists that could usefully be accounted for in future iterations.

A note on the structure-conduct-performance approach. This chapter does not discuss in detail the large literature that uses the "structure-conduct-performance" paradigm to study how competition affects health care market outcomes. This approach originated in the broader empirical industrial organization literature in the 1950s through 1970s. The researcher typically conducts a regression analysis where the dependent variable is a market outcome like profit or price and the primary explanatory variable is a measure intended to capture the structure of the market, often the Herfindahl-Hirschman Index (HHI), defined as the sum of squared market shares. Other explanatory variables are also included to account for other (exogenous) reasons for variation in the outcome variable. The objective is to relate market structure to firm performance, with conduct (which is not observed) generating the estimated relationship between these two variables.

Berry, Gaynor and Scott-Morton (2019) explain that the field of industrial organization moved away from the structure-conduct-performance approach in the late 1980s for several reasons (Bres-

[5]Different authors have had access to different types of data, and this has directly affected their modeling choices. For example, early papers (Capps, Dranove and Satterthwaite (2003), Ho (2006)) utilized hospital discharge data together with (at best) insurance plan market share data covering different markets and time periods. In contrast, Ho and Lee (2017) observed individual household-level choices of health insurance plans, hospital admissions for individuals in those households, and actual prices paid to hospitals. This enabled them to make fewer assumptions when developing and estimating their model.

nahan (1989), Schmalensee (1989)), although it has persisted longer in health economics than elsewhere. We summarize their explanation here. The first issue is measurement: measuring concentration is inherently difficult because, as discussed below in the health care context, markets are not observed directly in the data. Economic profits are difficult to measure accurately, and in health care, even prices should presumably be adjusted to account for differences in health status severity across consumers. The second issue is endogeneity of the concentration variable, which (as a function of market shares) is likely to be correlated with unobserved demand shifters that also affect price. Instruments are difficult to find because, by definition, the regression of prices on concentration depends on all elements of demand and marginal costs. The most fundamental problem, however, is that different changes in primitives can produce the same observed correlations between concentration and prices, with very different implications for welfare. That is, there is no causal relationship between the two variables. A positive observed correlation between market concentration and prices, for example, could be caused by firm mergers that jointly generate higher concentration, higher markups, higher prices and lower consumer surplus. However, the correlation could also be observed if large firms have low marginal costs but high fixed costs, since in that case firm size (and industry concentration) may be associated with high markups, in part in order to recover the fixed costs (Demsetz (1973)). A correlation is also possible, in a differentiated products setting, if a reduction in search costs shifts market share towards firms with high quality products, increasing concentration and also consumer welfare (Autor et al. (2020)). Thus the results of these types of regression analyses are at best suggestive. As Bresnahan (1989) argued, we cannot clearly consider the impact of concentration unless we focus on three objects: a demand system; the marginal costs of firms; and the nature of oligopolistic competition. The following sections investigate these objects, and their combination, in the setting of commercial health insurance.

2.1 Facts about Insurer and Provider Prices and Competition

We provide some brief facts about the industry to motivate our discussion of the literature on consumer choices, price and network negotiations, and the impacts of consolidation in both upstream and downstream markets.

2.1.1 Insurer concentration and premium variation

US commercial health insurance markets are concentrated and becoming more concentrated over time. Dafny (2015) uses public data sources to construct estimates of the national market share

of the four largest insurers in the commercial market over the period 2006-2014.[6] The four-firm concentration ratio increased from from 74% to 83% over that time. By comparison, Dafny cites the equivalent figure for the airline industry as 62%.

Dafny (2010) accesses new data from a benefits consulting firm on the plans purchased and premiums paid by 776 large employers over the period 1998-2005. These data are not necessarily complete by market or nationally representative, but they represent one of the most complete and extensive datasets containing prices and quantities for the insurance market. Dafny examines the effect of shocks to employer profitability on changes in the insurance premiums they pay. The idea is that if insurers possess no market power then the premiums they charge will not vary with employer profitability. Only if insurers have market power will they be able to price discriminate on this basis. Dafny finds strong evidence that premiums increase with the buyer's profitability. This effect decreases in magnitude with the number of insurers in the market, consistent with insurer market power falling with the number of firms.

2.1.2 Insurer network differentiation

Insurers differentiate themselves on a number of dimensions other than price. These include wellness programs; their patient-facing portals; and the extent to which they share data with physicians.[7] The breadth of plans' provider networks is arguably one of the most important sources of differentiation because it determines consumer access to hospitals and physicians in their local markets and also has a potentially meaningful effect on health care spending. Restricted network plans have been used as a means to control health insurer costs since the growth of managed care plans in the 1980s. The degree of selectiveness differs over time and across markets. In a sample of 43 major US markets in 2003, Ho (2006) found that 85% of hospital-HMO pairs in the commercial market agreed on a contract (i.e., on average, only 15% of hospitals were excluded). In contrast, Dafny, Hendel and Wilson (2015) document that only 57% of potential links were formed by HMO plans on the Texas exchange. The 2017 Employer Health Benefits Survey, released by the Kaiser Family Foundation, suggests that networks are increasingly narrow in the employer-sponsored market too. For 15% of employers offering health insurance, the largest health plan offered had high performance or tiered networks that provided financial or other incentives for enrollees to use particular hospitals. Nine percent offered a plan considered to be a narrow network plan.

[6] These data include privately insured lives across individual, small employer group, and large employer group markets. Market conditions (including barriers to entry and concentration) differ across these markets.

[7] Personal relationships among insurance sales representatives, brokers, and employer benefits managers may also be important in determining consumers' plan choices.

2.1.3 Provider price dispersion and provider consolidation

Cooper et al. (2019) uses a large dataset of medical claims, covering 28% of individuals with employer-sponsored insurance in 2008-11, to document the substantial variation in spending and prices across the US. Health spending per privately insured consumer differs by a factor of three across geographic areas, with half of the variation coming from provider price variation.[8] Prices for any particular service vary substantially at every level: across regions; across hospitals within a region; and across patients within a hospital. Market structure is highly correlated with prices: monopoly hospitals' prices are 12% higher than those in markets with at least 4 hospitals, and prices increase after mergers of nearby hospitals. This is consistent with a fairly substantial literature which finds that commercial prices tend to increase following mergers of hospitals in the same geographic and product market without a significant quality improvement.[9]

Craig, Ericson and Starc (2021) consider a different cut of the data. They quantify the extent of variation in negotiated hospital prices between insurers for a given hospital in a dataset covering medical claims in Massachusetts. They show that between-payer price variation is similar in magnitude to between-provider variation. Prices are higher for insurance plans that are not fully-insured (i.e., for Administrative-Service Only, or self-insured, plans).

Clemens and Gottlieb (2017) look at physician (rather than hospital) payment structures in commercial health care markets. Given the small size of many physician practices, one might expect that commercial prices might be determined at least partly based on federally administered Medicare rates (which formally apply only to Medicare-eligible patients aged over 65). The authors use a novel identification strategy to investigate this idea. They construct a link between Medicare and private sector claims data and exploit a one-time sharp reduction of Medicare's payments for surgical procedures relative to non-surgical procedures. They find that a $1 decrease in Medicare's payment for a surgical procedure results in a $1.16 decline in commercial payments for that service, within a year of the Medicare change. Medicare's influence is particularly strong in areas with concentrated insurance markets and competitive provider groups. Note that these findings do not rule out bilateral price negotiations between insurers and physician groups. Some of the estimated relationship may be mechanical, as many contracts explicitly define prices as a percent of Medicare rates. When contracts are renegotiated, the relation may change, but analyzing this requires examining prices over multiple years, when other factors may be at play. The authors interpret their findings through the lens of a bargaining model where Medicare payment rates are an important part of physicians' outside options, and an increase in these rates enables them to

[8] This mirrors findings for Medicare spending from the Dartmouth Atlas, but that variation is due almost entirely to quantities because prices are set centrally.

[9] See Dranove and White (1994), Dafny (2009), Haas-Wilson and Garmon (2011), Farrell et al. (2011), Gaynor and Town (2011), among others.

negotiate higher commercial prices. A second paper, Clemens, Gottlieb and Molnar (2017), uses a different dataset to consider these ideas further. The authors ask whether private insurers' payments to physicians mirror Medicare rates precisely, or whether they depart from this benchmark. They find that prices for 25% of physician services, representing almost half of spending, differ from Medicare rates, and that departures are particularly likely for large physician groups and capital-intensive care where the gains at stake are relatively high.

Overall, this literature provides evidence of substantial dispersion in the prices paid by commercial insurers to both physician groups and hospitals, for a given service, across insurers, regions and providers. A model of consumer demand and price negotiations is needed to predict the likely effects of market regulation and antitrust policy for both types of providers.

2.2 Demand: Consumer Choice of Providers

2.2.1 Discrete choice models: Consumer Demand for Hospitals

Three early papers use estimated discrete choice models of consumer demand for hospitals to assess the likely price effects of horizontal mergers between hospitals: Town and Vistnes (2001), Capps, Dranove and Satterthwaite (2003) and Gaynor and Vogt (2003). We describe Capps, Dranove and Satterthwaite (2003) in detail and then return to summarize the others. At the time these papers were written, the market definition used by the courts—a key input into merger analysis—was determined by the Elzinga-Hogarty approach. The idea was to use aggregate patient inflows and outflows to define market boundaries, expanding the market size until two criteria were satisfied: little (few patients traveling) out from the inside and little in from the outside. The authors argued that, while this approach made sense for the homogeneous product markets for which it was designed, it tended to over-estimate the size of the market for hospitals and hence under-estimate the price that a merged entity was likely to support.

There are two reasons why the method is problematic for use in hospital markets. First, hospitals provide differentiated products to heterogeneous consumers whose needs differ substantially in ways that affect market size calculations. For example, some patients with certain severe conditions are willing to travel large distances for care: if we assume that this is true for all patients, we will define large geographic markets for hospitals, implying permissive merger rulings. However, the willingness of *some* patients to travel does not eliminate the market power hospitals have in their local neighborhoods, because many patients with less serious conditions have a strong preference for access to nearby providers. The second issue is the need to account for the vertical nature of the health care market: the fact that commercial insurance carriers act as intermediaries between hospitals and their patients. Since insurers bargain with providers over reimbursement rates, and then bundle these providers' services and market their plans to consumers before diagnoses are

known, the data on ex post hospital utilization may not accurately reflect insurer pricing incentives. In particular, we need to account for the fact that consumers might place a high ex ante value on access to particular hospitals when choosing their plans—implying an incentive for the insurer to include those hospitals in the network, even at a high negotiated rate—even if they turn out not to utilize these hospitals in the following year. This ex ante nature of pricing, together with the heterogeneity of patient diagnoses and preferences, needs to be accounted for in any model that predicts the price effects of hospital mergers.

Capps, Dranove and Satterthwaite (2003) use a discrete choice model of consumer demand for hospitals that conditions on diagnosis and other observables to predict ex ante consumer willingness-to-pay for the hospital to be included in the network. This willingness-to-pay is envisioned as a measure of market power that, unlike patient flows, accounts for the differentiated goods market and is directly related to the prices that hospitals are able to negotiate. They use a multinomial logit demand framework for estimation.

Suppose consumers are grouped into age-gender categories (or "types") κ; each type requires admission to a hospital with probability γ^a_κ. Conditional on admission, the individual receives one of six diagnoses $l \in \mathcal{L} \equiv$\{cardiac, cancer, neurological, digestive, labor, other\} with probability $\gamma_{\kappa,l}$. Assume that individuals can only visit a hospital in their market m and insurer's network, and individual k of type $\kappa(k)$ with diagnosis l derives the following utility from hospital i:

$$u^H_{k,i,l,m} = \delta_i + z_i \upsilon_{k,l} \beta^z + d_{i,k} \beta^d_m + \varepsilon^H_{k,i,l,m} \tag{1}$$

where δ_i are hospital fixed effects, z_i are observed hospital characteristics (such as indicators for teaching hospitals and for-profit hospitals, the number of beds, and indicators for hospitals providing particular services), $\upsilon_{k,l}$ are characteristics of the consumer (such as diagnosis or income), $d_{i,k}$ represents the distance between hospital i and individual k's zip code of residence (and has a market-specific coefficient), and $\varepsilon^H_{k,i,l,m}$ is an idiosyncratic error term assumed to be i.i.d. Type 1 extreme value. There is no outside option since the data include only patients who are sick enough to go to a hospital for a particular diagnosis. The authors estimate the parameters of this equation via maximum likelihood using their hospital discharge data.

Specification differences across papers. Equation (1) follows the specification in Ho and Lee (2017). Capps, Dranove and Satterthwaite (2003) use a slightly different specification. For example, they include observed hospital characteristics rather than hospital fixed effects, and travel time (and its square) rather than distance. Further, while Ho and Lee (2017) observe the network of each insurer and can therefore accurately specify the choice set of each patient, assuming that the enrollee can choose any hospital in his local market that is included in his insurer's network,

Capps, Dranove and Satterthwaite (2003) do not observe networks and therefore have to make a different assumption. They estimate the utility equation for patients enrolled in Medicare or indemnity insurance, who have unrestricted hospital choice sets, and proceed by assuming that managed care enrollees (ie, the consumers of interest for their merger analysis) have the same preferences conditional on observable characteristics.

The out-of-pocket price is not included in equation (1). Capps, Dranove and Satterthwaite (2003) include price in their initial utility equation but later note that prices are unobserved and (at least for consumers enrolled in managed care plans) likely to differ little across hospitals, and hence exclude it. The assumption that negotiated hospital prices do not influence individuals' allocations to hospitals could also potentially be justified by arguing that negotiated prices are difficult to observe, even for patients who face coinsurance payments, and that insurers have few other levers to steer patients to cheaper hospitals. However, as discussed in Ho and Pakes (2014) and Gowrisankaran, Nevo and Town (2015), this abstracts away from both patient and referring physician price sensitivity, both of which may be important, and the implications of the model for prices would change if it was relaxed. We return to these issues below.

Willingness-to-Pay (WTP). The model predicts the probability that an individual k—who lives in market m, is enrolled in insurance plan j, and has diagnosis l—visits hospital i. In addition, the estimates are used to construct a measure of consumers' ex-ante expected willingness-to-pay (WTP) for the insurer's network. This object, which varies by age and gender, is the focus of Capps, Dranove and Satterthwaite (2003); it will also be included as a plan characteristic in the model of consumer demand for insurance plans below. Given the assumption on the distribution of $\varepsilon^H_{k,i,l,m}$, individual k's WTP for the hospital network offered by plan j is

$$WTP_{k,j,m}(\mathcal{G}_{j,m}) = \gamma^a_{\kappa(k)} \sum_{l \in \mathcal{L}} \gamma_{\kappa(k),l} \underbrace{\log\left(\sum_{h \in \mathcal{G}_{j,m}} \exp(\hat{\delta}_h + z_h \upsilon_{k,l} \hat{\beta}^z + d_{h,k} \hat{\beta}^d_m) \right)}_{EU_{k,j,l,m}(G_{j,m})},$$

where the expression is a weighted sum across diagnoses of the expected utility of a hospital network conditional on a given diagnosis ($EU_{k,j,l,m}(G_{j,m})$), scaled by the probability of admission to any hospital.[10]

Capps, Dranove and Satterthwaite (2003) use the estimated parameters of their utility equation to predict the change in $WTP_{k,j,m}$ when hospital i is added to the insurer's network. Integrating

[10] $EU_{k,j,l,m}(G_{j,m})$ is the expected value of the maximum of $\{u^H_{k,i,l,m}\}$ across all hospitals in $G_{j,m}$ before the realization of the (demeaned) error terms $\{\varepsilon^H_{k,i,d}\}$.

over the distribution of consumer locations, demographics, and likely clinical indications, summing over consumers in the market, and renormalizing by an (assumed constant) price coefficient, they obtain a $-valued variable $\Delta WTP_{i,j,m}$ that summarizes the population's ex ante willingness-to-pay to include hospital i in the network offered by insurer j.[11]

Finally, the authors consider a simple myopic version of a Nash bargaining model. It suggests that the insurer should include hospital i in its network whenever the population $\Delta WTP_{i,j,m}$ exceeds the cost of including it $\Delta C_{i,j,m}$. Further, if every hospital captures a proportion α of the surplus it generates, then the contribution the hospital earns above its variable costs from the interaction with managed care insurer j is:

$$\pi_{i,j,m} = \alpha(\Delta WTP_{i,j,m} - \Delta C_{i,j,m}) + u_{i,j,m}$$

The authors point out that, while this simple framework ignores potentially interesting issues (discussed below) that are raised by more detailed models of bargaining in vertical oligopoly, it has the advantage of suggesting a simple regression framework for estimating α. They make some further modifications to account for the lack of data on hospital costs before estimating a positive, statistically significant relationship between observed hospital profits and their ΔWTP measure. They use the estimates to demonstrate the model's prediction that hospital profits, and hence (under assumptions about price-cost margins) prices could change substantially following hypothetical mergers between particular pairs of hospitals in San Diego, even in cases where the Elzinga-Hogarty approach would imply very large hospital markets and little or no merger effect.

Related Papers. Recall that two other early papers address a similar question to Capps, Dranove and Satterthwaite (2003) in the context of an estimated model. Town and Vistnes (2001) is an earlier paper that develops a model of a "switching regime" where the insurer has two options if it fails to reach agreement with a given hospital: either drop it without replacement, or replace it with the next-best alternative. The authors predict enrollees' valuations for having access to different networks of hospitals using an estimated utility equation for inpatient hospitals. They then regress the log price on the log of the expected utilities from the two alternative networks. The estimates indicate that hospital prices decrease when the alternative networks available to the insurer are attractive. Hospital mergers, which reduce the number of alternative networks, can have substantial effects on prices. Gaynor and Vogt (2003) focus on the effect of ownership type (non-profit versus for-profit) on firm behavior. They estimate a model of demand and pricing in the hospital industry, allowing the behavior for for-profit and not-for-profit firms to differ, and find that not-for-profit hospitals face less elastic demand; have lower marginal costs; and higher markups

[11] Since the authors do not observe the network offered by each insurer, they define $\Delta WTP_{i,j,m}$ as the population willingness-to-pay to add the hospital to the otherwise-complete network (i.e., this does not differ across insurers).

(but lower prices) than for-profit hospitals. Simulated mergers in relatively concentrated markets lead to substantial price increases for both non-profit and for-profit hospitals.

Impact on Antitrust Policy. Overall, the models developed in these papers generate the empirically relevant prediction that prices may increase in response to horizontal mergers between hospitals. Merger price effects are predicted when the merging hospitals are substitutes at the point of service (for a particular patient). Together with a hospital merger retrospectives project launched by the Federal Trade Commission in 2002, which generated evidence that past mergers had resulted in hospital price increases, these papers have had a substantial effect on antitrust merger policy. The FTC now relies on a methodology very similar to those in Town and Vistnes (2001) and Capps, Dranove and Satterthwaite (2003) to predict the "direct effects" of mergers. The proportion of proposed horizontal mergers that were abandoned, or prevented after FTC investigation, has increased dramatically since this policy change.[12]

Given the influence of this literature on antitrust policy, it is important to assess the predictive relevance of discrete choice models in the hospital setting and their usefulness in predicting price effects of mergers. A few recent papers contribute to this process of assessment. Garmon (2017) compares the results of several potential merger screening methods to the actual post-merger price changes after 28 hospital mergers measured relative to controls. He finds that willingness-to-pay based methods more accurately flag potentially anticompetitive mergers for further investigation than previous methods based on Hirschmann-Herfindahl Indices, but there is heterogeneity in their predictive ability. Raval, Rosenbaum and Wilson (2020) use a series of natural disasters that unexpectedly removed hospitals from patients' choice sets to evaluate the ability of discrete choice models to predict patient substitution to other hospitals post-disaster. Most models considered in the paper under-predict large substitutions, but there is a significant improvement using models that include a random coefficient on distance. This line of research is clearly very useful for practitioners as well as researchers.

2.2.2 Physician - Patient Interactions

The recent I.O. literature on health care markets has focused on hospital rather than physician services, abstracting away from patients' choices of primary care providers or specialists and treating physician and patient as a single "aggregate" decision-maker rather than modeling physicians' hospital referral decisions. In reality, physicians may exploit their informational advantage to refer patients to a specific hospital, thereby influencing choice. In that case, a model which accounted

[12]However, the Capps, Dranove and Satterthwaite (2003) simple model predicts that there is no price effect of a merger between hospitals that are not direct substitutes at the point of care. We return to this issue below.

for patient choices of physicians, and for physician incentives, would have different implications for the impact of policy on patient choice and hence incentives to change prices or quality.

Ho and Pakes (2014) investigate the response of physicians' hospital referrals to the cost-control incentives imposed by managed care insurers. Commercial health insurers in California often pay large physician groups through global capitation contracts where the physician group is paid a fixed amount per patient to cover all treatment costs (including hospital costs). An alternative is professional services capitation, usually including a "shared risk" arrangement where the physician group receives a share of the savings made relative to some pre-agreed benchmark, again including hospital costs. The authors consider birth episodes. They estimate a utility equation for each insurer that summarizes the preferences implied by hospital referrals. They use a partially identified framework that addresses both measurement error in expected price and the fact that the price for a particular patient is likely to be correlated with the unobserved hospital quality for that severity. The estimates indicate that physicians' price responsiveness, when referring patients to hospitals, increases significantly with the capitation rate of insurer payments. The price coefficients are also much more negative than those from a more standard multinomial logit analysis which does not address either of the two estimation issues. Finally the authors show that, while the trade-off between distance and price differs substantially across insurers, the trade-off between distance and quality does not. That is, the estimates suggest that highly capitated, more price-sensitive plans tend to send their patients longer distances to access similar-quality services at a lower price. Consistent with this, severity-adjusted outcomes also do not differ significantly across plans. These findings are in line with Song et al. (2011) which studies the Alternative Quality Contract implemented by Blue Cross Blue Shield of Massachusetts in 2009 and finds that physicians responded to five-year global budget contracts by referring patients to lower-priced outpatient providers with no reduction in quality of care.

2.2.3 Other Related Issues

Several recent papers investigate other policy-relevant issues that affect consumer demand for providers and that the supply side (pricing) may respond to. While not always embedded in a model of provider pricing, they may be important inputs into future iterations of such a model.[13]

Price transparency. The wide variation in the price of health care procedures across providers is often difficult for consumers to observe. Various recent price transparency initiatives at the employer, insurer and state level have attempted to improve consumer price-shopping, steer patients to lower-priced options, and thereby exert downwards pressure on provider prices. The evidence

[13]Narrow and tiered networks are also relevant here; see Section 2.4 for an outline of these papers and the issues they raise.

on the efficacy of these initiatives is somewhat mixed. Several papers (Lieber (2017), Whaley (2015), Desai et al. (2016)) consider the effects of initiatives by individual employers or insurers, finding small or no effects on shopping behavior. The first papers to assess the impact of a price transparency initiative that was broadly available to all individuals in a state are Brown (2019) and Brown (2020). In March 2007 the state of New Hampshire introduced a website that allowed individuals to access information on their insurer-specific out-of-pocket prices for a subset of medical procedures. Since this intervention was market-wide, it had the potential to generate substantial supply-side effects on pricing in response to any demand-side effects from changes in shopping behavior. Brown (2019) uses difference-in-differences analyses that utilize two sources of variation: the timing of introduction of the website and variation in procedures included. Results for outpatient medical imaging services indicate that patient demand responded to price information, particularly for patients who had not yet met their deductible, and that prices fell by a modest amount (2% on average) in response to this. Brown (2020) develops an empirical model of demand and supply for medical imaging services that explicitly accounts for consumer uncertainty about prices. Consumers with rational expectations receive noisy price signals, form beliefs based on these signals, and then make decisions consistent with these beliefs. The introduction of the website is assumed to make a subset of consumers fully informed about prices; the proportion of such consumers is estimated as part of the model. Counterfactual simulations suggest that price transparency makes residual demand more price elastic and this can decrease the incentive for providers to negotiate high prices. (There is also an offsetting effect because price transparency makes consumers less likely to choose high-priced providers, reducing the incentive for insurers to refuse to include such providers in their networks, but this is dominated by the first effect in the estimated model). Overall, if all consumers had price information, prices could fall in equilibrium by as much as 20%.[14] In related ongoing work, Alcott et al. (2021) study a randomized-controlled trial in New York that provides information about negotiated prices to both consumers and providers. They find limited evidence that consumers attend to the information and discipline prices, but some evidence that providers use this information to benchmark their own negotiated rates, in some cases leading to increased prices.

Surprise billing. Cooper and Scott-Morton (2016) documents the prevalence of “surprise" out-of-network billing, under which consumers receiving care at an in-network hospital are nevertheless treated by, and receive unexpected bills from, out-of-network physicians. Over one in five patients who went to in-network emergency rooms in the authors’ data were treated by out-of-

[14]There has been some debate among researchers about the possibility that price transparency could also affect firm price negotiations directly, e.g. by facilitating collusion (Cutler and Dafny, 2011), or alternatively, resolving uncertainty about other firm bargaining weights or costs. This is discussed further in the section on negotiations for medical devices below.

network emergency physicians. This is possible because physicians in the US often negotiate contracts with insurers independently from the hospitals in which they practice. That is, particular institutional features in this market generate a profitable loophole that some providers choose to exploit. Cooper, Scott Morton and Shekita argue that, in addition to harming individual patients who receive unexpectedly large bills for their care in the short run, surprise billing also creates frictions that impede the long-run functioning of price competition in the commercial market. The ability to charge patients on an individual (unexpected) basis enables some physicians to choose to go out-of-network, thereby bypassing the downwards pressure on prices that is generated through negotiations with insurers. This is particularly feasible for physicians in emergency departments or other specialties where their services are part of a wider bundle of hospital care and cannot be avoided once the hospital choice is made. Alternatively, such physicians may use the threat of going out-of-network to negotiate increased in-network payment rates. The paper assesses the impact of a New York State law that introduced binding arbitration between emergency physicians and insurers, hence reducing physician threat points, and shows that it significantly reduced both the practice of out-of-network billing and the level of in-network emergency physician payments.

2.3 Demand: Consumer Choices in Insurance Markets

The next component of the model considers consumer choice of health insurance plans. We follow the literature by specifying the indirect utility from an insurance plan as a function of consumer and plan attributes, as in a traditional discrete choice analysis, rather than using the theory of expected utility under uncertainty to build a demand model based on individual risk preferences and exposure to risk. Each approach has advantages relative to the other. The framework considered here requires fewer assumptions but prevents the researcher from estimating risk aversion and other parameters that may be useful to answer some questions. See Section 4 for the literature that considers those issues.[15]

Ho (2006) was the first paper to model consumer demand for insurers in a way that explicitly accounted for the value of the hospital network offered by each plan. Ho and Lee (2017)'s more comprehensive data allow them to estimate a more detailed utility equation. Suppose each household chooses among the insurance plans in the choice set, taking all household members' hospital preferences into account. We can write the utility a household or family f receives from choosing insurance plan j in market m as

$$u^M_{f,j,m} = \delta_{j,m} + \alpha^{\phi}_f \phi_j + \sum_{\forall \kappa} \alpha^W_\kappa \sum_{k \in f, \kappa(k)=\kappa} WTP_{k,j,m} + \varepsilon^M_{f,j,m} \ , \tag{2}$$

[15]Einav, Finkelstein and Levin (2010) provide further discussion of the relative advantages and disadvantages of these two approaches to modeling demand for insurance.

where $\delta_{j,m}$ is an insurer-market fixed effect that controls for physician networks, brand effects, and other insurer characteristics and ϕ_j is the premium faced by the household (in reality this may vary across family sizes and is scaled to reflect the fact that the employer may make a contribution towards premiums). The term $\sum_{\forall\kappa} \alpha_\kappa^W \sum_{k\in f,\kappa(k)=\kappa} WTP_{k,j,m}(\cdot)$ accounts for the household's WTP for the insurer's hospital network by summing over the value of $WTP_{k,j,m}$ for each member of the household multiplied by an age-sex category specific coefficient, α_κ^W. Finally ε_{fjm}^M is a Type 1 extreme value error term. The parameters are estimated under the assumption that each household chooses the insurance plan that maximizes its expected utility among those available to it. This specification is consistent with households choosing an insurance product prior to the realization of their health shocks and aggregating the preferences of members when making the plan decision.

The estimated coefficients on WTP in the health plan utility equation are positive and significant in both Ho (2006) and Ho and Lee (2017). Ho (2006) uses the estimates to quantify the welfare loss from restricted hospital choice due to exclusion from insurers' networks. The loss to society is approximately \$16 per consumer, or \$1 billion per year over 43 major US markets studied, holding prices fixed. The author notes that this may be substantially outweighed by the price and premium reductions resulting from insurers' ability to threaten hospital exclusion during price negotiations with providers.

Specification differences across papers. The detailed data available to Ho and Lee (2017) enable them to make relatively weak assumptions for estimation. In particular, they have access to household level plan choice data rather than aggregate market shares, and thus can model plan choices at the household level rather than the individual level and permit household characteristics (such as the number of children and household income) to affect choices. In addition, they observe—and condition on—the identities of the insurers in each household's choice set. In contrast, Ho (2006) uses different datasets to estimate hospital versus insurer demand, and does not see family composition. She therefore models both insurer and hospital demand at the individual consumer (rather than household) level. The insurance plan utility equation is estimated from aggregate market share data. Individuals' employer-based choice sets are not observed, so the estimates are interpreted as reflecting the joint preferences of the employers choosing the choice sets and the employees choosing their plans.

Ho and Lee (2017) do not explicitly model household responsiveness to deductibles, copays, or coinsurance rates. Accounting for them would add complexity to the pricing and premium-setting equations set out below. They note that, as long as the financial generosity of plans (outside of premiums) does not vary when an insurer is added to or removed from a market, the impact of deductibles and copays will be absorbed into plan-market fixed effects and not affect the analysis.

However, this simplification abstracts away from possible consumer sensitivity to hospital prices through out-of-pocket payments, an issue assessed in Gowrisankaran, Nevo and Town (2015) (Section 2.4 below) among others.

2.4 Supply: Insurer-Hospital Price Negotiations and Premium Setting

Provider payments from commercial health insurers are determined by bilateral bargaining between insurers and providers. We now outline a model of these negotiations, developed in Ho and Lee (2017), that considers pricing at two levels of a vertical market.[16] A demand system like the one outlined above is an important model input. While the model is necessarily somewhat involved, it (or something similar) is an essential tool to consider a number of policy-relevant questions. Ho and Lee (2017) use their estimated model to examine the impact of insurer competition on premiums, prices, and welfare in the U.S. commercial health care industry. The model captures the standard intuition that reduced insurer competition may increase health expenditures by raising insurer premiums and, with them, the payments made to medical providers. Offsetting this, a more concentrated insurance sector can also strengthen insurers' bargaining leverage when negotiating with medical providers. This additional effect—a variant of countervailing power (Galbraith, 1952)—can mean that greater downstream concentration can reduce total hospital payments. The overall effect is theoretically ambiguous. The model makes clear that the effects of reduced competition on premiums and payments are closely linked; any overall assessment of the impact of insurer competition needs to consider them together as part of the same model.

2.4.1 A model of price and premium negotiations

Ho and Lee (2017) assume that commercial insurers engage in simultaneous bilateral Nash bargaining ("Nash-in-Nash" bargaining) over premiums with a large employer, and (at the same time) in simultaneous bilateral Nash bargaining with hospitals over prices in each market. This bargaining protocol, which assumes that each bilateral negotiation maximizes bilateral Nash products (taking the outcomes of all other bargains as given), was proposed in Horn and Wolinsky (1988). It has been used in applied work to model upstream-downstream negotiations over input prices in oligopolistic vertical markets (e.g., Crawford and Yurukoglu (2012), Grennan (2013), Gowrisankaran, Nevo and Town (2015)). See the companion chapter on vertical markets by Lee, Whinston and Yurukoglu for further details on the model.

More formally: consider the set of insurers (or MCOs) $\mathcal{M}$ that are offered by an employer, and a group of markets that contain a set of hospitals $\mathcal{H}$. Let the network of hospitals and MCOs

[16] Papers which consider other health insurance contexts, like Medicare where prices are set administratively, necessarily rely on different models of supply that fit their particular settings.

be represented by $\mathcal{G} \subseteq \{0,1\}^{|\mathcal{H}|\times|\mathcal{M}|}$, where $ij \in \mathcal{G}$ denotes that hospital i is present in MCO j's network. Assume that an enrollee in MCO $j \in \mathcal{M}$ can only visit hospitals in j's network, $\mathcal{G}_j^M$; similarly, $\mathcal{G}_i^H$ denotes the set of insurers that have contracted with (and are allowed to send patients to) hospital i. Take the network $\mathcal{G}$ as given, and assume the following timing, which follows the overall framework described in this section:

1a. The employer and the set of MCOs bargain over premiums $\boldsymbol{\phi} \equiv \{\phi_j\}_{j\in\mathcal{M}}$, where ϕ_j represents the per-household premium charged by MCO j.

1b. Simultaneously with premium bargaining, all MCOs and hospitals $ij \in \mathcal{G}$ bargain to determine hospital prices $\boldsymbol{p} \equiv \{p_{ij}\}$, where p_{ij} denotes the price paid to hospital i by MCO j for treating one of j's patients.

2. Given hospital networks and premiums, households choose to enroll in an MCO, determining household demand for MCO j in market m, denoted by $D_{j,m}(\mathcal{G}, \boldsymbol{\phi})$, and the number of enrollees $D^E_{j,m}(\mathcal{G}, \boldsymbol{\phi})$ (Section 2.3 above).

3. After enrolling in a plan, each individual becomes sick with some probability; those that are sick visit some hospital in their network. This determines $D^H_{ijm}(\mathcal{G}, \boldsymbol{\phi})$, the number of individuals who visit each hospital i through each MCO j in market m (as in Section 2.2).

The assumption that premiums and hospital prices are simultaneously determined, rather than sequential, simplifies computation and estimation of the model because prices can be treated as fixed when evaluating payoffs from premium bargaining and premiums can be held fixed when considering both agreement and disagreement payoffs from hospital price bargaining (see the equations below). While the assumption implies some theoretical restrictions on the relationship between prices and premiums, it does not mean that premiums are independent of negotiated hospital prices in equilibrium. There is a relationship between the two, which is influenced by consumer demand and other factors, because the two variables are constrained to be "optimal" (i.e., maximize their bilateral Nash products) with respect to each other in equilibrium. Thus, for example, an increase in premiums due to insurer mergers can have a positive effect on hospital prices in equilibrium (intuitively, as the "larger pie" generated by increased concentration is shared between insurers and hospitals) and, since hospital prices are assumed to be linear, double marginalization will also be present.[17] Note also that, while not entirely realistic, the simultaneity assumption may

[17]However, the simultaneity assumption does rule out some vertical incentives. For example, when considering raising prices to an insurer, a hospital does not internalize the effect of its price increase on downstream premiums. Further, the assumption implies that premiums do not change upon disagreement (off the equilibrium path). The effect of these issues may be limited in Ho and Lee (2017) because hospitals are small contributors to overall premiums that are set at the state level. They may, however, be important in other settings.

not be unreasonable in this setting. Since prices and premiums are set at staggered intervals and are fixed for different period lengths in reality, the obvious alternative timing assumption—that premiums immediately adjust to changes in negotiated prices—may not be more accurate.

Profit Equations. MCOs and hospitals seek to maximize profits when bargaining over negotiated prices and premiums. Assume that the profits for MCO j are given by

$$\pi_j^M(\mathcal{G}, \boldsymbol{p}, \phi_j) = \sum_m \left(\phi_j \boldsymbol{D}_{j,m}(\cdot) - D_{j,m}^E(\cdot)\eta_j - \sum_{h \in \mathcal{G}_{j,m}^M} D_{h,j,m}^H(\cdot) p_{h,j} \right) . \tag{3}$$

The first term on the right-hand side of (3) represents total premium revenues obtained by MCO j. The second term is non-inpatient hospital costs, such as payments to primary care physicians, while the third represents expected payments made to hospitals in MCO j's network for inpatient services.

The corresponding expression for the profits for a hospital i is:

$$\pi_i^H(\mathcal{G}, \boldsymbol{p}, \boldsymbol{\phi}) = \sum_{n \in \mathcal{G}_i^H} D_{in}^H(\cdot)(p_{in} - c_i) , \tag{4}$$

which sums, over all MCOs n with which hospital i contracts, the number of patients it receives multiplied by an average margin per admission (where c_i is hospital i's average cost per admission for a patient).

All demand-related terms in either MCO or hospital profits, $(D_{j,m}(\cdot), D_{j,m}^E(\cdot), D_{ijm}^H(\cdot))$, are determined by the two-stage demand model described in the previous subsection. Any components of MCOs' or hospitals' profits that do not vary with the network, including fixed costs, do not affect the subsequent analysis and are omitted.

Employer-Insurer Bargaining over Premiums. Assume that premiums for each MCO are negotiated with the employer via simultaneous bilateral Nash bargaining, where the employer maximizes its employees' welfare minus its total premium payments. This assumption nests the standard Nash-Bertrand model of premium setting. Negotiated premiums ϕ_j for each MCO j thus satisfy

$$\phi_j = \arg\max_{\phi_j} [\underbrace{\pi_j^M(\mathcal{G}, \boldsymbol{p}, \{\phi, \boldsymbol{\phi}_{-j}\})}_{GFT_j^M}]^{\tau^\phi} \times [\underbrace{W(\mathcal{M}, \{\phi, \boldsymbol{\phi}_{-j}\}) - W(\mathcal{M} \setminus j, \boldsymbol{\phi}_{-j})}_{GFT_j^E}]^{(1-\tau^\phi)} \forall j \in \mathcal{M} , \tag{5}$$

(where $\boldsymbol{\phi}_{-j} \equiv \boldsymbol{\phi} \setminus \phi_j$) subject to the constraints that the terms $GFT_j^M \geq 0$ and $GFT_j^E \geq 0$. These terms represent MCO j's and the employer's "gains-from-trade" (GFT) from coming to agreement and having MCO j in the employer's choice set. The MCO's gains-from-trade are its profits from being offered by the employer; its disagreement outcome is assumed to be 0. The employer's gains-from-trade are the difference between its objective $W(\cdot)$ when MCO j is and is not offered. Ho and Lee model $W(\cdot)$ as the employer's total employee welfare net of its premium payments to insurers.

Given the timing assumptions, outside options from disagreement are determined by removing MCO j from the employer's choice set, holding fixed premiums and negotiated hospital prices for other MCOs, but allowing employees to choose new insurance plans (but not switch employers).

The Nash bargaining parameter for this negotiation is $\tau^\phi \in [0, 1]$, where $\tau^\phi = 1$ implies that MCOs simultaneously set profit-maximizing premiums (i.e., compete via Nash-Bertrand), and $\tau^\phi = 0$ implies that the employer pays each MCO only enough to cover its costs.

Insurer-Hospital Bargaining over Hospital Prices. As with premiums, hospital prices $\boldsymbol{p}$ are determined via simultaneous bilateral Nash bargaining.[18] Each negotiated price per-admission $p_{ij} \in \boldsymbol{p}$ between hospital $i \in \mathcal{H}$ and MCO $j \in \mathcal{M}$ (for all $ij \in \mathcal{G}$) maximizes the pair's bilateral Nash product:

$$p_{ij} = \arg\max_{p_{ij}} \left[\pi_j^M(\mathcal{G}, \boldsymbol{p}, \boldsymbol{\phi}) - \pi_j^M(\mathcal{G} \setminus ij, \boldsymbol{p}_{-ij}, \boldsymbol{\phi})\right]^{\tau_j} \times \left[\pi_i^H(\mathcal{G}, \boldsymbol{p}, \boldsymbol{\phi}) - \pi_i^H(\mathcal{G} \setminus ij, \boldsymbol{p}_{-ij}, \boldsymbol{\phi})\right]^{(1-\tau_j)}, \tag{6}$$

where the Nash bargaining parameter for MCO j is represented by $\tau_j \in [0, 1]$. That is, each price p_{ij} maximizes the product of MCO j and hospital i gains-from-trade, holding fixed all other negotiated prices $\boldsymbol{p}_{-ij} \equiv \boldsymbol{p} \setminus p_{ij}$, where $\pi_j^M(\mathcal{G} \setminus ij, \boldsymbol{p}_{-ij}, \boldsymbol{\phi})$ and $\pi_i^H(\mathcal{G} \setminus ij, \boldsymbol{p}_{-ij}, \boldsymbol{\phi})$ are MCO j and hospital i's disagreement payoffs. Since each bilateral bargain occurs concurrently with premium setting, both parties to a disagreement believe that the new network will be $\mathcal{G} \setminus ij$, and all other prices $\boldsymbol{p}_{-ij}$ and premiums $\boldsymbol{\phi}$ remain fixed.

2.4.2 Equilibrium Negotiated Premiums and Hospital Prices

Next the authors derive the first-order conditions for the premium and hospital price bargaining equations in (5) and (6) to examine how insurer competition affects their determination in equilibrium.

[18] The authors' empirical application actually allows for insurers to bargain simultaneously with hospital systems.

Insurer Premiums. Setting the first-order conditions of (5) equal to 0 (for a given network and set of premiums $\boldsymbol{\phi}_{-j}$, and set of negotiated prices $\boldsymbol{p}^*$) generates a set of conditions that correspond to the standard Nash-Bertrand first-order conditions when $\tau^\phi = 1$: $\partial \pi_j^M(\cdot)/\partial \phi_j = 0$ for all j. However, holding fixed $\boldsymbol{\phi}_{-j}$, if $\tau^\phi < 1$, then the equilibrium premium for j will likely be lower than that predicted under Nash Bertrand premium setting. It will be particularly low, for example, if the MCOs' Nash bargaining parameter (τ^ϕ) is low; the profits that MCO j receives from the employer ($\pi^M(\cdot)$) are high; the employer's gains-from-trade with the MCO (GFT_j^E) are low; or the harm to the employer from higher premiums ($-\partial GFT_j^E(\cdot)/\partial \phi_j$) is large.

Hospital Prices. Turning now to hospital prices, the first-order conditions of (6) (for a given network, set of premiums $\boldsymbol{\phi}$, and set of negotiated prices $\boldsymbol{p}^*_{-ij}$) are

$$\underbrace{p_{ij}^* D_{ij}^H}_{\text{total hospital payments}} = (1-\tau_j)\left[\underbrace{[\Delta_{ij} D_j](\phi_j - \eta_j)}_{\text{(i) premium and enrollment effect}} - \underbrace{\left(\sum_{h \in \mathcal{G}_j^M \setminus ij} p_{hj}^* [\Delta_{ij} D_{hj}^H]\right)}_{\text{(ii) price reinforcement effect}}\right]$$
$$+ \tau_j \left[\underbrace{c_i D_{ij}^H}_{\text{(iii) hospital cost effect}} - \underbrace{\sum_{n \in \mathcal{G}_i^H \setminus ij} [\Delta_{ij} D_{in}^H](p_{in}^* - c_i)}_{\text{(iv) recapture effect}}\right] \qquad \forall ij \in \mathcal{G}\ , \quad (7)$$

where we have dropped the arguments of all demand functions for expositional convenience, and $[\Delta_{ij} D_j] \equiv D_j(\mathcal{G}, \cdot) - D_j(\mathcal{G} \setminus ij, \cdot)$, and $[\Delta_{ij} D_{hj}^H] \equiv D_{hj}^H(\mathcal{G}, \cdot) - D_{hj}^H(\mathcal{G} \setminus ij, \cdot)$ represent the adjustments in demand when hospital i and MCO j come to a disagreement.

Equation (7) decomposes the determinants of negotiated payments when MCO j and hospital i bargain over the gains-from-trade created when that hospital is included in j's network. These gains are primarily obtained by MCOs through higher premiums and additional enrollees. The first line of the equation, representing MCO j's gains from having hospital i on its network, comprises two terms. The first is the premium and enrollment effect: the effect of hospital i's inclusion in MCO j's network on the MCO's premium revenues. Second is the price reinforcement effect: the adjustment in payments per enrollee that j makes to other hospitals in its existing network upon dropping i. The second line of (7), representing hospital i's gains from being included in MCO j's network, also comprises two terms: the hospital cost effect indicates that every unit increase in hospital i's costs results in a τ_j unit increase payments. Finally, the recapture effect is the adjustment in hospital i's reimbursements from other MCOs when i is removed from MCO j's

network.

These terms have intuitive effects on equilibrium negotiated prices. The premium and enrollment effect indicates that the greater is the loss in an MCO's premium revenues (net of non-hospital costs) from losing access to a hospital, the more that hospital is paid. The price reinforcement effect indicates that, if hospital i's patients on MCO j substitute to cheaper hospitals when i is dropped, hospital i is paid less than if its patients switch to more expensive hospitals. The Nash bargaining parameter determines how completely the hospital is able to pass through cost increases to the MCO. And finally, the recapture effect represents hospital i's "opportunity cost" from being in MCO j's network: the more hospital i would be paid by other MCOs if i dropped MCO j, the more MCO j pays i in equilibrium.

Effects of Reducing Insurer Competition. The authors use the bargaining first-order conditions to assess the impact of a reduction in insurer competition due to the removal of an insurer from the employer's plan menu. They note first that the logic from Nash-Bertrand premium setting is still present: the removal of an insurer tends to reduce "competitive pressures" (i.e., the elasticity of demand with respect to premiums for each MCO), and thus increase premiums. However, if $\tau^{\phi} < 1$, there are additional effects. The term $GFT_j^E(.)$ may either increase or decrease for an MCO j when a rival insurer is removed, depending on the relative cost-effectiveness of the different plans and other attributes that affect their value to the employer. Any net increase in $GFT_j^E(.)$ would reduce the extent to which premium-setting departed from Nash-Bertrand behavior and lead to additional upward pressure in j's premiums, but might also be offset by an increase in $\pi_j^M(.)$. Overall, in this model, it is possible for premiums to either increase or decrease as a result of removing an MCO from the choice set, even holding hospital payments fixed.

The effects on hospital prices are also non-trivial. The removal of a rival MCO affects every term in equation (7). The effect on the first term is theoretically ambiguous. On one hand, when a rival insurer is no longer competing for the same enrollees, the loss of hospital i typically results in a smaller adjustment to MCO j's enrollment; this is a primary source of MCOs' additional bargaining leverage when negotiating with hospitals in less competitive markets, and can lead to lower negotiated prices. On the other hand, a less competitive insurance market may generate higher premiums, which will tend to increase negotiated prices. The effects on terms (ii) and (iv) of the equation are even more difficult to sign because they are affected by changes in demand for all MCOs n and are also a function of the equilibrium prices paid to all hospitals. Finally, the impact of insurer competition on term (iii) will be limited in this model because hospital costs per admission are assumed not to be a function of realized hospital demand.

Overall, the equilibrium effects of insurer competition on negotiated prices and premiums (and consequently on consumer welfare and industry profits) depend on underlying demand primitives,

firm heterogeneity, and institutional details. Ho and Lee estimate the components of the model using detailed household and individual-level data from the California Public Employees' Retirement System (CalPERS), a benefits manager that provides pension and health benefits to California state and public employees. The details of the demand system are described in previous sections of this chapter. The remaining components of the model—insurer non-inpatient hospital costs $\boldsymbol{\eta}$ and Nash bargaining parameters $(\tau^{\phi}, \boldsymbol{\tau})$—are estimated jointly using two-step GMM based on three sets of moments: two derived from the premium and price first-order conditions and a third "margin moment", which is particularly helpful in pinning down insurers' non-inpatient hospital costs, that fits observed to predicted insurer margins defined as the MLR obtained from financial reports from the California Department of Managed Health Care.

The authors' simulations demonstrate that neither premiums nor hospital reimbursements need necessarily increase upon the removal of an insurer. In their setting, two particular factors help determine the premium changes for one insurer (in the application this is Blue Shield) when a rival insurer is removed: (i) the size and attractiveness to enrollees of the insurer that is removed; and (ii) the presence of effective premium setting constraints. If premiums are not constrained by the employer—modeled by assuming Nash Bertrand premium-setting—premiums for Blue Shield are predicted to rise when its rival is removed. This is consistent with other results in the literature (e.g., Dafny, 2010; Dafny, Duggan and Ramanarayanan, 2012; Trish and Herring, 2015). Predicted increases are larger on removal of Kaiser, which has approximately a 40% statewide market share, than Blue Cross, with a 16% share. However, when premium setting is constrained—modeled by assuming Nash bargaining as laid out above—premium increases are predicted to be smaller, and even negative when Blue Cross is removed. Countervailing power effects are also empirically relevant: they may lead to lower negotiated prices and hence limited premium increases. Finally, in every counterfactual, there is substantial heterogeneity in predicted price changes across providers and markets.

2.4.3 Other related papers

Several other papers also use models of bargaining between hospitals and health insurers to consider policy-relevant questions, often related to hospital mergers. Capps, Dranove and Satterthwaite (2003) and Town and Vistnes (2001), both discussed above, are early examples that use a simple bargaining concept to motivate a regression equation linking willingness-to-pay to observed hospital profits or prices.

Gowrisankaran, Nevo and Town (2015) develops and estimates a model of hospital-insurer bargaining which is used to predict the impact of hospital mergers on negotiated prices. In contrast to Ho and Lee (2017), the main analysis assumes that premiums are fixed and enrollees do not choose health plans; that is, insurers do not compete with one another in the downstream market

for enrollees. The insurer objective function is not its profit; this would be a function of enrollment which the authors do not model. Instead insurers maximize a weighted sum of (negative) expected payments to in-network hospitals and the WTP variable derived in Capps, Dranove and Satterthwaite (2003).[19] This simplification comes at the cost of ignoring the impact of networks on enrollment and hence insurer profit, and the equilibrium relationship between premiums and hospital prices, that are captured in Ho and Lee (2017). Instead the authors add flexibility on other dimensions. Most notably, they include an out-of-pocket price due to coinsurance in the hospital utility equation. Under the assumption that hospital prices are known to consumers, they use the Nash-in-Nash bargaining framework to derive a first-order condition for prices, conditional on hospital demand parameters and observables, which indicates that patients who face coinsurance payments are sensitive to hospital prices at the point of care. This adds a new lever—consumer price sensitivity—that affects negotiated price levels in equilibrium. It can also affect price dispersion: since MCOs use prices to steer patients towards cheaper hospitals, they have less incentive to exclude high-priced providers from their networks, so higher-cost hospitals may have relatively high negotiated prices in equilibrium.[20]

Prager and Tilipman (2020) also consider a Nash-in-Nash model of hospital-insurer bargaining, focusing their attention on modeling hospital disagreement points. Rather than assuming the hospital's share of patients from a particular plan falls to zero on disagreement, they allow patients to access out-of-network hospitals at potentially higher out-of-pocket prices. The authors show how this feature can affect negotiated prices for in-network hospitals and explore its implications for the impact of proposed policies to impose caps on out-of-network prices.

2.4.4 Revisiting provider consolidation

The model developed in Ho and Lee (2017) has implications for hospital merger price effects that are broader than those from the prior literature. Dafny, Ho and Lee (2019) note that the simplified theoretical framework in Capps, Dranove and Satterthwaite (2003), which (along with the similar model in Town and Vistnes (2001)) is used as an input to assess the anti-competitive threat from hospital mergers, makes the implicit assumption that there can be no increase in bargaining leverage unless the merging parties are competing to provide the same set of services to the same set of patients. Since insurance enrollment is not modelled, insurance markets are assumed independent of patient markets and irrelevant for hospital negotiations, and patient demand is not permitted to be linked across markets. Thus, while the model generates the empirically relevant prediction that prices may increase in response to mergers between same-market hospitals, there is no predicted

[19] The authors also compare their results to a calibrated version of their model in which insurers engage in Nash-Bertrand premium setting.

[20] Brown (2020) makes a similar point in the context of price transparency; see Section 2.2.

price effect of cross-market mergers.

Dafny, Ho and Lee (2019) argue that the fact that insurers bundle together a network of hospitals' services before selling the resulting insurance plans to their customers can generate linkages across markets that may lead to cross-market merger price effects. For example, since insurers sell their plans not directly to individual consumers but instead to employers and households, there may be "common customers" who value the services offered by merging parties that operate in distinct patient markets. These common customers could be large employers that demand insurance products covering hospital services in multiple distinct geographic markets, i.e. areas where their employees live and work. A merged cross-market hospital system that covers those regions may be able to demand higher reimbursement rates from insurers. Hence common customers can create links across markets which in turn generate price effects of cross-market hospital mergers.[21]

Two recent papers provide early empirical evidence of price effects of cross-market hospital mergers. Lewis and Pflum (2017) use a difference-in-differences analysis to assess the impact of cross-market hospital mergers on prices. They find that independent hospitals acquired by out of market systems raise price by 17-18 percent, and the effects are larger when the acquiring system is larger or when the acquired hospital is smaller (by number of beds). They argue that greater post-merger bargaining skill is the most credible explanation for the results. Dafny, Ho and Lee (2019) examine two distinct samples of acute-care hospital mergers, addressing concerns about the exogeneity of which hospitals are parties to transactions by focusing on hospitals that are likely to be "bystanders" rather than the drivers of transactions. They estimate that prices for hospitals acquiring a new system member in the same state but not the same narrow geographic market ("adjacent treatment hospitals") increase by 7-10 percent relative to control hospitals, while non-adjacent treatment hospitals have small, statistically insignificant relative price changes. Acquirers raise their own prices, not just those of targets, suggesting that significant quality or bargaining improvements (such as might arise for targets following a takeover) are unlikely to be the source of price increases. Price effects are largest when the merging parties have hospitals in closer geographic proximity.

Schmitt (2018) has a related but distinct finding: mergers that increase multi-market contact between hospital systems raise prices by 6% in markets where there is no change in market structure from the merger. Brand and Rosenbaum (2019) review this small literature and conclude that there is reasonable empirical evidence that cross-market mergers lead to higher prices. However, they argue that more work is needed to understand the mechanisms behind the estimated effects and their implications for antitrust policy.

[21] Common customers can also be households that demand services of hospitals in the same geographic market but different product markets, e.g. pediatric and cardiac hospitals. See also Vistnes and Sarafidis (2013) for a further discussion of these issues.

2.4.5 Network Formation

The literature discussed above focuses on predicting hospital prices for a given hospital network. As noted, however, insurance plans are increasingly differentiated in terms of network breadth. This raises interesting questions about the determinants of hospital networks and the impact of narrow networks on prices and other outcomes. A small literature (Gruber and McKnight, 2016; Atwood and LoSasso, 2016; Wallace, 2019) suggests that employers realize spending reductions with no adverse effect on clinical quality when they offer narrow network plans.

Ho (2009) takes a first step towards modeling hospital network formation and contracting, assuming a take-it-or-leave-it offers model to determine hospital prices. She uses the estimated model of consumer demand for hospitals and insurers given the network offered from Ho (2006) as an input. In a partially identified framework, Nash conditions on observed networks (no plan could improve its profits by reversing a decision with any hospital; no hospital could do better by offering a null contract to any plan) are sufficient to place bounds on the determinants of equilibrium hospital profits despite the fact that the data do not include information on hospital prices. The estimates indicate that hospitals in systems, and those that are particularly attractive to patients, capture high markups while those with higher costs per patient receive lower markups than others. However, this paper is limited to using the observed variation in network breadth to make inferences about hospital profits, in a setting where provider prices and profits are not observed. It does not take the next step of endogenizing network formation.

Shepard (2020) picks up the thread of this literature. He studies network variation across plans and within-plan over time on the Massachusetts Health Connector insurance exchange that was established in 2006. He demonstrates substantial adverse selection against plans that offer the star academic hospitals (most obviously the hospitals in the Partners system in Boston). The sickest consumers, and also those who may be less sick but who have a strong preference for Partners hospitals, tend to enroll in these plans. Thus insurers have an incentive to exclude Partners hospitals in order to cream-skim enrollees, avoiding those who are costly to insure (either because of their preferences or their medical risk). Shepard demonstrates the magnitude of these incentives using a two-stage model of insurer and provider choice combined with a cost model that is estimated from claims data. He notes that a large insurer dropped the Partners hospitals in 2012. This led to a substantial shift of enrollees away from the plan, but it improved the plan's bottom-line profitability while reducing profits for its peers that continued to offer Partners access. By the end of 2014, only one plan covered Partners, and it had been purchased by Partners in 2013. The cream-skimming incentive for narrower networks is most relevant in individual health insurance markets as opposed to markets where employers select plans for their employees. This may help explain why narrow network plans have proliferated in exchanges while remaining uncommon in employer-based insurance.

Tilipman (2021) takes the ideas in Ho (2009) further, adding switching costs to the insurer choice equation and estimating a model of consumer demand for physicians (as well as hospitals) that also allows for inertia. He uses a partially identified framework, under simple assumptions regarding price and premium adjustments, to bound the fixed costs faced by employers choosing their menus of plans in order to maximize an objective function that weights employee surplus and (negative) premiums and fixed costs. Offered plans differ in their hospital and physician networks as well as their premiums. Tilipman uses the estimates to explore the influence of switching costs on employers' health plan offerings, and particularly the networks of the plans they offer, and finds it is substantial. We discuss this paper in more detail in Section 4 below.

A Model of Price Negotiation and Network Formation: Nash-in-Nash With Threat of Replacement. Ho and Lee (2019) investigate the issues raised in the previous literature by developing a model that allows them to endogenize insurer network formation. They study the same CalPERS setting that was analyzed in Ho and Lee (2017), noting that in the year following their data, one of the large insurers (Blue Shield HMO) had requested permission to exclude a substantial number of hospitals from its network. Networks were previously constrained by CalPERS to be essentially complete. The authors argue that one possible reason why an insurer might choose to exclude a hospital is related to price negotiation. By excluding some hospitals from its network, an insurer may be able to negotiate lower prices with those that remain.

Ho and Lee develop the Nash-in-Nash price negotiation model from their previous paper on two dimensions. First, they introduce an initial stage where a single insurer commits to a particular network prior to bargaining. Second, they modify the bargaining framework to allow out-of-network hospitals to influence negotiated payments. Intuitively, we can think of each bilateral insurer-hospital pair as engaging in simultaneous Nash bargaining over their gains-from-trade (as in Nash-in-Nash bargaining), with the important addition that each insurer is permitted not just to drop its bargaining partner but also to replace it with any alternative hospital that is not already on its network. In the hospital-insurer setting, this may be intuitively more reasonable than the Nash-in-Nash assumption that an insurer's only alternative to reaching agreement with a particular hospital is to exclude it without replacement, even if other alternative hospitals exist outside the network. The extension is also useful in rationalizing exclusion, because it effectively generates an endogenous cap on Nash-in-Nash prices, where the effectiveness of the cap depends on the existence of credible alternative (currently excluded) negotiating partners. The new bargaining solution, Nash-in-Nash with Threat of Replacement, assigns each included hospital a payment equal to the minimum of (i) what would be paid under Nash bargaining, holding fixed other hospital prices at NNTR prices and (ii) the price that would make the insurer indifferent between keeping the hospital in its network, and replacing it with the "best" alternative at the lowest price that the

alternative provider would be willing to accept.[22]

One further component of the model is important for understanding its implications. The NNTR solution is defined to be admissible only for networks that are stable, i.e. that satisfy conditions implying that no party has a unilateral incentive to terminate a contract based on negotiated prices. The authors show this is equivalent to assuming that any hospital included in the network must generate higher joint surplus with the insurer than any excluded hospital. Overall, in order to affect equilibrium bargaining outcomes, excluded hospitals must be sufficiently attractive—i.e., must have the potential to generate enough surplus—to provide the insurer with additional leverage in bargaining, but not so much that excluding them makes the network unstable. Thus the NNTR solution concept provides an opportunity for the detailed data and demand model to inform which hospitals are most likely to be excluded, and why. Note that, if excluded hospitals are sufficiently unattractive that they are not credible outside options, then the NNTR solution coincides with the Nash-in-Nash outcome. This would also be true if the network was complete.

The paper then proceeds to simulations, based on the estimated model in Ho and Lee (2017) combined with the new bargaining concept, which demonstrate that NNTR provides the insurer with a new empirically-relevant incentive to exclude hospitals: while the Nash-in-Nash solution has difficulty rationalizing any exclusion by Blue Shield in the relevant year, the NNTR solution does not. The model can also explain why an insurer might choose to exclude more than one hospital from its network in some markets. Since hospitals are differentiated on multiple (vertical and horizontal) dimensions, the most effective threat for replacing one hospital that remains in the network may be different from the most effective threat for another.

Note that the Ho and Lee (2019) model endogenizes network formation only in settings with a single strategic insurer. Their application is particularly suitable for this assumption because it is plausible to assume that only a single insurer chooses its network strategically.[23] However, there remains a question of how to expand the model to account for multiple strategic insurers. Ho and Lee (2019) suggest that the most direct extension would assume that each insurer simultaneously announced the set of hospitals it was willing to negotiate with, and that prices were then determined by the NNTR bargaining solution. If appropriate extensions were made to the concept of stability, this would allow authors to begin to analyze insurer competition with endogenous networks and prices. However, the extension would face at least two challenges. The first is computational,

[22]The theory builds on the literature on bargaining with outside options, particularly the discussion of "deal me out" versus "split the difference" models in Binmore, Shaked and Sutton (1989) and the model of bargaining with endogenous outside options in Manea (2018). Insights from these papers are adapted to a bilateral contracting environment where firms can negotiate with multiple partners and there are externalities between bargains.

[23]The other two insurers are Kaiser Permanente, a vertically integrated insurer that owns its hospitals and does not contract with other providers, and Blue Cross PPO, a broad network plan which included essentially every hospital in the markets it covered.

since the number of potential combinations of networks to be analyzed would increase rapidly with the number of insurers. The second is conceptual: the NNTR solution only allows one side of the market (insurers) to threaten replacement of the other (hospitals). In a setting with multiple strategic insurers, it seems unreasonable to ignore the possibility that hospitals could do the same, leveraging excluded insurers in negotiations. This introduces issues related to endogenizing each agent's outside options given the contracting externalities embedded in the model. For example, if one hospital threatens to replace insurer j with insurer j', does it predict that j might also replace it with an alternative? Does this affect the identity of the hospital's optimal replacement for j? Further, are the information and timing assumptions defined such that some alternative (excluded) bargaining partners maintain some bargaining leverage rather than being forced down to their reservation prices? Many of these questions raise dynamic considerations; they suggest an alternative approach of specifying a fully dynamic network formation game. One promising route forward is provided in Lee and Fong (2013), which proposes a dynamic model of network formation and bargaining in a bilateral oligopoly between multiple upstream and downstream firms. Their model also endogenizes networks and outside options, in a setting where agents anticipate future (not contemporaneous) adjustments to the network while bargaining.

Ghili (2020) and Liebman (2020) are recent papers that are complementary to Ho and Lee (2019). Each develops a model that also allows excluded hospitals to affect insurers' negotiated rates with included hospitals in a static framework. These models of negotiation are embedded into a demand model similar to that in Ho (2006) and Ho and Lee (2017). Details of the bargaining frameworks differ across papers. Ghili (2020) is based on pairwise stability conditions (as in Jackson and Wolinsky (1996)) which imply that any hospital-insurer pair that is excluded in equilibrium must be unable to generate positive gains from trade conditional on the prices negotiated by included hospitals. This is a stronger assumption than the stability condition in Ho and Lee (2019), making it more difficult for the model to predict exclusion. The author rationalizes the networks observed in the data by estimating a recurring fixed cost of contracting. He allows multiple insurers to choose networks simultaneously, although he does not address the issues relating to contracting externalities outlined above. Liebman (2020) adapts a bargaining protocol from Collard-Wexler, Gowrisankaran and Lee (2019). He allows an insurer to commit to a maximum number of hospitals that it will contract with; upon disagreement, a replacement hospital is perceived to be randomly chosen from an exogenously determined set of potential replacements. This is an interesting modification to the model that takes seriously the idea that as the insurer excludes more hospitals, the continuation value of those that remain falls, leading them to accept lower prices. However, it does not allow the estimated demand model, and detailed data, to help inform which hospitals are good substitutes for others and hence might profitably be excluded.

Other authors have considered yet more complex questions related to network formation. In re-

cent years insurers have begun to offer tiered hospital networks, in which some hospitals are made available at lower coinsurance rates than others. Intuitively, this should have the effect of constraining consumer choice—and making consumers aware of price differences between hospitals—without fully removing providers from the choice set. Prager (2020) considers consumer demand in the presence of tiered networks. She shows that consumers substitute towards hospitals on more preferred tiers, presumably generating incentives for insurers to establish tiered networks and also affecting price negotiations in the presence of such tiers. Consistent with this intuition, Starc and Swanson (2021) provide evidence from Medicare Part D data that drug plans with more restrictive preferred pharmacy networks pay lower retail drug prices. To our knowledge, no paper yet estimates a model that accounts for these supply side effects.

Distinguishing Features of NNTR versus Nash-in-Nash bargaining. We know of no simple way to test whether the observed variation in a particular dataset is consistent with the Nash-in-Nash model, the NNTR concept, or some alternative bargaining model. Ho and Lee (2019) note that, under their assumptions, the Nash-in-Nash model does not rationalize exclusion by Blue Shield in the year in which it in fact proposed to exclude a number of hospitals, while their NNTR solution predicts this outcome quite naturally. This is helpful evidence to support the NNTR concept but it is not definitive. Other modifications to the Nash-in-Nash framework such as fixed costs of contracting (as in Ghili (2020)), or increasing marginal costs at the insurer-hospital level, could also fit this dimension of the data.

Similarly, it is tempting to try to distinguish between models by asking whether the breadth of networks (the proportion of hospitals in the market that are included) is positively correlated with prices. Unfortunately, the intuition that suggests such a test is incomplete. There are two offsetting effects when the network is expanded under NNTR: (a) the standard effect, also relevant for Nash-in-Nash bargaining, under which adding substitutes to the network reduces each hospital's marginal contribution to the joint surplus and hence reduces payments; (b) the additional "threat of replacement" effect that reducing the number of excluded providers potentially reduces the insurer's ability to play included hospitals against excluded ones. The relative importance of these effects depends on many factors including the characteristics of the relevant market and the providers in that market. Particular examples considered in Ho and Lee (2019) show that hospital payments may not decrease monotonically under NNTR as hospitals are excluded. In fact it is straightforward to construct examples where the first (Nash-in-Nash) effect dominates, even under NNTR bargaining, and prices actually increase as the network is narrowed. For these reasons we caution against using correlations in the data, either in the cross-section or over time, to attempt to rule out any particular bargaining framework.

2.5 Provider Markets and Quality

In stage one of the five-stage model, providers make investment decisions that help determine their quality. Investments are influenced by provider expectations regarding their impact on consumer decisions to enroll in an insurance plan that offers the hospital, and to choose it when they require care, and on the hospital's leverage when negotiating with insurers over inclusion in the network and over prices. This full model is complex; to our knowledge no authors have yet attempted to estimate it in full. The predicted impact of any policy to encourage investment is likely to be complicated by multiple equilibria and substantially affected by frictions such as asymmetric information regarding provider quality, and (for hospital quality) problems generated when the referring physician has more information about quality than the patient.

Quality when prices are administered. Questions regarding provider quality investment are simplest in markets where prices are determined administratively. The fee-for-service US Medicare market and the UK National Health Service (NHS) are good examples. Two fairly recent studies (Cooper et al. (2011), Gaynor, Moreno-Serra and Propper (2013)) examine the impact of a 2006 NHS reform that was intended to promote competition on hospital quality. Prices were administratively determined based on patient diagnoses, so that when patient choice of hospital was introduced, hospitals were forced to compete solely on non-price dimensions. These studies use difference in differences estimation (where the differences are before and after the reform and across more and less concentrated markets). Although they differ in the precise methods employed, both Cooper et al. (2011) and Gaynor, Moreno-Serra and Propper (2013) find that, following the reform, risk-adjusted mortality from acute myocardial infarction (AMI) fell more at hospitals in less concentrated markets than at hospitals in more concentrated markets.

Gaynor, Propper and Seiler (2016) take the analysis further, estimating a discrete choice demand model for patients requiring coronary artery bypass graft (CABG) surgery using a method that explicitly accounts for the 2006 reform's mandate that patients had to be offered a choice of five hospitals. No such requirement was in place before the reform. The authors assume that the choices made by the referring physician post-reform fully reflect patient preferences. To estimate preferences pre-reform, they use an approach which draws from the consideration set literature (Goeree (2008), Mehta, Rajiv and Srinivasan (2003)), assuming the patient choice set contains a subset of the full list of options which is determined by the physician's preferences based on local administrative boundaries. This allows them to estimate the extent to which patient choices were constrained in the period before the reform. They find that the constraints were considerable; there is clear evidence of improved sorting of patients to higher-quality hospitals after the reform; and that an increase in mortality for the average hospital led to a five-times-larger reduction in market share post-reform than pre-reform. Hospitals which experienced the largest increase in elasticity

also had the largest reduction in mortality rates after the reform. Overall, the paper provides an important model-based decomposition of the mechanisms behind the impact of hospital competition on quality in markets where prices are fixed.

Moscelli, Gravelle and Siciliani (2021) notes that theory predicts an improvement in quality due to competition only if price is greater than marginal cost. In that case firms facing competition have an incentive to increase their quality in order to attract patients. If price is below marginal cost, increases in competition can actually lead to reductions in quality. The authors investigate whether the 2006 NHS reform affected the rate of emergency hospital readmission after surgery for elective treatments—hip and knee replacements—where regulated prices are unlikely to be sufficient to cover hospital costs. The authors show that after the reform, hospitals facing more rivals reduced quality, increased waiting times and reduced length of stay for these two procedures. They found no effect on outcomes (mortality rates) for CABG treatments.

Quality with negotiated prices. The recent literature that considers provider quality in markets where prices are negotiated is small and not model-based. We omit studies that follow a structure-conduct-performance approach (see Gaynor, Ho and Town (2015) for a discussion of these papers). A few papers use variation caused by hospital mergers or entry to address the issue. Ho and Hamilton (2000) and Capps (2005) both examine the impact of hospital mergers on quality of care. Ho and Hamilton (2000) study 130 hospital mergers of various types over the period 1992 to 1995 using hospital specific fixed effects to control for time invariant hospital characteristics that may be related to merger. Capps (2005) compares merging to non-merging hospitals in New York state during 1995-2000. Neither study finds significant effects of hospital mergers on the quality of care. Romano and Balan (2011) study the impact of a particular consummated merger between Evanston Northwestern Hospital and Highland Park Hospital which was the subject of an antitrust suit by the Federal Trade Commission. The authors again use a difference-in-differences approach. They find no significant impact of the merger on many quality measures, but there is a significant negative impact on some and a few have positive impacts.

Cutler, Huckman and Kolstad (2010) utilizes the repeal of entry-restricting regulation (certificate of need regulations) in Pennsylvania to examine the effect of entry of hospitals into the market for Coronary Artery Bypass Graft (CABG) surgery. The authors argue that overall production is capacity constrained—cardiac surgeons are a scarce input and their supply cannot easily be altered—so that hospital entry cannot lead to increased quantities of CABG surgery but may increase the market shares of high quality surgeons. This is confirmed in the empirical analysis. Estimates suggest that in markets where entrants had 11-20 percent market shares of CABG surgeries, high quality surgeons' market shares increased 2.1 percentage points more than for standard quality surgeons. Overall, the authors conclude that entry led to increased quality, but that there

was no net effect of entry on social welfare.

Several papers assess the impact of widely-used quality "report cards" on consumer choices of physicians and also of health plans. Studies analyzing physician choice tend to find positive but small effects of reported quality on provider market shares (Cutler, Huckman and Landrum, 2004; Dranove and Sfekas, 2008). Other papers investigate the possibility that quality reporting could lead to selection by providers against sicker patients. Dranove et al. (2003) compares outcomes for cardiac patients in the Medicare population in New York and Pennsylvania located in areas with and without report cards. They find that report cards improved the match of patients to hospitals—a gain from the provision of information—but also find evidence of selection against sicker patients. Dafny and Dranove (2008) considers the effect of Medicare HMO report cards, distributed to 40 million Medicare enrollees, in 1999-2000, on subsequent health plan choices. The authors find that, while the public report cards generated changes in enrollment, these effects are smaller than market-based learning as measured by the trend towards higher-quality plans in the years prior to the intervention.

Kolstad (2013) considers the impact of quality report cards on CABG surgeon quality in the same Pennsylvania setting as Cutler, Huckman and Kolstad (2010). Kolstad notes that report cards may affect physician behavior and hence physician quality, both because information on quality affects consumer demand and hence physician profits (an "extrinsic" motivation) and because of an "intrinsic" motivation to observably perform well relative to a reference group of peers for reasons unrelated to profit. He estimates a model of consumer demand for surgeons and shows that variation in demand for quality, and the competitive structure of markets, leads to large differences in extrinsic incentives between surgeons. Those facing stronger profit incentives due to report cards show greater quality improvements, but the response to intrinsic incentives is four times larger, leading to significant declines in risk-adjusted mortality.

A useful next step in this literature would be to specify and estimate an equilibrium model of provider investment in quality. To our knowledge this has not yet been attempted for health care providers (although essentially the same question has been modelled in education; see Neilson (2020), Allende, Gallego and Neilson (2020), Allende (2020)). The small number of papers already discussed that use partially identified models to consider insurer network breadth—a measure of quality for *insurers* rather than providers—may suggest an approach that makes estimation feasible. We view these issues as an opportunity for future research.

2.6 Medical Organization Responses to Price Regulation

The impact of prices on medical organization care delivery is central to the ongoing debate on how to control health care spending. While there is much ongoing work in health economics on how to

best regulate prices to ensure efficient health care utilization, a full review of this work is beyond the scope of this paper. See, e.g., Agarwal et al. (2020) for a discussion of bundled payment models and, e.g., Frech et al. (2015) for a discussion of accountable care organizations (ACOs), two policy initiatives that focus on pricing and provider behavior. See, e.g., Clemens and Gottlieb (2014), for a broader analysis of how health care supply, technology diffusion, and patient outcomes respond to regulated price changes.

There are, however, a few recent notable health and IO papers that use sophisticated models of price gaming and productivity to study contract design questions. Most notably, two recent papers (Eliason et al. (2018) and Einav, Finkelstein and Mahoney (2018)) have both studied (i) how long-term care hospitals (LTCHs) strongly game Medicare price regulation and (ii) how pricing regulation for LTCH care could be changed to better facilitate efficient utilization.

LTCHs care for patients who have been discharged from an acute care hospital but who still need meaningful care post-discharge. The Medicare payments incentives studied in Eliason et al. (2018) and Einav, Finkelstein and Mahoney (2018) rise linearly up until a "magic day" when the LTCH receives a large lump sum additional payment. After that point, the LTCH receives no further payment. Formally, the marginal prices p_t for keeping a patient in the LTCH an extra day at day t are:

$$\begin{aligned} p \text{ if } t < t^m \\ P - (t^m - 1)p \text{ if } t = t^m \\ 0 \text{ if } t > t^m \end{aligned}$$

Here, P is a total lump sum payment the LTCH receives if a patient stays longer than t^m days (typically 25 days). This total amount is larger than the sum of the linear fee leading up to day t^m, such that the marginal payment on $t = t^m$ is large and positive, equal to approximately \$13,500 on average (Einav, Finkelstein and Mahoney (2018)).

Both papers document very strong LTCH responses to these incentives, with huge spikes in patient discharges immediately after the magic day. The papers investigate a range of alternative explanations but conclude that the LTCH behavior is a response to these clear pricing incentives. Eliason et al. (2018) document that for-profit LTCHs are more likely to game the price regulation relative to not-for-profit LTCHs while Einav, Finkelstein and Mahoney (2018) show that there are no detectable mortality changes resulting from this price gaming.

Both paper estimate dynamic structural models in order to study counterfactual contract design for LTCHs. In Eliason et al. (2018), the LTCH has a daily flow utility per patient equal to:

$$u_t = \lambda_t + \alpha p_t$$

Here, λ_t represents the non-financial benefits and costs of keeping the patient for one more day and p_t is the marginal price for keeping the patient an extra day, as discussed above. The LTCH solves a dynamic problem when determining whether or not to keep the patient another day:

$$V_t(\epsilon_t) = u_t + \max[\epsilon_{kt} + \delta EV_{t+1}, \epsilon_{dt}]$$

The authors assume that the idiosyncratic shocks for keeping the patient ϵ_{kt} and discharging the patient ϵ_{dt} are Type I extreme value distributed such that the probability the LTCH discharges the patient on day t, conditional on not being discharged earlier, is:

$$\frac{1}{1 + e^{\delta EV_{t+1}}}$$

The authors solve the model using backwards induction starting from a terminal date T to determination continuation values and discharge probabilities as a function of candidate parameters. The model presented in Einav, Finkelstein and Mahoney (2018) is similar in spirit, but differs in several key ways including that it (i) assumes stationarity in patients' health processes and (ii) allows for a richer discharge set to upstream acute care hospitals as well as downstream to a less intensive facility (the only option allowed in Eliason et al. (2018)). Ultimately, the modeling approaches are complementary and allow for slightly different counterfactuals and differential emphasis on patient / LTCH heterogeneity.

Eliason et al. (2018) find that (i) LTCHs would discharge patients a week earlier on average without the lump sum "magic day" payment and that (ii) cost-plus reimbursement policies would eliminate the discharge spike after the magic day but would actually lead to longer stays on average because patients remain marginally profitable for the entire stay, not just through day 25. Einav, Finkelstein and Mahoney (2018) focus on alternative contract designs that hold the LTCH harmless and highlight a contractual design that leads to $2,100 (5%) savings per patient for Medicare without leading to lower LTCH profits. They also look at non-Pareto contracts that generate substantially greater savings to Medicare but lead to lower LTCH profits, with ambiguous implications for patient well-being.

In addition to these papers on LTCH incentives, there are several recent papers on dialysis clinic incentives. Grieco and McDevitt (2016) model the quantity-quality tradeoff for these clinics accounting for unobservable and endogenous choice of treatment quality and, separately, for differential productivity across clinics conditional on treatment quality. They find that reduced quality leading to a one percentage point increase in septic infections allows for the clinic to see an additional 1.6% patients, holding other factors fixed. Eliason et al. (2020) study the implications

of mergers and acquisitions for health spending and outcomes at dialysis clinics. They study the acquisitions of over 1,200 independent clinics by several large organizations and document the transfer of several key strategies employed by the large clinics. These include (i) moving patients to more highly reimbursed drugs (ii) replacing higer skilled nurses with less-skilled technicians and (iii) waitlisting fewer patients for kidney transplants. The authors show that patients fare worse as a result of these changes with key implications for worsened hospitalization and mortality rates. These results also relate to Dafny (2005), who finds greater price responsiveness by for-profit firms when faced with varying Medicare prices.

It is important to note that there are also many important papers on mechanism design and kidney exchange, which happens outside the price system. We do not discuss these papers here since they are discussed in depth in the companion chapter in this handbook by Agarwal and Budish (2021).

2.7 Vertical Consolidation between Providers

The model outlined so far in this chapter abstracts away from an important component of health care market structure: the extent of 'vertical' consolidation between physician groups and secondary care providers such as specialists and hospitals. Such consolidation, which is perhaps more accurately viewed as consolidation of complements, has increased substantially over the last 10-20 years. There is a growing literature considering the implications of this change. Authors emphasize the agency problems raised by the patient-physician relationship, as patients rely on their physician for information about which services are needed as well as for provision of the services themselves. Vertical consolidation could increase the incentive for a primary care physician to refer a patient to the newly-owning hospital, perhaps for treatments that would not otherwise be recommended; alternatively, it could improve coordination across care settings (physician's office and hospital) and reduce duplication of care. Physician or hospital prices could also be affected (although most papers do not specify a mechanism for such price effects).

Recent papers considering the impact of physician-hospital mergers include Baker, Bundorf and Kessler (2016), which uses detailed data on hospital admissions of Medicare beneficiaries, matched to data on physician practice ownership, to investigate whether integration of referring physicians with hospitals affects hospital choice. The authors estimate multinomial logit discrete choice demand models that account for hospital and physician characteristics (including distance to the patient's home) as well as ownership details. They find that patients are significantly more likely to be admitted to hospitals that own physicians, and substantially (33.4 percentage points) more likely if the patient's physician is owned by the particular hospital. Brot-Goldberg and de Vaan (2020) also investigate the impact of provider consolidation on referrals, holding prices

fixed. They use detailed data from Massachusetts to study the impact of integration that generates large systems of health providers, assessing the trade-off between productive efficiency of care and potential inefficient allocation of patients across specialists in the context of PCP referrals to orthopedic joint surgeons. The authors estimate a model of PCP referrals that allows for measured heterogeneity in cost outcomes across specialists. They conclude that consolidation generates productive efficiencies, reducing expected costs per patient, but that incentives to refer patients internally for non-efficiency reasons are also substantial.

Capps, Dranove and Ody (2018) go a step further, investigating the effect of hospital acquisitions of physician practices on prices as well as spending. They use detailed proprietary data (covering several geographically dispersed states) to identify hospital-physician integration at the individual physician level and study physician transaction prices before and after integration. They document substantial changes in market structure: the share of spending by vertically integrated doctors increased in their sample from 17.7% to 27.2% between 2007 and 2013. Difference-in-differences regressions indicate that this change in market structure led to an average physician price increase of 14.1%. Approximately 45% of the price change was due to integrated organizations exploiting a reimbursement rule that allowed hospitals to charge "facility fees" for procedures by hospital-owned physicians. The authors also consider the impact of consolidation on total spending, focusing on hospital integration with primary care physicians, and find that any decrease in utilization from integration was insufficient to outweigh the increase in prices.

Dranove and Ody (2019) is a related paper that investigates the causes (rather than consequences) of the increase in hospital-physician integration in the authors' data. The core idea is that at least some portion of the observed change in market structure was a reaction to the reimbursement rules established by Medicare, and often followed by private insurers. In 2010, the Centers for Medicare and Medicaid Services replaced the physician survey used to estimate practice costs, leading to procedure-level shocks to Medicare prices. This tended to reduce the aggregate Medicare reimbursement for office-based care for physicians who were not integrated with a hospital, increasing the incentive to vertically integrate. A previous paper, Song et al. (2015), shows that three cardiology procedures shifted from physician offices to hospital outpatient offices in response to this change. This paper extends the analysis by examining a broader range of procedures; providing evidence that the 2010 price shock increased hospital employment of physicians and that this explains much of the shift to hospital outpatient offices; and showing that this single shock was sufficient to explain approximately 20% of the overall increase in physician employment by hospitals between 2009-13. That is, the authors argue, organizational structure responded to profit incentives introduced by changes to Medicare reimbursement rates.

Cuesta, Noton and Vatter (2020) considers the scenario of integration between hospitals and insurers (rather than hospitals and physicians). The authors adapt the model of vertical integration

in the cable television market developed in Crawford et al. (2018) to fit their health care setting, accounting for the effects of insurer-hospital integration on negotiated hospital prices, consumer choices of insurance plan and their hospital choices. Vertical integration reduces inefficiencies due to double marginalization but also introduces incentives for integrated firms to increase prices to rivals in order to steer consumers to their own integrated partners. The authors estimate this model using detailed administrative data from Chile, finding evidence that vertical integration has led to increased negotiated prices and welfare reductions in their setting.

Overall, this small but growing literature promises to provide important insights for policy-makers and researchers on the effects of, and incentives for, integration across various components of the health care market. Further research would be very valuable in all these areas.

2.8 Medical Devices: Prices and Bargaining

We conclude this section by outlining a small literature considering price negotiations for medical devices. These begin with Grennan (2013), an innovative paper which was among the first in the literature to use a Nash-in-Nash bargaining model to analyze price negotiations between upstream and downstream firms. The author uses a new panel dataset containing prices and quantities for coronary stents that are purchased by hospitals from medical device manufacturers. He begins by noting the substantial cross-sectional variation in prices, across different hospitals, for the same device being sold by the same manufacturer. He argues, in the context of the Nash-in-Nash model, that such dispersion could be caused by differences across hospitals in the gains from trade provided by a particular device, or alternatively by variation in Nash bargaining weights (which he interprets as a measure of bargaining ability). The model is estimated in two stages: first, doctor demand for stents is estimated using observed price and quantity data; then the bargaining framework, together with inputs from demand estimation, are used to estimate costs and relative bargaining abilities. Identifying assumptions are required to separate costs from bargaining weights: the author assumes that costs are determined entirely by observed type of stent, while (relative) hospital bargaining weights are permitted to vary more flexibly across hospitals, manufacturers and time. Counterfactual simulations suggest that policies to limit suppliers' ability to price discriminate might actually work against hospitals, leading to a softening of competition and an increase in average price. Unsurprisingly, this finding is sensitive to assumptions about the impact of a move to uniform pricing on hospital bargaining weights.

In Grennan (2014), the author looks more closely at the bargaining weights estimated in the previous paper. He shows that variation in bargaining weights is four times larger than variation in demand for a given stent; that is, bargaining weights explain most of the observed variation in prices when viewed through the lens of the model. He then explores the variation in estimated

bargaining weights, using the panel structure of the data to run a regression that projects their log onto manufacturer-hospital-pair dummy variables. Firm (manufacturer and hospital) fixed effects explain almost 30% of the variation in relative bargaining weights: that is, some firms consistently negotiate more favorable prices (conditional on estimated costs, willingness-to-pay and the extent of competition) than others. A further 36% of the variation in relative bargaining weights is pair-specific.

A very recent addition to the literature is Grennan and Swanson (2020). This paper investigates an important and policy-relevant question: does price transparency lead to price changes in a context with negotiations between upstream and downstream firms, and if so, in what direction? There are concerns among policy-makers that while (as already discussed) providing price information to consumers might make residual demand more price elastic and provide incentives for firms to negotiate low prices, there are potential offsetting effects if price information also affects firm price negotiations directly. The authors investigate components of this question empirically, using new data containing all purchase orders issued by a sample of hospitals that purchased a subscription to a web-based price benchmarking database. Focusing on 508 facilities negotiating prices for coronary stents, the authors consider two potential mechanisms through which benchmarking data could affect price negotiations. The first is based on an asymmetric information model where hospitals face uncertainty about suppliers' costs or bargaining weights: transparency reduces uncertainty, and with it, the dispersion in negotiated prices. The second is an agency model in which transparency allows hospital managers to better observe purchasing agents' effort and provide more effective incentives to reduce prices. Two sources of data variation are used to investigate these mechanisms: variation in hospitals' timing of joining the database; and the fact that new brands entered the market during the time period of the data. Estimated average price effects are small and noisy, but the estimates suggest that high-price hospital-brand combinations have significant price reductions when database information becomes available. Price declines are larger in cases with high purchase volumes. Various additional analyses, including tests based on timing of price changes relative to brand entry, are consistent with benchmarking solving an asymmetric information problem—helping hospitals learn about suppliers—rather than an agency problem. The authors note that their findings have potentially important implications for the empirical literature on bargaining. Further, while they do not directly consider the possibility that price transparency could help facilitate collusion—a concern raised by researchers assessing potential overall effects of price transparency on equilibrium prices—their broad findings that prices fall when benchmarking data is available is suggestive that, at least in this market, collusive behavior is not the dominant response.

3 Consumer Choice in Health Insurance Markets

A key premise underlying much of health insurance market design and regulation is that consumer choice can help (i) facilitate efficient matching between consumers and the available plans and (ii) encourage insurers to offer higher quality products and compete to lower prices. Discussed in depth in Enthoven, Garber and Singer (2001), the notion of managed competition in insurance markets has made strong inroads into many health insurance provision contexts, especially in the United States. Regulated insurance exchanges that are founded on the notion of active consumers include Medicare Part D prescription drug insurance for seniors, Medicare Advantage (privatized Medicare), the state-by-state exchanges set up to target the uninsured in the Affordable Care Act, Medigap supplemental insurance for seniors, and privatized Medicaid markets for low income consumers. In addition, large group markets (e.g. large employers) in the United States often offer multiple plan options with the same underlying logic as discussed for these regulated exchanges. Finally, many international contexts also operate insurance markets following the managed competition paradigm, including, e.g., the Netherlands, Switzerland, Chile and Australia.

Since choice is such a central input into insurance market regulation, modeling demand for insurance—in a way that accounts for issues raised by asymmetric information—has been a vital contribution of the health and industrial organization literature on insurance markets. Modeling demand for health insurance has much in common conceptually with modeling demand for other insurance markets (e.g. car or life insurance) though health markets have specific features related to the scale of the risks and the nature of the risks that need to be addressed in demand modeling. Some of the key features that relate directly to the insurance nature of health insurance are risk preferences, beliefs about health risk, and moral hazard (i.e. price sensitivity) in health care utilization. Here, we discuss these demand foundations in depth with a specific eye towards their use in health insurance markets: see Einav, Finkelstein and Mahoney (2020) for a broader discussion of demand estimation in insurance markets.

In addition to these insurance-specific dimensions, health insurance demand has two other key micro-foundations we will discuss in this chapter. One is choice frictions / behavioral choice foundations that the literature has studied extensively. These frictions have been studied in different forms but ultimately work against the premise in managed competition that consumers will help discipline the market. Such frictions have also been studied extensively in markets for other financial products (e.g. retirement savings plans), where consumers often have substantive difficulties choosing among products with important implications. We cover this work in some depth after going through a baseline model for insurance demand.

A second key foundation is non-financial preferences for insurance plans. The earlier portion of this chapter covers in depth how important provider networks are for insurance plan demand and

digs into how consumers value those networks in detail. In addition to these specific preferences for networks, consumers may have brand preferences that reflect a broad range of factors specific to a given insurance carrier (some of which may be tangible factors and some of which may be intangible). We discuss these non-financial preferences in the context of the specific papers we cover.

3.1 Health Insurance Demand: Baseline Model

Cardon and Hendel (2001) is one of the earliest papers that jointly models health plan choice and health care utilization in large group employer markets. The main contribution of this paper is the two-stage model of plan choice and utilization. This model nicely embeds the central welfare tradeoff between risk protection and moral hazard in insurance markets (see, e.g., Zeckhauser (1970)). If an insurer offers greater financial coverage, consumer surplus from risk protection increases but, potentially, the negative welfare impact of moral hazard (partially or fully wasteful care) increases. While Cardon and Hendel (2001) focuses on testing for asymmetric information, rather than welfare analysis of a specific policy or phenomenon, the framework is well set up for welfare analysis. Many papers, including many of those discussed for the remainder of this chapter, build on this framework by extending the mirco-foundations and then applying the resulting model to study the welfare implications of specific policies.[24]

3.1.1 Health Insurance Demand: Moral Hazard

Cardon and Hendel (2001) set up their model with two stages. Working backwards, they first describe the second stage that models how consumers use health care once they have enrolled in a given health plan. While demand for health care is realized ex post to the purchase of insurance, consumer projections of (i) how much their out-of-pocket expenses will be during the year and (ii) how much health care they will consume given the plan design are important factors into ex ante demand for insurance.

In Cardon and Hendel (2001), consumer preferences for utilization are described as:

[24]For brevity, we focus this demand discussion on structural papers that dive into the micro-foundations of demand. There are many excellent papers that study health insurance demand without explicitly modeling these micro-foundations, e.g. Einav, Finkelstein and Cullen (2010). There are many reasons why frameworks that model demand with fewer assumptions, in a way that is sufficient to answer specific policy questions, can be preferable to a more structural approach. We discuss relevant health and industrial organization papers that estimate both types of demand models throughout this chapter. For a more detailed discussion of Einav, Finkelstein and Cullen (2010) and other related demand approaches, see the companion chapter by Einav, Finkelstein and Mahoney (2020) in this volume.

$$U(m_i, h_i) \tag{8}$$

$$h_i = x_i + s_i \tag{9}$$

Here, h_i is a consumer's utility from health and m_i is that numeraire good representing utility from additional money. x_i is their health care consumption, and s_i is their realized health state in a given year. s_i is unknown at the time of insurance purchase and affects marginal utility for health care. Once s_i is realized, consumers can spend x_i to improve their utility from health. So, e.g., if one's health state is particularly poor, marginal utility at spending level x_i will be higher than the same marginal utility for someone in a good health state.

$$\begin{aligned} U^*_{ij}(s_i) = U^*(y_i - p_j, s_i, C_j) = \quad & \max_{x_i} U(m_i, h_i) \\ \text{s.t.} \quad & m_i + C_j(x_i) = y_i - p_j \end{aligned}$$

That is, a consumer chooses a total amount of health care spending x_i conditional on their income net of the plan premium $y_i - p_j$, plan cost-sharing characteristics C_j and their realized health state s_i. U^*_{ij} is the indirect utility of individual i with policy j. Here, C_j reflects the typical non-linear insurance contract that maps plan cost-sharing features to consumer medical spending, for a given total medical spending level. Cardon and Hendel (2001) specifically model plan deductibles and coinsurance rates for a wide range of large group plans and develop a methodology to solve for optimal usage x_i given the peculiarities of dealing with the non-convex budget set induced by most health insurance contracts.

There are a large number of papers that provide insight into different impacts of health care demand, conditional on a given set of insurance characteristics. Surveying this whole literature is well outside the scope of this chapter. However, there are several papers that help to summarize key insights from the literature.

Brot-Goldberg et al. (2017) studies demand for health care using a natural experiment at a large employer that required all employees to switch from free health care on the margin to a non-linear contract with a deductible, coinsurance rate, and out-of-pocket maximum. This paper shows that consumers are price sensitive on average, reducing spending by 15% as a result of the increase in marginal health care prices. The paper finds that these spending reductions are not due to price shopping for cheaper providers but rather due to straight quantity reductions. Consumers reduce quantities of "wasteful" care as well as quantities of "high-value" care, where these categories are defined on a medical basis. These findings, both in direction and magnitude, are consistent

with other key papers in the literature, including, e.g., the RAND Health Insurance Experiment discussed in Newhouse (1993).[25]

In addition, following on earlier work in the literature, this paper shows that consumers have unusual responses to the true marginal cost of care during the insurance plan year. During a plan year, under a typical non-linear insurance contract, consumers face a "spot" price, which is the price of care they actually pay in that moment. However, the true price of care at a given point of time is the "expected marginal price" that consumers face at the end of the insurance contract. Given the way typical health insurance contracts are shaped, the spot price is almost always weakly higher than the expected marginal price (the Medicare Part D donut hole is a key exception). Brot-Goldberg et al. (2017) find that consumers respond heavily to spot prices, even when they diverge sharply from the expected marginal price (the price that a homo economicus would use). The paper shows that this has important implications. Spot price responses lead to spending reductions for otherwise sick consumers who have zero expected marginal prices of care (because they are very likely to reach the out-of-pocket maximums in their plans). These findings are highly consistent with the findings of Aron-Dine et al. (2015), Einav, Finkelstein and Schrimpf (2010), Abaluck, Gruber and Swanson (2018), and Dalton, Gowrisankaran and Town (2019), which primarily focus on demand responses to non-linear contracts in Medicare Part D.

3.1.2 Health Insurance Demand: Plan Choice

Regardless of the specifics of the second stage model for health care demand given contract design, when considering health insurance plan choice consumers have expectations over these second stage health and financial outcomes and use those expectations as an ingredient into their choice. Cardon and Hendel (2001) set up a discrete choice model of plan choice for the first stage. In the first stage, consumers choose a plan j from a set of J_i plans offered by their employer and can also choose to be uninsured. The indirect utility from plan choice incorporates second period optimal behavior for each policy j:

$$V_{ij}(\omega_i, a_{ij}) = E(U^*_{ij}(s_i)|\omega_i) + a_{ij} \tag{10}$$

$$= \int U^*(y_i, z_i, Z_j)\pi_i(dz_i|\omega_i, D_i) + a_{ij} \tag{11}$$

Here, π_i is the distribution of health state s_i at the time of plan choice. This distribution is conditional on a consumer's private signal about their health state distribution, ω_i, and also on observable demographics D_i. a_{ij} represents policy-specific random tastes. The consumer's first stage problem

[25] See also, e.g., recent papers by Baicker, Mullainathan and Schwartzstein (2015), Hackmann, Kolstad and Kowalski (2015) and Kowalski (2016).

is:

$$\max_{j \in J} V_{ij}(\omega_i, a_{ij}) \; \forall j \tag{12}$$

In this setup, the authors model self-selection into policies j based on consumers' signals ω_i and their demographics D_i.

Similarly to the moral hazard literature, the literature on plan choices, risk preferences, and information about health risk is now extensive and beyond the scope of this chapter to fully survey (see, e.g., Einav, Finkelstein and Mahoney (2020) for a broader discussion). We summarize key insights on each of these dimensions here.

Quite a few papers have focused on estimating risk preferences and their implications for insurance choice and welfare. While Cardon and Hendel (2001) estimate a homogeneous risk aversion parameter for their population, most subsequent papers estimate heterogeneity in risk aversion to account for different preferences in the population. Einav et al. (2013), Handel (2013), and Carlin and Town (2009) estimate risk preferences for consumers choosing from plan menus that are only financially differentiated (which helps to eliminate confounds from non-financial plan attributes). Abaluck and Gruber (2011), Ketcham et al. (2012), and Abaluck and Gruber (2016) are examples of papers that estimate risk preferences from larger plan menus in Medicare Part D where there is plan heterogeneity in non-financial characteristics.[26] These papers, as Cardon and Hendel (2001) do, typically assume constant absolute risk-aversion (CARA), which means that consumers' preferences for risky gambles don't change with their underlying wealth levels. This is a convenient assumption in the literature, so that wealth doesn't have to be modeled in a sophisticated way empirically.

The papers estimate a range of values for risk protection that are context-specific. The papers in employer markets typically find positive but moderate benefits from risk protection (in a welfare sense) and meaningful heterogeneity in those benefits. Generally speaking, the specific risk aversion coefficients estimated are likely not to be that useful out of context, because risk preference estimates are known to be quite sensitive to scaling gamble sizes (see, e.g., Rabin (1998)). However, these estimates should be quite relevant for thinking about the welfare benefits from risk protection in the given empirical context they are estimated, as long as the scenarios studied do not deviate too far from the scale of the gambles observed empirically. Another useful paper in this space is Aron-Dine et al. (2012), which doesn't structurally estimate risk preferences but does study how the ranking of choice riskiness is correlated within-individual across different financial products. They find that there is a high correlation between the riskiness of choices across contexts, suggesting that, even if these choices do not necessarily lead to a consistent structural risk aversion

[26]There are also quite a few influential papers in this literature in non-health insurance contexts. See, e.g., Cohen and Einav (2007) and Barseghyan et al. (2013).

parameter, they are consistent with a heuristic model of risk preferences.

A second key element of structural insurance choice models is consumer beliefs about their distribution of out-of-pocket expenditures for plans in their choice sets. Most recent papers leverage detailed individual-level claims data sets to predict spending for the upcoming health plan year using (i) information about plan cost-sharing designs and (ii) claims diagnoses and costs. Claims diagnoses at the individual level have been especially helpful in projecting individual-specific risks going forward, since different diagnoses have different degrees of persistence and cost. Typically, papers model underlying health risk and then project it onto different plan designs, potentially allowing for moral hazard as in stage two of the Cardon and Hendel (2001) model described above.

Due to regulation that restricts pricing on observable variables as well as the granularity of individual-level data, most papers focus on using observable information to model risk. They typically perform a *correlation test*, or some variant of one, to help show that concerns of selection on private information are not particularly important to model for the questions the papers seek to answer. The correlation test estimates a plan choice regression with rich observables, a plan cost regression with similar observables, and then asks whether the residuals of the two regressions are correlated in the sense that those whose residuals favor more generous coverage are also those whose residuals favor higher costs. See Chiappori and Salanie (2000) for an early reference in this literature and see Einav, Finkelstein and Levin (2010) for a more extensive discussion of this literature. We note that some papers in the literature specifically seek to identify private information about health risk separately form moral hazard. For example, Cardon and Hendel (2001) uses the model described above, together with National Medical Expenditure Survey data, to test for asymmetric information in consumers' plan choices across a range of large employers. The authors separately identify adverse selection (via the signal ω) and moral hazard (via how x_i depends on C_j) with the assumption that choice of employer does not depend on the plans that employer offers. [27] In their data, the authors can't reject a null hypothesis of no private information used in plan choice, they find a high level of risk aversion, and they find a price elasticity of care similar in magnitude to that found in prior work, e.g. in the RAND Health Insurance Experiment (Newhouse (1993)).

Risk aversion and health risk estimates are key foundations of essentially all health insurance choice models. In addition, when plan networks vary this is an important potential source of value that consumers consider. See the earlier part of this chapter for a detailed discussion of consumer demand for medical providers and insurance plan networks. For non-financial, non-provider plan features, such as, e.g., brand equity and care rationing, we don't present a general

[27] This assumption, which has been used quite frequently in the literature, implies that insurance choice sets are exogenous at the individual level. As a result, the authors can compare similar consumers facing different plan choice sets, and thus similar consumers who end up in different plans. This provides an instrument to identify consumer responses to cost sharing separately from their ex ante unobserved information about their health.

discussion though we do address these important aspects in relevant papers throughout the rest of this chapter. Now, we turn to a detailed discussion of one other important demand dimension in insurance markets: choice frictions and behavioral foundations.

3.2 Choice Frictions: Active Choice Issues

Quite a few papers have ventured beyond the classical frameworks for insurance demand to study choice frictions and behavioral choice factors in insurance markets. These issues have been shown to be important in insurance markets, which are notoriously difficult for consumers to make choices in. Research in this area has been useful for studying health insurance market design and has also been useful for broader insights into the demand for complex financial products.

Typically, papers modeling these kinds of frictions start from the classical framework just described and modify that framework to account for choice problems. The literature naturally separates into two branches. The first studies active choice issues, where inertia / adherence to a default option is not the focus. The second studies inertia and passive choice issues, which are especially important in markets like health insurance where consumers have default options and the products are complex to evaluate.

Handel and Kolstad (2015*b*) is one example of a paper modifying the classical expected utility setup to account for choice frictions. By sticking closely to the classical expected utility model, the paper shows how bringing additional data to bear on consumers' lack of knowledge (interpreted as the result of information frictions) impacts the conclusions that are drawn, relative to assuming biases and frictions away in a classical expected-utility framework.[28]

In this paper, where consumers choose from a set of plans offered by a large employer, the consumer's problem is to choose a plan j from set $\mathcal{J}$.

Consumer i's utility in health plan j, ex post to the realization of their health state, is:

$$u(W_i - P_{ij} + \pi_j(\psi_j, \mu_i) - s, \gamma_i). \tag{13}$$

u is assumed to be a concave utility function, implying that consumers have diminishing marginal utility for wealth and are risk averse. Following earlier work, such as, e.g., Cardon and Hendel (2001), consumers are assumed to have constant absolute risk aversion (CARA), meaning that the curvature of the utility function doesn't depend on baseline wealth.

This ex-post utility includes several components, some of which are the same regardless of health during the year. W_i is consumer wealth and P_{ij} is the premium contribution an individual i pays in plan j. π_j reflects the consumer's value for non-financial plan characteristics, such as

[28] One potential downside of sticking closely to the classical expected utility framework is that the paper may misspecify the underlying model for why mistakes occur.

provider networks or tax-advantaged health-savings accounts: this depends on plan characteristics ψ_j and a consumer's health type μ_i. In this formulation, each of these components is assumed to be independent of the health-risk realization.[29] Finally, the payment s is the consumer's out-of-pocket payment for health care, given an ex post realization of their health risk. This approach for modeling ex post utility is similar to the second-stage model in Cardon and Hendel (2001) discussed above, with the obvious omission here that consumers are assumed to have no moral hazard.

We now turn to *ex ante* consumer utility, similar to stage one in the Cardon and Hendel (2001) framework. Assume that a consumer faces uncertainty about their out-of-pocket spending in a given plan j, following the probability distribution $f_{ij}(s|\psi_j, \mu_i)$. The distribution of payments depends on the plan design and the consumer's health-risk type. Given this uncertainty, a consumer's expected utility for plan j is:

$$U_{ij} = \int_0^\infty f_{ij}(s|\psi_j, \mu_i) u(W_i - P_{ij} + \pi_j(\psi_j, \mu_i) - s, \gamma_i) ds. \tag{14}$$

Within this setup, the consumer will choose the plan j that maximizes her expected utility U_{ij}. Handel and Kolstad (2015*b*) depart from this baseline expected utility model by allowing for the consumer's beliefs (notated with "hats") to deviate from what they would be under full information and rational expectations:

$$\widehat{U_{ij}} \quad = \int_0^\infty f_{ij}(s|\widehat{\psi_{i,j}}, \widehat{\mu_i}) u(W_i - P_{ij} + \widehat{\pi_{i,j}}(\widehat{\psi_{i,j}}, \widehat{\mu_i}) - s, \gamma_i) ds \tag{15}$$

Here, beliefs about plan characteristics, health risk, and health benefits are modeled allowing for both population-level and individual-level departures from the rational-model values.

Empirically, this framework allows for departures from baseline beliefs and information due to information frictions or biases more broadly. These frictions and biases may result from consumers not having easy access to key information; consumers not attending to readily available information; or consumers having difficulty integrating certain types of information into decisions. Handel and Kolstad (2015*b*) consider data from a large firm with over 50,000 employees where employees choose between two plans: a broad network PPO plan with no premium and no (in network) cost sharing, and a high-deductible plan with the same network and a linked health savings account subsidy (essentially a reverse premium). The paper presents descriptive evidence showing that consumers seem to substantially under-purchase the high-deductible plan (HDHP) based on its financial value relative to the simpler PPO option. The standard non-behavioral explanation

[29] In certain settings, one may want to model π as a function of the ex post risk realization as well, since provider networks and health risk interact. We don't do so here for simplicity.

is that these purchasing patterns reflect consumer risk aversion—but the degree of risk aversion necessary to rationalize these choices is very high. Given this backdrop, the authors implement a comprehensive survey to measure consumer information sets shortly after they make plan choices during open enrollment. The survey asks multiple choice questions to consumers about all aspects of plan choice, including perceptions about the health savings account subsidy, provider networks, and financial characteristics such as deductibles or coinsurance. In addition, the survey asks about perceived hassle costs of enrolling in a high-deductible plan where medical bills and health savings accounts may involve time and hassle costs relative to the hassle-free PPO option. The survey is linked to enrollment and detailed claims data at the individual-level, allowing the authors to study how individual choices relate to limited information. The authors show that consumers who lack knowledge about the high-deductible plan relative to the PPO plan are more likely to leave substantial sums of money on the table in their plan choices. The key point is that this money left on the table is not due to risk aversion, but to frictions or biases that result in limited knowledge.

The primary structural model the authors estimate is a baseline expected utility model with shifters that reflect changes in willingness-to-pay for the high-deductible plan as a function of limited information about that plan (as measured in the survey). This is very similar to the theoretical model in equation (15) but incorporates measures of limited information in a specific way. The main specification is:

$$U_{ij} = \int_0^\infty f_{ij}(s)u_i(x_{ij})ds \tag{16}$$

$$u_i(x) = -\frac{1}{\gamma_i(\mathbf{D}_i)}e^{-\gamma_i(\mathbf{D}_i)x} \tag{17}$$

$$x_{ij} = W_i - P_{ij} - s + \eta(\mathbf{D}_i)\mathbf{1}_{j_t=j_{t-1}} + \mathbf{Z'}_i\beta\mathbf{1}_{HDHP} + \epsilon_{ij}. \tag{18}$$

Here, U_{ij} is an expected utility function for a risk averse consumer, following the model just discussed. Equation (17) describes the functional form used to implement the constant absolute risk aversion model. x_{ij} measures the outcome (translated into monetary units) for each consumer during the year, given a realization of their health uncertainty. η is a term that addresses consumer inertia, modeled as an implied switching cost. Risk aversion γ and inertia η both vary with observable demographics D_i.

The authors include indicator variables related to consumers' information sets in the vector $\mathbf{Z}$. For each question, they construct indicator variables for 'informed', 'uninformed' or 'not sure' answers as well as variables derived from answers to questions about hassle costs and knowledge of own health expenditures. $Z = 0$ indicates that a consumer is perfectly informed, while $Z = 1$ indicates that a consumer lacks information on a certain dimension. The coefficient β then

measures the impact of that lack of information on willingness-to-pay for the high-deductible plan relative to the less complex PPO option.

This empirical approach to studying the impact of consumer frictions and biases has several advantages and disadvantages. One advantage is that measuring effective consumer information sets with surveys is often feasible. Another advantage is that the approach is simple, in the sense that the estimates tell us about the impact of survey-measured limited information on willingness-to-pay for different options. One disadvantage is that it doesn't posit a specific structural mechanism for how limited information impacts choices: a more structured version would allow for answers to survey questions to imply something specific about the precise nature of beliefs. But it is also difficult to link the responses directly to belief objects. This disadvantage makes it difficult to assess whether specific policy interventions to improve consumers' choices would be successful. Another potential disadvantage is that the baseline model used is a specific expected utility model that does not capture behavioral notions of how consumers respond to risk and uncertainty, which is an important topic.[30]

Handel and Kolstad (2015*b*) offer several results on the knowledge consumers lack and the resulting amount of money they leave on the table. The most influential gaps in knowledge are about available providers and treatments, and the perceived time and hassle costs for the high-deductible plan. For example, a consumer who incorrectly believes that the PPO option grants greater medical access than the high-deductible plan (they grant the same access in reality) is willing to pay $2,267 more on average for the PPO over the one-year period of the insurance contract than a correctly informed consumer. Aggregating across all included measures for incomplete knowledge, the average consumer is willing to pay $1,694 more for the PPO relative to a fully informed consumer with zero perceived hassle costs. Consumer perceptions of relative hassle costs, which likely overstate true hassle costs, have a major impact, equaling approximately $100 per perceived extra hour of time spent on plan hassle.

Next, they find that including measures of consumer information into the model together with risk aversion significantly changes estimates of risk aversion. Framed in terms of a simple hypothetical gamble, a consumer with baseline model risk aversion (where information frictions are not taken into account) would be indifferent between taking on a gamble in which he gains $1000 with a 50 percent chance and loses $367 with a 50 percent chance. In other words, he would have to be paid a risk premium of roughly $633 in expectation to take this risky bet. In the primary model with survey variables included, the consumer is instead found to be indifferent between taking

[30]While we are unaware of empirical papers studying non-standard consumer responses to risk and uncertainty in health insurance, Barseghyan et al. (2013) study non-linear probability weighting for consumers choosing car and property insurance policies and Grubb and Osborne (2015) studies overconfidence and myopia in cellular phone markets. These projects structurally identify alternative choice models, but typically assume full consumer information to do so. It should be possible to combine the Handel and Kolstad (2015*b*) approach with these others.

on a gamble with a $1000 gain and $913 loss (with 50% chance of each). This has meaningful implications for policy, for example altering conclusions of the benefits of forcing consumers into high-deductible plans.

It is important to note that this is just one example of quite a few papers that document consumer difficulties in making plan choices. Since our focus on this chapter is on the industrial organization implications of these choice issues, we describe these papers briefly (see Chandra, Handel and Schwartzstein (2019) for a more extended treatment of these topics). Bhargava, Loewenstein and Sydnor (2017) document mistakes in active insurance purchases at a large firm where (i) many of the choices are dominated by other choices and (ii) many consumers choose those dominated choices, leaving meaningful sums of money on the table. Abaluck and Gruber (2011) show that consumers forego substantial savings in Medicare Part D choices, controlling for spending risk, risk preferences, and average brand preferences. Abaluck and Gruber (2011) find that a key reason consumers lose money on their plan choices is that they overweight premiums by a factor of 5 to 1 relative to expected out-of-pocket spending.[31] Heiss, McFadden and Winter (2010) also study consumer choice quality in Medicare Part D and find results that are consistent with those from Abaluck and Gruber (2011). Ketcham et al. (2012) show similar patterns in Part D plan choices and also study whether consumers learn to make better choices over time. They find evidence of poor consumer choices but, leveraging panel data, find that consumers may make better choices over time as they gain experience in the market. Specifically, they find that consumer overspending is reduced, on average, by $298 in their second year in the Part D market relative to their first. Some of this may be due to plan switching and some to plans delivering better value over time. Gruber et al. (2020) show that even trained intermediaries (brokers) struggle to make high-value choices on behalf of the consumers they serve, though brokers' choices improve when given access to sophisticated decision support.

3.3 Choice Frictions: Inertia and Passive Choice Issues

In the last section we discussed choice frictions in insurance markets when consumers are actively considering insurance choices, i.e. they don't have a default option or they are actively considering different options despite having a default option. There has been as much, if not more, research on inertia in health insurance markets, which causes consumers to leave substantial surplus on

[31] Despite the fact the consumers systematically seem to overweight premiums relative to their potential out-of-pocket spending, throughout many papers in the literature, it is not obvious that this means consumers have "overly generous" coverage relative to what a social planner would want. There are several reasons including (i) consumers may also over-weight salient cost-sharing features like deductible level relative to predicted out-of-pocket spending and (ii) Brot-Goldberg et al. (2017) and Abaluck et al. (2020) show that less generous coverage can, respectively, lead to consumers under-consuming high value care and lead to higher mortality rates downstream. Thus, it is still an open question whether or not the choice frictions documented in insurance choice lead to overly generous coverage, especially when viewed in light of choice frictions related to care consumption.

the table. Inertia is especially large in typical insurance markets because consumers typically have a default option, usually their previously chosen plan. As shown in many contexts, defaults can be quite powerful and substantially lower active shopping and price sensitivity. Consumer inertia reduces the quality of consumer choices in such settings, as products evolve over time and consumers do not adjust accordingly.

Handel (2013) studies inertia using data from a large employer that spans six years (2004-2009). The employer changed the menu of options employees could choose from during the middle of this time frame and forced all employees to make active (non-default) choices from this new menu of options. Following that forced active choice, consumers had a default option of their previously chosen plan, despite the fact that the plan premiums and features changed significantly over time. The paper presents several pieces of descriptive evidence suggesting that inertia causes consumers to leave meaningful sums of money on the table. First, one product changed over time such that it became dominated by other options and, despite losing over a thousand dollars for sure, consumers continued to enroll in the newly dominated plan when it was their default option. Second, the active choices that new enrollees made were significantly better (in terms of money left on the table) than the choices of similar incumbent employees who had a default option. While active choices are far from perfect, choices become worse in an environment with a sub-optimal default option.

The paper estimates a structural model of consumer inertia, modeled as a switching or adjustment cost that could result from consumers having research / paperwork costs of switching or learning costs of using a new plan. The expected utility framework is similar to that in Cardon and Hendel (2001) as described in equations 10. In Handel (2013), the money at stake for consumers in each ex post realized health state is;

$$x_{ij} = W_i - P_{ij} - s + \eta(\mathbf{X}_i^B)\mathbf{1}_{j_t=j_{t-1}} + \epsilon_{ij}. \tag{19}$$

Here, W_i is baseline consumer wealth, P_{ij} is the premium paid up front, and s represents out-of-pocket spending in plan j under the realized health state. Inertia is quantified by the amount of money consumers are willing to leave on the table to stick with their incumbent plan. In effect, the premium for the incumbent plan is lowered by η for consumers in this model. η is allowed to depend on observable characteristics, X, including other benefits choices consumers make (such as flexible spending account choices that must be actively made every year).

Inertia in this environment (and most health insurance environments) could result from any of the following micro-foundations:

1. **Switching Costs:** Consumers could incur paperwork or hassle costs of switching plans. Consumers may also incur adjustment costs to learn how to use their new plan, or costs as-

sociated with needing to switch care providers. While this last cost (of switching providers) is not an issue in the Handel (2013) analysis, such costs will be relevant in many settings.

2. **Search Costs:** Consumers could incur costs of searching through the different available plan options to determine if they want to switch. Typically, this would be modeled as a two stage model (as in Ho, Hogan and Scott Morton (2017) described below) where consumers first decide whether to search and then decide whether to switch after searching.

3. **Inattention:** Consumers could be inattentive. They could rationally decide not to engage in the search process because search is too costly relative to expected benefits. Or they could less rationally neglect potential benefits of carefully considering plans and plan options.

4. **Naive Present Bias:** Consumers could believe that they will conduct research and make a new choice right before the choice deadline, but then when the time arrives not be willing or able to invest the time and effort to do so.

Handel (2013) does not distinguish between these micro-foundations, but shows how welfare conclusions are sensitive to the micro-foundations. In particular, his welfare analysis allows for a range of results that depend on whether or not inertia primarily results from a rational response to costs (e.g., of search) or a less rational response to perceived benefits and/or perceived costs.

The paper finds that consumers exhibit significant inertia: on average, consumers with a default option are estimated to leave $2,032 on the table annually to stay with their default. Consumers who also make active flexible spending account elections leave an average of $551 less on the table. Families, who have more money at stake, leave $751 more on the table than single employees. There is no evidence that recent health shocks lead to active choices. The paper studies counterfactual policies where the extent of inertia is reduced by some proportion and consumers re-choose plans in the market. In the partial equilibrium analysis where plan prices do not adjust from re-sorting, a 75% reduction in the magnitude of inertia improves consumer welfare by 5.2% of paid premiums. Later in this chapter, when we discuss market design, we will discuss the part of this paper where prices are allowed to re-adjust as consumers make better choices due to reduced inertia.

Quite a few other papers study inertia in health insurance markets and show that it causes meaningful financial losses for consumers. Ho, Hogan and Scott Morton (2017) study inertia in Medicare Part D with a model of inattention. They model consumers with a default option making choices in two stages. First, they decide whether or not to engage with the market. This decision is influenced by a series of shocks (e.g., changes to the premium of their current plan) related to the market and their default option. Second, consumers who decide to engage in the market choose a

plan following a standard active discrete choice model, where consumer i's utility for option j is denoted by $u_{i,j}$.

As the market evolves over time, consumers costlessly learn about how their current plan changes but have to pay a cost ε to learn about how the characteristics of other plans change. Consumers choose to pay this cost if the expected benefit of doing so outweighs the cost:

$$\mathbb{E}\left[\max_{j=1....J} u_{i,j,t+1}|\bar{X}_{i,k,t+1}\right] - u_{i,k,t+1} > \varepsilon_{i,t}.$$

Here, plan k is the choice a consumer is currently enrolled in and $\bar{X}_{i,k,t+1}$ includes the known characteristics for that plan. The expectation is taken over the characteristics of other plans that the consumer discovers if she pays the cost to search through the set of available plans. If the consumer pays the cost to search then she learns the characteristics of all plans in the market. The consumer is more likely to search if (i) she has a health shock that changes the value she receives from different plans; (ii) the characteristics of her current plan change; and/or (iii) she receives a signal that the market significantly evolved to make search valuable.

Empirically, the authors estimate this model without fully specifying consumers' beliefs about other options in the market prior to search. They model consumer attention as being a function of whether they experience shocks (v) that cause them to pay attention:

$$v_{i,t} = v_{i,p,t}\beta_1 + v_{i,c,t}\beta_2 + v_{i,h,t}\beta_3 + v_{i,e,t}.$$

Here, $v_{i,p}$ equals 1 if there is a premium increase for a consumer's own plan that exceeds the median weighted increase in the market; v_c equals 1 if there is a meaningful change to the out-of-pocket coverage characteristics for a consumer's own plan; v_h equals 1 if the consumer experienced an acute health shock in the past year, e.g., a significant increase in drug spending; and v_e is a random shock that spurs consumer search. With this framework, a consumer searches if her composite shock v is greater than some threshold value (related to $\varepsilon_{i,t}$ above). Then, if the consumer searches, she picks the plan that maximizes her expected utility, with full updated knowledge of all plan characteristics. If the consumer does not search then she remains in the plan that she is already enrolled in.

Ho, Hogan and Scott Morton (2017) find substantial inertia in the Medicare Part D context: only approximately 10% of consumers switch plans each year and enrollees leave a lot of money on the table by not switching. Consistent with the model of inattention, consumers are more likely to switch when their own plan features (e.g., premium or cost-sharing) change but are less likely to search when alternative plan features change by similar amounts. The paper then studies how insurers price given the degree of inertia in the market, which we discuss later in this chapter. It is interesting to note that Handel (2013) and Ho, Hogan and Scott Morton (2017) use similar data and

identification strategies to study inertia, but assume different micro-foundations. In ongoing work, Brot-Goldberg et al. (2021) do distinguish between the potential micro-foundations underlying default effects, using the fact that Medicare Part D randomized default options for low-income individuals entering the market. They show that consumers almost always stick with the random default option and that, when switched out of that option, they stick with a new plan despite only having to pay a very small amount to switch back to their old plan. Consumers stick with default options even when the plans don't include drugs on the formularly that they clearly need. This paper strongly suggests that inattention is the primary driver for inertia and default effects in their context, rather than switching costs. Future work that continues to empirically distinguish between mechanisms for inertia in different populations and contexts will be valuable in this literature (Handel and Schwartzstein (2018)).

A range of other papers also document inertia in Medicare Part D. These papers include, but are not limited to, Ericson (2014), Polyakova (2016), Heiss et al. (2016), and Abaluck and Gruber (2016), with each approaching the inertia question from a distinct angle. In addition, Abaluck and Gruber (2016) find limited evidence that consumers learn to shop effectively for plans over time, contrary to the findings in Ketcham et al. (2012). Abaluck and Adams-Prassl (2021) and Coughlin (2021) model consumer consideration sets, where consumers only consider a subset of plan options at a given point in time, and apply this to studying inertia in plan choice in Medicare Part D. Finally, in the large employer and Medicaid managed care contexts, respectively, Strombom, Buchmueller and Feldstein (2002) and Marton, Yelowitz and Talbert (2015) both show significant value left on the table due to consumer inertia.

4 Health Insurance Market Design and Regulation

4.1 Frameworks for Studying Insurance Market Design

A key premise underlying many health care markets around the world is that competition between payers (insurers) will reduce costs and lead to higher quality care. This paradigm, typically referred to as "managed competition," acknowledges that, though such competition can be valuable, it needs to be more heavily regulated than typical product markets (see, e.g., Enthoven, Garber and Singer (2001)). There are a number of key reasons for why such regulation is important, including that (i) health care is often viewed as a "right" so that public subsidies often play a role in provision and that (ii) adverse selection is a potential concern. Adverse selection can occur both on the extensive margin (into or out of a market) or on the intensive margin (across plans in a given market) and manifests when consumer costs are correlated positively with choosing generous plans. Government regulation can help mitigate both dimensions of selection in a variety of ways, as we

discuss in more detail below.

To study the design of insurance markets, it is useful to have in mind a benchmark model capturing firm behavior in a typical "managed competition" style market, often also referred to as an "exchange." There are two useful workhorse models in the literature, both of which effectively assume perfect competition between firms. The first is Einav, Finkelstein and Cullen (2010), who set up a model with the following key assumptions:

1. Competing insurers offer one specific regulated insurance product
2. Insurers cannot price discriminate between consumers
3. All consumers are allowed to purchase insurance from any insurer that they want to (guaranteed issue)
4. If you don't purchase insurance in the market, you get a baseline outside option that is publicly provided (e.g. traditional Medicare for seniors over 65 in the U.S.)

Regulated insurance products, no price discrimination, and guaranteed issue are all hallmarks of managed competition-style markets. The second useful workhorse model, Handel, Hendel and Whinston (2015), makes similar assumptions to Einav, Finkelstein and Cullen (2010), with two key differences:

1. Competing insurers can offer multiple regulated classes of insurance options
2. There is a fully enforced mandate such that consumers must buy one option offered in the market

While the Einav, Finkelstein and Cullen (2010) assumptions may better reflect privatized add-ons to public insurance (e.g. Medicare Advantage HMOs), the Handel, Hendel and Whinston (2015) assumptions may better reflect regulated exchanges with multiple types of plans and an insurance mandate, similar to the markets set up under the Affordable Care Act (ACA) in the United States.

The details of these studies are discussed in more depth in the handbook chapter on selection markets included in this volume [Einav, Finkelstein and Mahoney (2020)]. Here, we discuss the key implications of these two studies for studying the industrial organization of health care markets.

We present a model that incorporates both frameworks, following the comparison between these two papers presented in Weyl and Veiga (2017). Assume that a unit mass of individuals must purchase insurance that has either low baseline generosity L or higher generosity H. The prices of these options are (p_L, p_H) and $\Delta p = p_H - p_L$ We will discuss momentarily how these prices are

determined. An individual's utility for H as opposed to L, not factoring in price, is denoted u. An individual buys plan H if their incremental utility u is greater than Δp.

Define $c_H(u)$ as the average cost of those enrolling in plan type H, i.e $c_H(u)$ is $E[c_H|u \geq \Delta p]$ and $c_L(u)$ as $E[c|u < \Delta p]$.

Consider two different institutional setups for pricing. The model in Handel, Hendel and Whinston (2015), which Weyl and Veiga (2017) refer to as "total pricing" (TP), each type of plan offered is responsible for its own costs, there is a fully enforced mandate, and no outside option. Insurers in the competitive market break even, such that, in any equilibrium:

$$p_H = E[c_H|u \geq \Delta p]$$
$$p_L = E[c_L|u < \Delta p]$$

Henceforth we will use the shorthand $\Delta P = \Delta AC$ to describe these equilibrium restrictions. Note that Handel, Hendel and Whinston (2015) also discuss what happens in boundary cases where all consumers shift to one plan or the other. More broadly, in that paper the authors present an in depth discussion of the game theoretic assumptions required to (i) ensure that an equilibrium exists and (ii) determine which potential candidate equilibrium survives as the unique equilibrium. For a more in depth discussion of these points see both Handel, Hendel and Whinston (2015) and the Handbook chapter in this volume by Einav, Finkelstein and Mahoney (2020). For the rest of this discussion, when discussing TP, we will operate under the assumptions Handel, Hendel and Whinston (2015) maintain to ensure that an equilibrium exists and is unique.

Alternatively, Weyl and Veiga (2017) discuss the framework set up in Einav, Finkelstein and Cullen (2010) as one of "incremental pricing" (IP). Under IP, c_L is covered by the baseline provider, e.g. the federal U.S. government in the case of traditional Medicare. The high provider, who is now providing top up coverage relative to L, has to break even, but only on the incremental costs relative to c_L, rather than on the spread in average costs between those enrolling in L and those enrolling in H. Specifically, average cost for the competitive provided top up plan is:

$$AC_H = E[c_H - c_L|u \geq \Delta P] \tag{20}$$

The equilibrium in an IP market occurs where p_H is set such that $AC_H = \Delta P$.

Weyl and Veiga (2017) show a number of key relative properties for TP markets relative to IP markets. First, they show that, under an assumption of global adverse selection (expected costs are increasing in u), the average cost wedge relevant to equilibrium pricing is always going to be larger in TP than in IP. The difference in this wedge across these two setups is:

$$E[c_L|u \geq \Delta P] - E[c_L|u < \Delta P] \tag{21}$$

Weyl and Veiga (2017) show that, under certain reasonable assumptions, this implies that *for any* ΔP, ΔAC in TP is going to be bigger than AC_H in IP. This, in turn, implies that:

$$\Delta P*_{TP} > P*_{IP} > P * q^H_{TP} < q^H_{IP} < q^H_* \tag{22}$$

Here, P* is the socially optimal price differential, while the other starred prices are the equilibrium price differentials under each of the institutional setups. The key finding is that under TP, adverse selection will be stronger, market unraveling higher, and the deadweight loss from adverse selection higher, relative to IP.

Weyl and Veiga (2017) show that the assumed institutions have quantitatively important implications for results. Figure 1, reproduced from Weyl and Veiga (2017), illustrates the differences between these two institutional setups, using parameter estimates from Handel, Hendel and Whinston (2015).

Panel A in the figure plots three average cost lines as a function of ΔP. The difference between the top and the middle line reflects AC_H under IP, while the difference between the top and the bottom line reflects ΔAC under TP. Quantitatively, the simulations the authors run show that ΔAC under TP is approximately 3 times larger than the average cost of the high plan under IP. Panel B shows the equilibrium implications of this. Under TP, the market share enrolled in more generous coverage in equilibrium is about 0.4. Under IP, it is about 0.9. The social optimum has everyone enrolling in more generous coverage, since u > MC for all consumers by assumption. Thus, the differences in adverse selection and coverage generosity are meaningfully different under these two sets of institutional assumptions. Panel C shows the deadweight loss from adverse selection under each setup as a function of the underlying correlation between health risk and insurance value. For the value of this correlation estimated based on Handel, Hendel and Whinston (2015), and in general as this correlation becomes larger, the deadweight loss from selection under TP institutions is much larger than that under IP institutions.

For further discussion on the specifics of these papers and models, see Einav, Finkelstein and Mahoney (2020). For our purposes here, there are several key takeaways as we move towards our discussion of insurance market function and regulation:

1. The assumed institutional setup (TP vs. IP) can have big implications for positive and normative estimates, including the degree of adverse selection

2. In empirical work, this distinction generally matters more when conducting counterfactuals

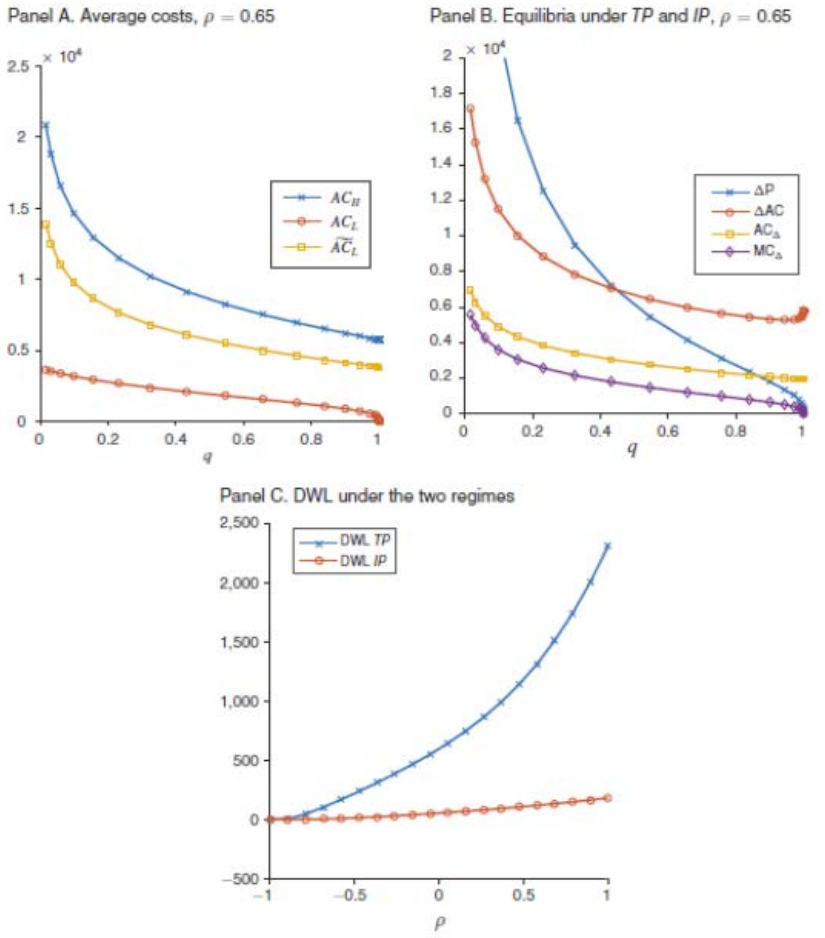

FIGURE 1

Notes: In panel A, the difference between the top and middle curves is the relevant average cost under *IP*, while that between the top and bottom curves is relevant under *TP*. In panel B, the curves determining equilibrium for the baseline calibration, which also show the magnitudes of the local distortions characterized by Proposition 1. In panel C, DWL under the two institutions for alternative values of ρ.

Figure 1: This figure is reproduced from Weyl and Veiga (2017). Copyright American Economic Association; reproduced with permission of the AEJ: Microeconomics.

(which use the model assumptions to project new scenarios) rather than in-sample analysis, where the observed pricing and shares tell us a lot about these key quantities, irregardless of the underlying model assumptions

3. Taken literally, there are quite a few policy environments where each framework applies well. For example, Handel, Hendel and Whinston (2015), with the TP model, likely applies more naturally to ACA-like exchanges, especially when an effective insurance mandate is in place, while Einav, Finkelstein and Cullen (2010), with the IP model, likely applies better to a top up market like Medigap supplemental coverage (prevalent in many systems around the world).

4.1.1 Modeling Imperfect Competition

Quite a few empirical papers in the literature focus on imperfect competition in insurance markets. It is more challenging to set up a general framework for imperfect competition in selection markets, in part because firms with market power also consider risk selection as a key dimension of pricing decisions (i.e. they care about who buys at a given price, as well as the number of buyers). Since these empirical papers, which we discuss later, do not typically discuss overarching concepts related to imperfect competition and selection markets, we outline some general insights from Mahoney and Weyl (2017) on this topic here.

Mahoney and Weyl (2017) set up a symmetric model of imperfect competition that paramaterizes the extent of market power and the extent of selection based on risk. They study the interaction between these two phenomena and find that policies that enhance efficiency by combatting adverse selection in competitive markets may actually be welfare reducing when the market is imperfectly competitive. Here, the key insight is that if the equilibrium quantity of insurance provided is relatively high, and the slope of marginal revenue is relatively flat, then flattening the average cost curve through risk-adjustment transfers decreases quantity, though the social planner wants to increase quantity. If equilibrium quantity is low and marginal revenue is steep, risk-adjustment transfers still increase quantity and reduce selection. The authors show the converse is true for markets with advantageous selection.

The key conceptual insight, which is relevant to the empirical papers discussed later in this chapter, is that the conceptual comparative statics typical of competitive markets with adverse selection may not hold in imperfectly competitive selection markets. Though, in practice, many of the empirical papers in this area assume perfect risk-adjustment (i.e. assume away adverse selection) it is important to keep the rich potential interactions between imperfect competition and selection markets in mind when thinking about these papers.

4.2 Managed Competition Exchanges: Examples

There are a few key examples of managed competition exchanges that are oft-studied in the health and industrial organization literature. We briefly describe these markets here and describe further details in the next section when discussing the specific papers.

1. **Medicare Part D:** Medicare Part D, which began selling prescription drug insurance to seniors in 2006, is probably the most studied health insurance exchange market. This program, which serves over 50 million seniors, is one of the leading examples of privatized insurance benefits being sold through a regulated, competitive market. The Part D market sells voluntary "stand-alone" drug plans direct to consumers, though consumers can also obtain Medicare drug benefits if they elect a Medicare Advantage HMO plan that includes those benefits.

   Medicare Part D markets, which are typically organized at the state level, have had on average about 30 insurance plan choices per market. Choices are differentiated based on (i) insurer brand (ii) insurer drug formulary (iii) insurer administration and (iv) plan cost-sharing characteristics that determine the out-of-pocket payments consumers make. Medicare determines premium subsidies given to consumers on a sliding scale that relates to income and, for the lowest income, also provides cost-sharing subsidies. The specific design of the premium subsidy scheme has been the point of much study and is something we will discuss in more depth later in this section.

   While there have been many papers focused on consumer demand for Part D plans (see some discussion earlier in this article) in this section we will focus on papers that study specific aspects of regulation, competition and supply in the Part D market.

2. **Medicare Advantage:** Medicare Advantage, formerly known as Medicare Choice Plus or Medicare Part C, is a program that allows seniors to opt out of traditional Medicare benefits and receive benefits instead from a private insurer. Insurers operating under Medicare Advantage operate under a range of regulations that define what services and what providers they have to provide access to. Medicare Advantage plans are typically thought of as HMO plans that have low cost-sharing, but ration care through other means, e.g. through access to a specific network of providers. As noted above, Medicare Advantage plans can also offer drug benefits and thus substitute for standalone Part D plans.

   Medicare Advantage beneficiaries receive subsidies from the federal government and pay premiums, similarly to Part D. Insurers generally cannot price discriminate and, though risk-adjustment transfers are in place to mitigate adverse selection, it is unclear if these transfers are particularly effective (Brown et al. (2014).

Medicare Advantage has grown in popularity over time, enrolling 36% (24.1 million) of Medicare-eligible enrollees in 2020 (up from 24% in 2010. Imperfect competition has been an important concern in Medicare Advantage markets, where several carriers dominate the landscape. The nationwide C3 index is 59%, with United Health Care, Humana, and BCBS making up over half the nationwide market share. In addition, since plans are offered on a county-specific basis, there are many counties where a low number of plans are offered, increasing concerns about market power. We discuss research related to imperfect competition in Medicare Advantage in more depth later in this chapter. See Kaiser Family Foundation (2020) for more details on the Medicare Advantage program.

3. **State Exchanges:** The Affordable Care Act, passed in the United States in 2010, created the template for state-by-state insurance exchanges to be set up for consumers in the United States. The goal of the exchanges is to fill in the gaps and insure consumers who are not covered by an employer, Medicare, or Medicaid. Exchanges are either operated independently by states or run by the federal government (federally facilitated exchange).

   Plans typically are offered by county, and, unlike Medicare Part D, consumers typically have between 2 and 10 options to choose from. The lower number of plans has raised meaningful concerns about access and imperfect competition, especially in markets with a low number of plans.

   State exchanges follow federal regulations for managing competition and increasing access. Subsidies are given by the federal government according to a sliding scale between 133-400% of the federal poverty line (FPL). In addition to these subsidies, which increase access, price discrimination in essentially prohibited in the exchanges, increasing access for the predictably unhealthy. The Affordable Care Act also included a broad mandate to purchase insurance, though consumers can get insurance from any feasible source. One key difference between the exchanges and other managed competition setups (such as Part D) is that the majority of consumers have insurance through another source (employer sponsored coverage) so exchange designers need to be heavily concerned about substitution in and out of the market, as well as substitution across plans with the market.

   In addition to the state exchanges set up under the Affordable Care Act, several exchanges operated prior to the onset of this law, including the Massachusetts Connector Exchange, which has been the focus of much research. See Kaiser Family Foundation (2011) for further details on the initial regulation of exchanges set up under the Affordable Care Act.

Of course, in addition to these key examples, there are many other examples of important regulated insurance markets both within and outside the United States. We discuss further examples outside

of the United States later in this chapter. With these market examples in mind, we now discuss these markets and related regulation in more detail, following the conceptual and empirical literatures.

4.3 Regulation of Competitive Insurance Markets

In the managed competition health insurance paradigm, there are a number of policy decisions that are made repeatedly, over time and across markets. Since these policy decisions are the focus of much conceptual and empirical work in the literature, we lay out some of the key policy decisions here before getting to the specific empirical papers that address them later on in this chapter.

1. **Subsidies:** health insurance markets almost always provide subsidies to consumers, due to the high cost of insurance and the fact that health care, in contrast to most other products, is often viewed as a human right. Both exchange markets and employers provide subsidies for insurance purchase and these subsidies typically cover well over half of plan premiums.

   This has several implications. First, in a short-run sense, employers and the government are responsible for much of the cost of health care consumed by enrollees. Second, even for a given average subsidy level, the way that subsidies are set can have meaningful implications for plan pricing and plan design. Enthoven, Garber and Singer (2001) advocates for lump-sum subsidies where consumers have to pay fully on the margin if they want more expensive insurance coverage. This has the benefit of making consumers more price sensitive and having them bear the cost, e.g., of higher priced providers or very generous risk-protection. In turn, this should help stiffen competition, both in premiums and insurance product design.

   However, in practice lump-sum subsidies have several drawbacks. First, for lower-income consumers, they can make more expensive plans completely unaffordable, raising significant equity concerns. Second, Jaffe and Shepard (2020) note that subsidies that are linked to plan premiums, i.e. that rise with premiums to some degree, can help exchange designers mitigate uncertainty about premium changes over time. The central tradeoff discussed in this paper is an important one for subsidy policy design. On the one hand, price-linked subsidies can be helpful in preventing large fluctuations in the plan premiums seen by consumers over time. On the other, linking subsidies to prices softens price competition, since a plan price increase is automatically met by increased public payments, dampening any demand response.

   The authors theoretically model this tradeoff and then investigate it empirically using data from the Massachusetts health insurance Connector exchange (similar in spirit to the state-by-state exchanges set up under the ACA). They find that price-linked subsidies in the Massachusetts exchange leads to price increases of between 1-6 percent and that the negative impacts of these price increases meaningfully outweigh the expected gains from reducing

insurance plan price uncertainty, though they acknowledge that quantifying such uncertainty may be difficult in many contexts. Pinning this uncertainty down is potentially quite important for several reasons. First, because of consumer inertia, lump-sum subsidies may necessitate greater churn but consumers may not actually respond to value creation and destruction fluidly in the market. Second, price-linked subsidies can reduce adverse selection death spirals relative to lump-sum subsidies (as discussed in Cutler and Reber (1998)), which is beneficial if market stability is valued in practice.

Related work by Tebaldi (2020) studies insurance plan competition and subsidy design in the California health insurance exchange set up under the Affordable Care Act. This paper makes the important point that, because younger households are both healthier and more price elastic, providing more generous subsidies to that group leads to equilibria where all buyers are better off and per-person public spending is lower. The paper implements a sophisticated discrete choice demand model that accounts for heterogeneity, and integrates this with a supply-side model with imperfect competition. It accounts for extensive margin adverse selection and assumes perfect risk-adjustment on the intensive margin.

In addition to studying an important policy question related to subsidy design, Tebaldi (2020) is one of the first papers to model imperfect competition in the exchanges set up under the ACA. He finds a meaningful degree of product differentiation, primarily due to carrier-specific differences and notes the important implications this has for subsidy design. One downside to studying this nascent market at its inception is that the model does not account for carrier uncertainty and learning when setting prices and establishing products in the market. This is a difficult but important area for future research. In addition, as other papers show, inertia may lead to meaningful reductions in price sensitivity and insurers may use invest-then-harvest policies to attract consumers at the market's inception (see the upcoming discussion on imperfect competition for more details).

There are also a number of papers that have studied subsidy design in Medicare Part D prescription drug insurance with an industrial organization focus. Decarolis (2015) studies competition in Part D markets with a specific focus on how low-income subsidies are delivered to consumers. The paper notes a number of reasons why firms price their plans with a specific focus on gaming the low-income subsidy system. First, about two-thirds of the 9 million LIS enrollees do not actively select an insurance plan. They are allocated by the Center for Medicare and Medicaid Services (CMS) to plans with a premium not greater than the LIS itself. Conditional on an insurer having at least one plan with its premium at or below the subsidy, the allocation rule keeps the LIS enrollees within the same insurer from year to year and, otherwise, allocates them at random across the insurers offering plans with

premiums at or below the subsidy. Second, CMS pays the premiums for LIS enrollees in full. Third, the amount of the subsidy is an average of plan premiums. Fourth, all major insurers offer multiple plans that enter into the calculation of the subsidy.

Decarolis (2015) notes that, at the most basic level, this means that a firm offering multiple plans can maintain just one plan with a premium equal to the low income subsidy and set high premiums for all its other plans to inflate the subsidy. The paper sets up an index to show how manipulable the low income subsidy is in a given market for a given insurer. Then, it shows that this index is associated with most of the substantial rise in premium increases in Part D between 2006 and 2011. This suggests that, from a policy standpoint, redesigning the subsidy scheme could lower costs without reducing consumer welfare.

In related work, Decarolis, Polyakova and Ryan (2020) extend the Decarolis (2015) analysis and estimate a general model of imperfect competition in Part D with the goal of assessing desirable properties of subsidy design. The paper assumes that risk-adjustment transfers (discussed soon) perfectly mitigate adverse selection. Insurers have market power because they are differentiated by their brand equity / non-financial plan features. The authors find the observed Medicare Part D subsidy mechanism is close to optimal. Across a range of counterfactual analyses, they find that more efficient subsidy mechanisms in Medicare Part D share three features: (i) they continue to support demand elasticity through making prices matter; (ii) they limit firms' ability to exercise market power; and (iii) they continue to link the prices firms set with their marginal costs.

Miller et al. (2019) study optimal subsidy regulation on a different dimension, asking how a planner should allocate subsidies across different geographic regions when they have a fixed subsidy budget. Their framework allows for insurers to adjust both pricing and product characteristics in response to alternative subsidy designs, while accounting for consumer preference heterogeneity, consumer inertia heterogeneity, and firm cost heterogeneity. They study Medicare Advantage subsidies and find that the optimal subsidy scheme they solve for increases consumer surplus by 30 percent over the current approach and is reasonably easy to implement with a linear rule based on market-level observables.

2. **Risk-Adjustment Transfers:** Risk-Adjustment transfers are another oft-discussed health insurance market policy. Risk-adjustment transfers use an algorithm to transfer money from insurers who enroll healthy consumers directly to insurers who enroll sicker consumers. These transfers combat adverse selection by making sicker consumers cheaper for insurers and healthier consumers more expensive for them.

   Abstracting away from implementation difficulties, risk-adjustment transfers should be implemented aggressively in almost all health insurance markets if done properly and on an

ex-ante basis (i.e. the risk-adjustment occurs prior to the realization of health states). Cutler and Reber (1998), Handel, Hendel and Whinston (2015), Mahoney and Weyl (2017), Handel, Kolstad and Spinnewijn (2019) are examples of papers that study the stylized implications of risk-adjustment transfers for selection markets. Many other empirical papers in insurance markets avoid modeling risk selection by assuming that risk-adjustment transfers are fully effective, though this assumption is unlikely to be entirely realistic.

In practice, risk-adjustment transfers are typically only partially effective. They are quite difficult to implement for both computational and strategic reasons. Ellis and Layton (2014) and Geruso and Layton (2017) provide nice bridges between conceptual discussions of risk-adjustment transfers and empirical implementation of these transfers. One key implementation issue is that it is much easier to implement ex post risk-adjustment (based on actual realized claims) from a statistical standpoint. But, ex post risk-adjustment creates significant incentive problems by giving insurers the incentive to increase patient costs. Ex ante risk-adjustment is clearly preferable, but requires a very detailed and effective statistical model mapping prior usage to expected future usage. While these types of algorithms have improved over time, they are still susceptible to gaming by insurers, as demonstrated by Geruso, Layton and Prinz (2019), which provides evidence that insurers try to attract consumers whose expected cost is below expected premiums net of risk-adjustment transfers. Moreover, Geruso and Layton (2020) show that once an enrollee joins a plan, insurers have the power to affect the size of risk-adjusted payments from the regulator by inflating the severity of the enrollee's reported illness.

While subsidies and risk-adjustment transfers are similar, since they both provide subsidies (one directly to consumers the other to plans), Einav, Finkelstein and Tebaldi (2019) show that there are two substantive differences between these policies from a conceptual standpoint. First, subsidies provide a greater ability to target consumers based on their willingness-to-pay for plans, rather than just their costs (which are a component of willingness-to-pay). Second, as a result of this first insight, under imperfect competition subsidies can be used to induce lower markups and greater plan enrollment, relative to risk-adjustment. Using data from the California ACA state exchange, the authors find that, holding government spending constant, shifting spending to subsidies away from risk-adjustment transfers could increase exchange enrollment by six percentage points while keeping all consumers weakly better off.

3. **Price Discrimination and Risk-Rating:** Another key regulatory decision made by market designers in health insurance is the extent to which they should allow price discrimination. This issue is addressed directly in Handel, Hendel and Whinston (2015), who discuss the

key tradeoff between adverse selection and reclassification risk that is induced by different regulations that impact pricing granularity.

The tradeoff between adverse selection and reclassification risk is one between short-run and long-run risk protection for consumers. In Handel, Hendel and Whinston (2015) the authors assume that the market is a static, one year at a time market, similar to what is present in almost all empirical settings. The authors study welfare as insurers are allowed to price based on finer and finer observables. At one end of the spectrum is pure community rating, where all consumers must be charged the same price. In that setting, there is potential for significant adverse selection (especially without effective risk-adjustment transfers) because all consumers are placed in one risk pool together and the sick drive up the cost of more generous plans making those plans much less desirable for healthier consumers. However, there is no risk over time: consumers know they will face the same community-rated premium every year, regardless of their health status.

On the other end of the spectrum, imagine a case where insurers are allowed to price discriminate based on all observable information. In that case, adverse selection is limited, since risk can be priced quite effective. However, long-run year-to-year risk is substantial: if a consumer becomes sick in a persistent manner their premiums increase substantially and for a long period of time.

The paper studies a range of interim cases (partial price discrimination) and quantifies the tradeoff between adverse selection and reclassification risk. The paper finds that, generally, community-rating is preferable to different forms of price discrimination, but that this does depend on lifetime income paths for consumers. For example, if consumers are very healthy earlier in life but have lower income then as well, some risk-rating may be preferable. The paper discusses pricing based on age, which many exchanges have implemented in practice, and finds that this can be a valuable tool for mitigating this correlation between health and income over the life cycle while still achieving the welfare benefits of reduced reclassification risk from community rating.

In related work, Ericson and Starc (2015) study the interaction between insurer price regulation and imperfect competition on the Massachusetts Connector Exchange. They study age rating regulation that restricts insurers to charging prices that are within 3 to 1 ratio relative to one another, across the range of ages. They find that younger consumers are twice as price sensitive as older consumers, implying that younger consumers face lower markups over cost. The paper explores the linkages and shows that there are two key benefits from pooling older consumers with younger consumers when age-pricing regulation is binding: (i) older consumers benefit from the higher price sensitivity of younger consumers, via lower markups

and (ii) older consumers benefit from being pooled with younger consumers who are lower costs, assuming risk-adjustment transfers are imperfect. Thus, stricter age-rating regulations transfer resources from younger, low-cost consumers to older, high-cost consumers, reduce firm profits, and increase consumers surplus overall.

4. **Contract Generosity:** Another key design decision in exchange markets is what levels of financial coverage to allow insurers to offer. The key benefits of allowing standardized coverage levels are (i) insurers have a harder time cream skimming profitable consumers with small changes to plan designs and (ii) making it easier for consumers to evaluate plans (which can increase price sensitivity and the overall competitiveness of the market).

   Determining the levels of contract generosity a regulator should allow is quite complicated. As discussed in more depth later, Marone and Sabety (2020) show in a large employer context that self-selection into plans limits the value of vertical plan differentiation on financial characteristics. Consumers self-select based on expected transfers while a social planner would like to target plans based on the surplus generated from risk protection as compared to the surplus lost from moral hazard. How close or far away plans are from one another in the attribute space has meaningful but subtle implications for adverse selection, as shown in Marone and Sabety (2020), Ho and Lee (2020) and Handel, Hendel and Whinston (2015).

   Moreover, in practice, regulation of the minimum coverage plan has had especially important implications for welfare. In practice, the minimum coverage plan attracts many healthy consumers, either due to liquidity constraints or adverse selection into more generous plans. Thus, the minimum coverage level in many exchanges is almost a direct regulation of the risk protection and moral hazard surplus generated by healthy consumers, as discussed in, e.g. Geruso et al. (2019). In addition to showing that advere selection within-market (intensive margin selection) can lead to many consumers winding up in the minimum regulated coverage, Geruso et al. (2019) also show that minimum coverage is especially important for determining who selects into the market on the extensive margin. Especially for the Affordable Care Act exchanges, where market participation is a pressing concern, this second margin of selection is important. As the minimum coverage level is lowered, liquidity constraints and lower premiums may push consumers already in the market towards that lower coverage. But, as the minimum coverage is lowered, consumers outside the market may be more willing to pay the now smaller cost of opting in.

   This second margin of selection into the market also relates to another oft-discussed policy: insurance mandates requiring all consumers to purchase health insurance. Many of the studies above (apart from Geruso et al. (2019) presume that a fully enforced mandate is in effect (close to what is idealized in the Affordable Care Act). The case for a mandate is

clear: it reduces dynamic free riding and allows for community rated premiums to include both sick and healthy consumers. In practice, mandates have typically been implemented as taxes, where a consumer pays a tax for not having health insurance. This operates similar to a negative lump-sum subsidy, as discussed earlier in this section, with one key difference being that some may feel a moral obligation to purchase insurance with the framing of the tax as a mandate (see, e.g., Cox et al. (2015)).

There are a number of other regulations that we don't discuss in depth here. Later on in this chapter, we discuss regulation of contract length (i.e. can insurance contracts be five years long?). Another important regulation studies the types of services and doctors that plans can and should cover. Additionally, as discussed soon in the section on market regulation when consumers have choice frictions, there are a number of policies (e.g. restricting the number of plans and default plan design) that may be valuable in the presence of consumer choice difficulties.

4.4 Choice Frictions and Health Insurance Market Design

A range of demand-focused papers have shown that choice frictions and/or behavioral choice factors can have important implications in health insurance markets. While much of this literature (as described in section 3.2) focuses on identifying issues with choices from a given menu of plans, some of it incorporates supply-side models that show important interactions between demand frictions and key supply outcomes.

4.4.1 Consumer Mistakes and Adverse Selection

One key industrial organization insight from the literature on consumers' choice frictions is that choice frictions have different implications for selection markets than for typical product markets. As is typical, in health insurance markets consumers' mistakes are bad for them given a specific market structure. However, conceptual and empirical research has shown that in insurance markets where adverse selection is a prime concern, improving choices may ultimately make consumers worse off. This presents a challenge for policymakers considering avenues to improve consumers' decisions.

Adverse selection is an important potential inefficiency that arises in health insurance markets where the costs to the insurer depend on who is insured. When sicker consumers choose more comprehensive insurance coverage, the premiums for those plans increase to reflect greater costs to the insurer. As a result, healthier consumers, who could prefer plans with greater network coverage or risk protection, may be priced out of the market.

Handel (2013) studies the interaction between inertia and adverse selection using a counterfactual analysis where, as consumer inertia is reduced, consumers pick different insurance plans

and the prices of those plans adjust as a result. When inertia is reduced by 75% of its baseline estimate, the premiums for comprehensive coverage increase sharply as healthy people who had been choosing that coverage and losing value shift to less generous coverage. This leads to a death spiral, where the comprehensive plan essentially disappears from the market with an extremely high premium, and consumers who want higher coverage are forced into lower-coverage options. Quantitatively, reduced inertia leads to a 7.7% unintended welfare *reduction* in this environment: helping consumers make better choices is bad for the sample overall.

Polyakova (2016) studies a similar question in Medicare Part D, but emphasizes that whether reduced inertia will be good or bad for consumers depends on how initial prices in the market are set. This paper shows that in Part D, where initial prices for comprehensive coverage are relatively far away from those for less generous coverage, reduced inertia actually helps the prices of more comprehensive coverage adjust downward over time (under the assumption that insurers use lagged average cost pricing). This is because initial prices were set further apart than steady-state equilibrium prices, so reduced inertia, which helps prices move more quickly towards the steady-state equilibrium, reduces the price gap. Thus, in the Part D environment, reduced inertia may both help consumers conditional on the market environment and, by lowering the price of comprehensive coverage in the market, reduce adverse selection.

Handel, Kolstad and Spinnewijn (2019) provide a general framework for studying when improved choices exacerbate adverse selection. They use a simple model to analyze a population of consumers that are heterogeneous across many dimensions: costs, willingness-to-pay, true value, and choice frictions driving a wedge between willingness-to-pay and true value. The authors derive several theoretical results for competitive insurance markets where consumers make active choices. They show that, as both the mean and variance of consumer surplus rise relative to the mean and variance of costs, improving consumer choices is more likely to be beneficial. This is because the feedback loop between costs and premiums generating adverse selection becomes dominated by improved matching of consumers to the plans they value the most. For example, if heterogeneous consumer values for insurance as a tool for risk protection are relatively large and varied, then improved decision-making facilitates large improvements to welfare through better matching. If these values are not strongly correlated with costs, then there will be limited incremental selection but substantial gains from better choices. The converse is also true: as the mean and variance of costs become more important contributors to insurance value relative to surplus from risk protection, helping consumers make better decisions is worse for the market: these improved decisions cause additional adverse selection which dominates the benefit from better matching. The authors illustrate the interactions between these key objects with simulations as well as an empirical application based on Handel and Kolstad (2015*b*).

4.4.2 Choice Frictions and Firm Pricing

In addition to studying the pricing impacts of improved choices in competitive markets with adverse selection, several papers study how firms price in markets with inertial consumers. Ericson (2014) documents the invest-then-harvest pricing patterns in Medicare Part D, finding that firms initially set prices low in order to attract consumers and then raise prices to take advantage of consumers' inertia. Ho, Hogan and Scott Morton (2017) study dynamic firm pricing to inertial consumers in Medicare Part D, with a model of imperfect competition. This paper begins by providing substantial multi-dimensional evidence that inertia is a large force shaping consumer plan demand. With estimates of rational inattention, consumer preferences, and consumer costs in hand, Ho, Hogan and Scott Morton (2017) then go on to study how inertia shapes premiums and costs in the market. They estimate the reduction in steady state plan premiums if all consumers were attentive, i.e. inertia were fully removed. They find that an average consumer could save $1,050 over three years and that government savings over the same time horizon could amount to $1.3 billion or 1% of the cost of subsidizing the relevant enrollees. This paper shows that understanding dynamic and behavioral aspects of competition are crucial for painting a full picture of competition in Medicare Part D (and likely in insurance exchanges with a large number of options more broadly).

Overall, there has been quite limited work studying how firms price to behavioral consumers in health-insurance and health-care markets, despite the importance of this topic. See Heidhues and Koszegi (2018) for a broader discussion of behavioral industrial organization and some of the approaches that could be applied to studying related questions in health-care markets.

4.4.3 Choice Set Restrictions and Targeted Defaults

One additional policy question that interacts with choice frictions, health insurance, and industrial organization is whether and how choice sets should be curated to help deal with those choice frictions. In most product markets, limiting the number and types of choices available would likely be welfare reducing. However, in health insurance markets where choice is complex and difficult, research has shown that such interventions can improve the efficiency gained from managed competition markets.

Abaluck and Gruber (2016) study whether including more options in the consumers' choice sets is beneficial. The authors study a tradeoff between improved consumer-plan matches from greater choice and increased consumer-choice errors from having more options. They leverage a unique data set from Oregon school district employees where each district had the opportunity to offer any combination of 13 approved plans to consumers. Thus, the overall set of plans each district could offer was fixed, but each district could curate its own set of options. Both cross-

sectionally and over time, the authors observe similar consumers with a number of choices ranging from 1 to 13, drawn from the same overall set of plans. They argue that market regulators may want to actively consider and regulate the number and quality of plans allowed to enter a market. If more options confuse consumers, and allow firms to prey on them, regulators could curate these markets closely and serve as intermediaries between plans and consumers.[32] Whether or not restricting choice sets is "good" policy depends on the specifics of a given empirical context.[33] In addition, Abaluck and Adams-Prassl (2021) study targeted defaults in Medicare Part D under a set of assumptions about (i) inattention underlying consideration set formation and (ii) the level of tangible switching costs. They find small benefits from targeted defaults if switching costs are high and everyone with a benefit from switching is defaulted into that ex post better option. But, they find that if people are given a new default option above some value threshold, e.g. at least a $300 expected gain, then targeted defaults increase consumer surplus substantially.

4.5 Imperfect Competition and Welfare

Several papers not yet mentioned focus primarily on the welfare implications of imperfect competition in insurance markets. Town and Liu (2003) study the welfare effects of the Medicare+Choice HMO market, the predecessor to Medicare Advantage. They find meaningful welfare gains from this program for both firms and consumers from 1993-2000, with bigger gains for firms than for consumers. They find that the welfare gains for consumers are distributed unevenly across geographic regions, with greater consumer welfare impacts occurring in markets with more plans. They find that the main impact of having more plans is increased price competition, transferring surplus from firms to consumers. In related work, Curto et al. (2019) use claims data from the Medicare Advantage program to study whether Medicare Advantage plans generate cost savings relative to traditional Medicare. They find the Medicare Advantage plans spend 9 to 30 percent less on health care, adjusting for enrollee case mix, and that these savings are generated through quantity reductions (for both high and low value care) rather than via lower prices or increased consumer price shopping. They find that plans generate revenue that is 30% higher than health care costs, suggesting some, though not exorbitant, profitability once factoring in non-health expenses.

While the above papers estimate Medicare Advantage plan profits and costs using static frameworks, Miller (2019) argues that these papers overestimate plan markups and underestimate plan costs because they do not account for consumer inertia and the dynamic behaviors of consumers

[32] Certain ACA state exchanges, e.g., Massachusetts and California, use this kind of model to offer more curated options.

[33] A related topic that researchers should investigate is the extent to which targeted (or "smart") default options can help or hurt consumers. Handel and Kolstad (2015*a*) propose a targeted default policy and analyze the tradeoffs involved in some simulations. See Chandra, Handel and Schwartzstein (2019) and Handel and Kolstad (2015*a*) for a more in depth discussion.

and firms. Miller presents reduced-form evidence of dynamic consumer and firm behavior, similar to that in Ericson (2014) and Ho, Hogan and Scott Morton (2017) for Medicare Part D, and estimate a dynamic model of demand and supply. He finds that costs in Medicare Advantage are higher than traditional Medicare for sick consumers, but not for healthy consumers, finding higher costs on average in this market than prior work that does not account for dynamics.

Importantly, imperfect competition can also matter for product design in addition to mattering for pricing. Starc and Town (2019) study the cross-market effects of insurance benefit design. This is an especially important topic area for health care in the United States, where private insurers often operate across multiple markets simultaneously, with some potential for consumers to substitute from one market to another.

The authors compare insurer behavior in stand-alone Medicare Part D drug plans (which only cover drugs) to their behavior in Medicare Advantage plans, which cover both drugs and medical care. One key insight is that plans covering medical expenses as well as drugs are more likely to cover more drugs and to cover drugs more generously. They show that this additional coverage induces greater drug use and, moreover, that these drugs reduce medical expenditures. Thus, having stand-alone drug or medical plans imposes a negative fiscal externality on traditional Medicare, because strategic private insurers don't consider the entire breadth of coverage when making decisions for plans that only cover one slice of health spending.[34].

Starc and Town (2019) set up an equilibrium model that endogenizes what plans choose to cover and subsequent plan pricing, accounting for adverse selection and asymmetric information. They use the model to show that strategic insurer incentives are as important, from a regulatory design standpoint, as adverse selection in determining benefit design in the markets they study. Lavetti and Simon (2018) show similar results related to plan formulary design and plan incentives for Medicare Part D and Medicare Advantage.

Of course, the papers mentioned earlier in this section that relate to specific policy regulations (e.g. subsidy design) also often investigate interesting interactions between subsidy design and imperfect competition. Thus, though there are not that many papers in the literature whose main policy question emphasizes market power and addressing market power, there are many papers that provide insight into the nature of imperfect competition in insurance markets and its implications. We now turn to a discussion of large group markets, which operate in a different manner than regulated exchanges but (i) cover more than half of consumers in United States and (ii) surface a range of rich industrial organization questions that researchers have worked on.

[34]In other recent work that studies cross-market effects, Holmes (2020) studies risk selection in private insurance as a result of the Affordable Care Act Medicaid expansion, finding that the expansion of the public Medicaid program has important implications for the cost of private insurance. Holmes (2020) finds that Medicaid expansion reduced private insurance premiums by approximately 10%, due to the selection of sicker consumers into Medicaid post-expansion

4.6 Group Markets

Especially in the United States, large group markets are a core method for delivering health insurance and health care benefits to consumers. Roughly 60% of consumers in the U.S. are covered by an employer, many of whom are covered by large group purchasers who have significant input into the design of health insurance menus. With roughly 700 billion dollars at stake annually in this segment of the market, it is crucial to understand how these markets operate and how distinct policies could improve their functioning.

Work in this market generally focuses on large self-insured employers who are at-risk for covered lives and have a lot of input into plan design. We will focus first on this setting but then describe recent research into competition and efficiency in smaller group purchaser markets, where insurers sell plans to employers and insurers are liable for the resulting risk.

Several recent empirical papers study the important question of how large employers should optimally design their menu of health plans. These papers leverage the framework built in Cardon and Hendel (2001) (who also study employer markets) and follow on papers, particularly Einav et al. (2013), but add important additional dimensions to the model and leverage more granular and comprehensive data. The questions these papers ask are more ambitious and contain myriad important positive and normative analyses that provide insights into how employers should design health insurance menus for employees.

Marone and Sabety (2020) study optimal menu design for large employers with a specific focus on what micro-foundations imply about that menu design. Specifically, they ask when offering vertical choice of different levels of financial coverage is fruitful vs. when it adds (or potentially subtracts) value from offering just one plan. The key insight in this paper is that consumers self-select into plans when there are multiple options and that that self-selection typically will not line up with the plan selection that is socially optimal. They perform this analysis conditional on a range of assumptions about how employers subsidize plans and how plan premiums are set, though the insights also apply to regulation of competitive markets (e.g. those described in Handel, Hendel and Whinston (2015)).

The authors model consumer willingness-to-pay for a plan x, relative to a less generous financial baseline plan x_0, as:

$$WTP(x,\theta) = E_l[c_0(l,\omega,x_0) - c_0(l,\omega,x)] + E_l[v(l,\omega,x)] + \Psi(x,\theta) \tag{23}$$

Here, $E_l[c_0(l,\omega,x_0) - c_0(l,\omega,x)]$ is the expected out-of-pocket cost benefit for a given consumer from enrolling in the more generous plan x relative to x_0. $E_l[v(l,\omega,x)]$ is the expected value of moral hazard spending in plan x relative to x_0, i.e. the net benefit of additional spending, factoring in the health benefits and financial costs. $\Psi(x,\theta)$ is the incremental value of risk protection in plan

x relative to plan x_0. With this private benefit of additional coverage in mind, the authors also define the social surplus from additional coverage:

$$SS(x,\theta) = \Psi(x,\theta) + E_l[k*(l,\omega,x)] + k_0(l,\omega,x) - v(l,\omega,x)] \tag{24}$$

Here, the social planner has the same value of additional risk protection as the consumer but a different cost of moral hazard, equal to the excess spending in more generous coverage net of the value of that spending.

The authors show that because consumers value changes to their expected spending (and the planner does not) while the planner values the total cost of moral hazard spending (while the consumer does not) there is a wedge between the private and social optima when plan choice is possible. Vertical choice should only be offered if consumers with higher willingness-to-pay have a higher efficient level of coverage, i.e. if the consumers who value insurance the most individually also are those with the highest social surplus from additional coverage.

The authors implement their model empirically using data on public school employees in Oregon between 2008 and 2013 (roughly 45,000 households). The context is useful for identifying moral hazard separately from risk aversion because each of 187 school districts independently selects plans to offer to its specific employees, from a broader menu of potential options negotiated at the state level. The authors find a negative correlation between willingness-to-pay and financial risk, in part because plan out-of-pocket maximums in all the options studied limit risk for the higher spending consumers, who gain substantial expected value from transfers under relatively generous coverage. In addition, lower spending individuals are slightly more prone to moral hazard. Consequently, in their setting, they find that households with higher willingness-to-pay do not have higher efficient coverage levels among the plans studied, implying that allowing for choice is not optimal.

In related work, Ho and Lee (2020) study optimal menu design using a new data set on employee health plan choice and utilization at Harvard. In 2015, Harvard changed their menu of plan options, requiring a subset of (non-unionized) employees to enroll in plans with higher out-of-pocket spending. Facing push back from its employees, Harvard then instituted a more expensive plan option with essentially no out-of-pocket spending that employees could self-select into. This presents a nice setting for identifying heterogeneous moral hazard for consumers in care utilization, as well as risk aversion and plan preferences.

Ho and Lee (2020) begin by studying the implications of allowing for choice of insurance plans that differ only on financial dimensions, similar to the exercise in Marone and Sabety (2020). They find, similarly, that the benefits from offering choice only just outweigh the costs that arise due to self-selection, implying only a small gain in consumer surplus from offering the best possible version of two plans rather than the best possible single plan.

In addition, Ho and Lee (2020) also model preferences for non-financial plan characteristics, e.g. preferences for a specific plan carrier / brand and preferences for a different model of insurer care provision (HMO vs. POS plan). The Harvard context has nice variation on these two dimensions and the authors estimate plan preferences for these non-financial characteristics as a function of underlying health status. This is an important added dimension when considering menu design for large employers, since non-financial plan features are typically quite important when assessing the value of health insurance in U.S. The authors find that allowing for this additional dimension of heterogeneity in menu design makes offering choice much more attractive than when only financial plan characteristics are considered. This insight suggests that, if features like carrier and insurance model differentially appeal to different types of households, then offering a choice of plans that differ on these dimensions may be very useful in helping capture more of the potential gains from plan choice.

Tilipman (2021) (also outlined briefly in Section 2 above) studies optimal menu design for large employers but with a different focus than Marone and Sabety (2020) and Ho and Lee (2020). He holds the financial dimension of insurance fixed and focuses on the non-financial dimension of plan choice (as discussed above in Ho and Lee (2020)). While Ho and Lee (2020) show that this dimension can be important for menu design in counteracting selection on financial dimensions, Tilipman (2021) focuses in on consumer demand for providers and plan networks and on network design. Then he investigates why narrow network plans, that limit access to doctors but are able to extract better prices from those doctors, are less prevalent than one would expect based on consumer preferences. He finds that plan switching costs are a key potential reason why the large employer he studies continues to offer broad network options, despite the meaningful additional cost of offering these options relative to consumer preferences for them net of switching costs.

To perform this study, Tilipman (2021) investigates the plan menus offered over time by the Massachusetts Group Insurance Commission (GIC), a large group purchaser that covers roughly 300,000 lives, many of whom are employed by state agencies. The context is ideal for identification of provider switching costs, plan switching costs, and preferences for broad vs. narrow networks. During the time period studied, the GIC offered some narrow network plans and quite a few broad network plans. In 2012, the GIC offered a three month premium holiday where they (i) forced all state employees to actively re-enroll in a health plan, with no default option and (ii) provided three months of free coverage if a consumer switched from a broad network insurance plan to a narrow network plan.

With this variation, the paper estimates a model of consumer demand for hospitals, physician practices, and insurance plans (conditional on the provider preferences). There are a number of key findings. First, a single-member household values a broad network over a narrow network by between \$15 to \$50 a month (holding insurance carrier fixed). 85% of this incremental value is

due to preferences for physician access, rather than preferences for hospital access. Of the value placed on access to physicians in broad networks vs. narrow networks, roughly 50% comes from consumers who are loyal to a physician they have already seen and who they would lose access to under the narrow network option. The author shows that consumer price sensitivity for plans is biased downwards significantly if provider preferences and inertia are not taken into account. In terms of plan demand, the paper finds very high plan switching costs, in line with other papers in the literature (see, e.g., Handel (2013) or Abaluck and Gruber (2016)). Consumers value staying in the same plan at roughly $250 per month, a large proportion of overall premiums. While this switching cost may reflect a range of micro-foundations, its implications for stickiness in plan choice are clear.

With these ingredients in hand, the paper studies optimal insurance menu design with respect to (i) the number of plans offered and (ii) the types of plans offered (broad or narrow network). The paper sets up an employer objective function for the GIC that trades off consumer surplus from a plan menu, GIC spending on premiums (net of consumer contributions), and the fixed cost of offering additional plans. The estimation of fixed costs uses a moment inequalities framework similar to that used in Ho (2009) to analyze the components of hospital profits; it is a nice addition to the literature considering how many (and what kind of) choices employers should offer.

More precisely: the supply model makes the revealed preference assumption that GIC surplus from offering the observed set of plans is greater than that from potential alternative configurations, at each point in time. The decision at time t depends on the following objective function:

$$E[W_t(\delta_{Jt}, \theta)|\Lambda] = E[S_t(\delta_{jt}, \theta)|\Lambda] - \Sigma_j FC_j \tag{25}$$

Here, S is the marginal surplus from offering plan menu δ_J and FC is the fixed cost of introducing a new plan j into the set of plans offered. Using the revealed preference assumption, this translates into the following estimation equation:

$$\frac{1}{T}\Sigma_t[(W_t(\delta_{Jt}, \theta) - W_t(\delta^a_{Jt}, \theta)) \times g(z)] \geq 0 \tag{26}$$

This framework identifies a set of (i) weights on consumer surplus vs. premiums and (ii) fixed costs that are consistent with marginal surplus maximization, net of fixed costs. The estimates suggest that the GIC values consumer surplus at four times the weight it values premiums and that fixed costs are small relative to premiums, equivalent to roughly $8 million per new plan introduced.

The author uses all of these ingredients as inputs into several counterfactuals. First, he studies what happens in the market in the absence of consumer loyalty to their prior physicians. He finds that this would ultimately lead to similar plan configurations, and not lead to more narrow network plans generally, because consumers place high value on seeing their prior providers and

these providers are typically not the most expensive in the network. Thus removing consumer surplus in this way is not worth the resulting premium gains from narrow network bargaining. Next, he studies the impact of removing plan switching costs, and finds that this has a large impact on menu design, leading to both a greater number and greater variety of plans being offered (in terms of network configurations). The number of broad network plans goes down, but the variety and number of narrow network plans increases substantially. The intuition is that, with more elastic consumers, the fixed costs of plan design are now worth paying, but many narrow networks are important to ensure consumers can access their prior physicians within these lower premium options. Finally, the author shows that a subsidy design that makes consumer pay more on the margin for broad networks is ultimately good given the employer's objective function, because it reduces premiums by so much that is compensates for the loss in surplus for consumers who genuinely want broader networks.

Taken together, the Ho and Lee (2020), Marone and Sabety (2020), and Tilipman (2021) papers provide a useful set of insights about optimal menu design. They show that, on purely financial dimensions, it is not obvious that more choices will lead to higher surplus, because of the implications of self-selection into plans. In addition, we learn that consumer switching costs, both for providers and for plans, are big potential impediments for offering a menu of narrow network plans that are able to lower costs via better bargained rates with providers. Plan switching costs are instrumental: if these are removed (holding provider switching costs constant) a lot of the surplus from network-based menu design can be realized. Additionally, Ho and Lee (2020) shows that, for design on the financial dimension, heterogeneity in design on the non-financial dimension that Tilipman (2021) studies can be quite beneficial in relaxing the constraints imposed by self-selection. Finally, in the context of the earlier discussion of consumer choice difficulties in the chapter, it is not obvious that having more choices is always better, even if the criteria set in the papers here that relate to selection and moral hazard are satisfied. It could be, e.g., the conditions in Marone and Sabety (2020) are met for offering multiple plans but that doing so is still sub-optimal because of choice frictions. See Ericson and Sydnor (2017) for an extended discussion of the questionable value of having more choices in health insurance markets.

There are several other papers that relate to employer menu design in large group markets. Bundorf, Levin and Mahoney (2012) study premium setting by employers and find that requiring uniform / community rated premiums can lead to meaningful short-run welfare losses due to adverse selection, though the authors note that this kind of pricing could be beneficial due to reductions in reclassification risk (as studied in depth in Handel, Hendel and Whinston (2015)). Einav, Finkelstein and Cullen (2010) studies adverse selection with data from a large employer, Alcoa, and find limited welfare consequences from adverse selection. Though this is a valuable empirical contribution, perhaps the most important contribution is the framework for studying competitive

provision of insurance, as discussed earlier in this chapter and in the chapter in this volume focusing on selection markets specifically (Einav, Finkelstein and Mahoney (2020)). Einav et al. (2013) study selection on moral hazard in the same large-employer context, showing that heterogeneity in moral hazard can interact with adverse selection in important ways when considering the welfare implications of adverse selection and menu design more broadly. This paper is also discussed in depth in Einav, Finkelstein and Mahoney (2020). Also of note are Handel (2013), which studies inertia and adverse selection in a large employer setting, and Handel and Kolstad (2015*b*), which studies menu construction in a large employer setting. We discuss these papers in more depth in other sections of this chapter, since the primary contributions relate to the underlying concepts discussed for health insurance markets broadly, rather than the specific contribution to the large employer context.

While this section has focused on papers studying large group markets where employers self-insure, there is a smaller but important literature studying the sizeable part of the group markets where employers contract with insurers to provide coverage for their employees and insurers bear risk for the spending that results. As noted in Section 2, Dafny (2010) studies this market with a specific focus on whether it is highly competitive. Using a proprietary dataset of firms nationwide, Dafny (2010) tests for competition by seeing whether premiums rise more quickly, ceteris paribus, for firm that have increasing profits over time. In a competitive market for insurance, employer profits should have no impact on insurance premiums. However, if insurers have some market power, higher firm profits should lead to higher premiums. This paper finds that when firm profits rise, insurance premiums rise as well, signaling insurer market power. Moreover, the paper studies firms operating in multiple states, and finds that, for those firms, premiums rise even more steeply in states where insurance markets are more concentrated. While a natural reaction is to presume that this kind of market power should be reduced, in health insurance markets it is unclear whether this is true or not since health insurers with market power can also extract lower prices from medical providers through improved bargaining position.

Fleitas, Gowrisankaran and LoSasso (2020) study the small group health insurance market in the U.S., where employers contract with insurers to provide coverage for their employees. The authors find that, though contract premiums are linked closely to the risk of the employees at the firm up front, this link breaks down dynamically, as only 16% of cost changes over time are passed through into premiums. Thus, though not explicit, employer-insurer relationships operate like guaranteed renewable contracts that provide insurance against reclassification risk for the firm's employees. The authors note that the benefits of these implicit properties are limited by the duration of employer-insurer contracts, which may also partially explain why insurers are fine with providing this kind of implicit coverage in the first place. We discuss dynamic aspects of insurance contracts directly in the next section.

4.7 Long-Term Guaranteed Renewable Contracts

Thus far, we have focused primarily on the managed competition paradigm with near community rating when discussing the industrial organization of insurance markets. This is the dominant setup for major regulated markets in the United States, and is also present in several other countries around the world (e.g. the Netherlands, as discussed in Handel et al. (2021*b*) or Switzerland). The health and industrial organization literature has studied several other market designs as well. Here, we focus on the alternative design provided by long-term guaranteed renewable insurance contracts.

Ghili et al. (2020) study long-term guaranteed renewable contracts in depth, first developing the micro-foundations for characterizing and computing these contracts and then estimating their welfare effects empirically.[35]. As discussed above, most managed competition markets allow for insurance contracts that are one year in duration. With these contracts, as discussed in Handel, Hendel and Whinston (2015), there is an inherent tradeoff between adverse selection and reclassification risk when considering regulation on permissible price discrimination.

One way to get around this tradeoff conceptually is to allow for long-term guaranteed renewable contracts with one-sided commitment. These contracts are similar to those used frequently in life insurance markets (see, e.g., Hendel and Lizzeri (2003)), where the insurer commits to a lifetime premium path and the consumer can leave the contract at any point in time. This one-sided commitment is consistent with legal restrictions in practice, where firms can commit to these kinds of arrangement but typically it is difficult to commit consumers to paying large sums of money years in advance. Importantly, insurers can risk-rate consumers when they sign up for the contract, an aspect the authors discuss in depth.

The paper sets up a dynamic optimization problem with symmetric information and symmetric learning for insurers and consumers. Consumers have a health status transition matrix and lifetime income paths. The paper presents a series of proofs to characterize the optimal contracts, which have several key features. First, contracts are front-loaded, in the sense that consumers pay more than their expected costs early in the contract and, as a result, cover the expected losses for the insurer down the road created by consumers being allowed to leave the contract at any point in time (i.e. if they have had a positive health shock and can find a better contract elsewhere). The authors show that the potential value of these contracts is higher when income paths are flatter, since front-loading is worse for consumers with credit constraints who have low income initially.[36]

[35]For earlier conceptual work in this space, see, e.g.,Cochrane (1995) and Pauly, Kunreuther and Hirth (1995)

[36]It is also important to note that the long-term contracts studied in Ghili et al. (2020) can also be interpreted as guaranteed renewable contracts coupled with potential consumer-led renegotiation. Evidence from Fleitas, Gowrisankaran and LoSasso (2020) supports this interpretation, that consumers renegotiate or search for better options when their health improves, something that is not allowed in other papers studying guaranteed renewability (see, e.g., Pauly, Kunreuther and Hirth (1995))

[37]

The papers estimates the lifetime welfare implications of these contracts and compares them to the managed competition year-to-year contracts typical of the Affordable Care Act exchanges. The authors develop an algorithm to compute the optimal dynamic contracts and use all-payer claims data from the state of Utah to characterize a second-order Markov process for health state transitions for a large population of policy interest. The authors show a range of contract comparative statics with respect to underlying health and underlying income and find, overall, that optimal dynamic contracts can reduce 94% of the welfare loss from reclassification risk for healthy age 25 consumers (at the presumed start of the market), relative to year-to-year contracts that allow for full risk-rating. Moreover, these contracts fully remove the issue of adverse selection on observable information. However, for consumers that are initially sick, these contracts cannot add much value, because they are already starting off in an expensive state.

In the paper, the authors show that, with ex ante health state insurance at the start of the market (age 25) there are some scenarios where dynamic long-term contracts add significant value relative to the typical managed competition setup with one year contracts. The scenarios where guaranteed renewable contracts are most appealing include:

1. Cases where consumer income paths are flatter over the life cycle
2. Cases where consumers have greater access to credit
3. Cases where consumers have higher contract switching costs, relaxing the lapsation constraint that incorporates the cost of consumers' inability to commit to a contract
4. Cases where consumers have low myopia and better incorporate the long-term value of the contract relative to higher up-front payments

The authors close with a discussion of why these contracts are only seen infrequently in practice. One potential reason is that long-run medical cost inflation risk is hard to diversify, especially for specific sub-populations of consumers (e.g. those with cancer or diabetes). Another possible impediment is that consumers whose health state degrades may have the quality of the benefits strategically degraded by insurers, as discussed in, e.g. Atal (2019). Finally, another key issue is contextual: in the United States, the employer-based market enrolls the majority of consumers, in part due to the tax exemption given to premiums for these plans. As a result, the state-based exchanges typically "fill in the gaps" of employer provided coverage, rather than supplant it. In that kind of context, with substantial churn, long-term contracts will be less appealing than short-run contracts, unless they are put on equal footing as employer plans from a tax standpoint.

[37] In extension of the base model, the authors also allow for consumer myopia, consumer switching costs, limited access to credit, and several other extensions.

In practice, these contracts are seen in the private market in Chile (as studied in Atal (2019)) and the private market in Germany (as studied initially by Hofmann and Browne (2013)). In Germany, Atal et al. (2020) leverage the theoretical framework developed in Ghili et al. (2020) to study the welfare impacts of the long-terms contracts found in practice. They find that, despite the contracts having a simpler dynamic structure than the optimal contracts derived in Ghili et al. (2020), these long-term contracts deliver much of the welfare gains that the optimal contracts would in their context, relative to short-term contracts that are one-year in duration. Thus, though empirical case studies of long-term contracts are limited, these contracts hold some promise in future market designs, especially as the technology to design and implement them improves.

5 Going Forward

We close by noting some opportunities for future research. While some parts of the literature are remarkably complete, others are sparse and represent opportunities for researchers. There are also opportunities to cross-pollinate the different literatures discussed in this chapter and bring insights from models of selection markets into the study of provider competition, pricing and antitrust. We now discuss several of these directions for future research.

Value Creation in Insurance Markets: A key premise of the managed competition paradigm that underlies many regulated markets is that private insurers will compete on prices and on product characteristics. While there is a substantial literature on the impacts of competition on prices, there is much more limited work on whether insurer competition leads to product innovation on other dimensions.

Assessing whether and how insurers innovate is an important topic for future work. There are some working papers that make progress on this topic. Abaluck et al. (2020) study differences in mortality effects for Medicare Advantage plans. They use a design that leverages plan exits from the market to show meaningful heterogeneity in plan mortality effects across plans. They show that consumers place little weight on these differential mortality effects in plan choices, potentially because these effects are not generally known to consumers. Moving beneficiaries away from the bottom 5% of plans by mortality effects could save tens of thousands of elderly lives every year.

This work shows that (i) plans have differential causal effects on a key health outcome measure and (ii) consumers have low willingness to pay for this dimension, likely because of a lack of information. Future work that unpacks the different potential domains for insurer innovation and investigates the micro-foundations for why consumers don't respond to these differences will be quite valuable.

For example, in ongoing work, Handel et al. (2021*a*) use the Utah all-payer claims database

along with a series of natural experiments to asses different domains for insurer innovation. They observe employer insurance menus and identify a large number of cases where employers required employees to switch insurance carriers if they wanted to take advantage of their benefits. As a result, many consumers switch from one carrier to another due to these broad policy changes. The authors decompose insurer strategies into (i) network configuration (ii) consumer steering within-network (iii) consumer price shopping and (iv) other constraints (e.g. prior authorization) and find that across many private insurers, there is quite limited differentiation on these key dimensions.[38] In other recent work, Dunn et al. (2021) studies prior authorization requirements that require insurer permission for certain types of medical procedures, imposing hassle costs on consumers and providers with the goal of reduced spending. They document that providers lose 16% of medical billing due to prior authorization restrictions in Medicaid and 4% in private markets, though they don't unpack the heterogeneous value (or lack thereof) generated by these restrictions across private insurers. For prior authorization and other dimensions of insurers productivity, unpacking this heterogeneity and the resulting value creation or destruction is an important avenue for future work.

Modeling Provider Quality: We discuss in Section 2 the literature that considers provider quality investments, in markets where prices are administered and those with negotiated prices. As noted there, a potential next step in this literature would be to specify and estimate a model of provider investment in quality, given expectations of the impact on outcomes; negotiated prices; utilization and profits. Garthwaite, Ody and Starc (2020) is a very recent working paper that is relevant here. The authors discuss a theoretical model of strategic quality choice by hospitals making investments to increase their private revenue. They argue, in the context of this model, that the welfare loss from high provider markups could be offset by the implied incentives for hospital investment. In some situations, price regulation might be welfare-reducing. Their empirical analyses confirm some of the model's predictions across several quality measures.

A full model-based empirical analysis of quality investment would be complex, in part because the problem is inherently dynamic: an investment in quality or technology in year t may affect outcomes and patient demand for many future years. However, it could also be important for understanding the impact of market design and regulation on equilibrium quality.

Public Option: Many countries around the world have a two-tiered insurance system where there is (i) a robust public insurance option and (ii) the public option can either be replaced by or supplemented by private insurance. In the United States, this structure exists in Medicare Advantage relative to traditional Medicare, but not in the Affordable Care Act exchanges, where it has been

[38] Earlier related work in this space includes, e.g., Gaynor, Rebitzer and Taylor (2004) and Cutler, McClellan and Newhouse (2000).

a topic of much debate. While the papers referenced in this chapter on Medicare Advantage make some progress in modeling how having a public option impacts market outcomes and welfare, there is still limited work formally studying these kinds of two-tiered systems, especially with an eye towards implementation in the under-65 U.S. private market.

Cross-Insurance Market Interactions: One particular feature of privatized health insurance markets is that insurers often operate across multiple product markets simultaneously. For example, in a typical U.S. context, an under-65 individual could enroll in an ACA-exchange plan, an employer plan, or Medicaid (including privatized Medicaid) if eligible. These markets are typically studied in isolation from one another, though there are potentially meaningful interactions. For example, Holmes (2020) studies the impact of ACA Medicaid expansion on private market premiums and finds that the expansion reduced those premiums, facilitating movement into those markets. In ongoing work, Dickstein, Ho and Mark (2021) use a model of insurance demand and insurer pricing, and detailed data from Oregon, to study the effects of recent policies to (partially or completely) combine the small-group market and the individual market.

There are quite a few interesting topics for future work to explore in this space including (i) optimal multi-market regulation (ii) insurer strategy that accounts for substitution across markets they operate in and (iii) how tax policy (e.g. for employer-sponsored plans) impacts other health care markets, such as the ACA exchanges.

Firm Pricing to Consumers with Choice Frictions: Heidhues and Koszegi (2018) discuss theoretical and empirical work in IO generally that relates to firm pricing with behavioral consumers, and/or consumers with choice frictions. Given the preponderance of evidence that consumers have choice issues in health insurance markets, there is quite limited work that rigorously studies how insurers respond to those choice issues in pricing (and in forming product characteristics more broadly). Ho, Hogan and Scott Morton (2017) and Ericson (2014) are two notable examples that investigate firm pricing in the presence of inertia in Medicare prescription drug markets. In addition, it will be interesting to study product design with behavioral consumers, similar to, e.g., Gabaix and Laibson (2006). While there is minimal work to date on this area in health care markets, the literature on choice frictions and limited information about product characteristics referenced earlier in this chapter suggests that product design may respond to these effects. These existing papers, and the broader industrial organization literature, show that modeling pricing and product design with both behavioral / information-constrained consumers and adverse selection is quite challenging. However, given the importance of this topic and the general advances in IO models when consumers have choice frictions, we view this as a promising area for future work.

Firm Learning and Firm Dynamics: In the IO literature broadly, it has been challenging to study firm learning and firm dynamics, due to the data and modeling requirements. In the health care space, which is often in flux, firm learning and dynamics have the potential to be important for both insurers and providers. This comment applies both conceptually when assessing policy impacts and also empirically when considering whether a given analysis that assumes a "steady state" is valid. While we recognize that this is a difficult area for future work, it is also an important one.

Provider price negotiations and network formation: While the literature on insurer-provider price negotiations is quite well-developed, there are still some unanswered questions in this space. One example is the topic of insurer-provider negotiations over tiered provider networks. Prager (2020) shows that consumers respond to tiered hospital networks, tending to favor hospitals on preferred tiers. This consumer behavior is likely to generate incentives for insurers to establish tiered networks, and to affect the negotiations that determine prices and equilibrium networks in interesting ways that may well be important for policy. Starc and Swanson (2021) provide some evidence on this point, demonstrating that Medicare Part D plans with more restrictive preferred pharmacy networks pay lower retail drug prices. Research to develop an equilibrium model of tiered network negotiation would be a useful and interesting avenue for future work. It would be useful for such work to also model and estimate consumer frictions in provider selection and network valuation, a complex topic that has been understudied but which is important for understanding provider price negotiations and network formation.

Payment Reform, Organizational Structure, and Gaming: As discussed earlier in Section 2.6, there are now many important documented instances where providers respond forcefully to pricing incentives for delivering care on the margin. While the papers discussed earlier make excellent headway in this area, payment reform and organizational structure is a broad and important topic with significant potential to impact efficiency in the health care system. Different potential reforms, like bundled payments, capitated payments, Accountable Care Organizations (ACOs) and more aggressive price regulation are all quite present in the current policy debate around reducing health care spending. Still, there is limited IO work investigating such reforms, including the papers on LTCH contract design discussed earlier and a recent working paper by Einav et al. (2020) that studies selection into voluntary payment regulation by hospitals. Given the policy importance of this area and the implications of such reforms for market structure, pricing and care delivery, we believe this is a very fruitful area for future work.

The Role of Sales Intermediaries in Health Care Markets: In some markets, relationships between sales agents, brokers and employer benefits managers may be important determinants of consumers' allocations to health plans. Sales intermediaries are also likely to influence the extent of price competition between insurers and hence the level of insurance premiums in these cases. This seems particularly likely in the small group market where employers are not commonly self-insured and are likely to rely on brokers to help choose and access plans. Dickstein, Ho and Mark (2021) use their detailed data from Oregon to show that average plan markups in the small group market are substantially higher than in the individual market, where brokers are less prevalent and competition may be more effective. However, they do not observe brokers and cannot investigate their impact further. Additional research on this issue would be very useful if data become available.

Market Power and Monopsony: As discussed in Section 2, there are many existing academic papers and merger retrospectives on the impact of health care sector mergers on prices and quantities of the traded good. Excluding fully structural work like Ho and Lee (2017), there has been much less work on market power and monopsony, where worker surplus is reduced. This is true generally (see, e.g., Berry, Gaynor and Scott-Morton (2019)) and also specifically for health care. A notable exception is recent work by Prager and Schmitt (2021), which uses hospital mergers as events to study monopsony. They find evidence for reduced wage growth in instances where the increase in concentration induced by the merger is large and workers' skills are specifically tailored to the health care sector. They also find that unions attenuate these wage reductions. Future work in this area would be valuable in a number of key directions including (i) additional evidence on hospital market power and monopsony (ii) new evidence on monopsony related to other large non-hospital health care organizations (e.g. insurers, provider organizations) and (iii) the role of licensing on preventing job substitution in the presence of market power. The labor economics literature also has quite a few recent papers on monopsony across a range of other sectors (e.g. Benmelech, Bergman and Kim (2020), Arnold (2020)) and future work on this topic has the potential to contribute jointly to the labor and IO literatures.

Vertical Contracting, Integration and Welfare: Section 2 outlines the literature that considers the impact of vertical integration in health care markets. As noted there, most of these papers consider integration between types of providers: e.g., primary care practitioners and hospitals; or primary care practitioners and specialists. There is also a very small literature analyzing the effects of integration between insurers and providers. There is clearly room for more research in this area, particularly given the degree of consolidation observed in the health care industry in recent years. Papers that account for the complementarities between medical providers in primary care

and in various specialties, and for geographic dispersion of physicians as well as hospitals, would be particularly welcome. There is also considerable scope for papers considering potential agency problems and other sources of inefficiencies in vertical contracting, as in Frandsen, Powell and Rebitzer (2019).

Nuanced Objective Functions: Almost all papers that study welfare in the health and IO literature use objective functions that assume away potentially important factors like heterogeneity in marginal utility of income and liquidity constraints. These factors are potentially quite important to consider in many health care contexts, where consumer financial risk is high and health care is often viewed as a "right."

One key modeling choice that assumes away these income-based issues is the use of constant absolute risk aversion (CARA) preferences that assume that the concavity of the utility function in income is invariant to the starting wealth point. One primary reason for this assumption is that it removes the need for detailed income or wealth data. Of course, in certain contexts, such as subsidies for the uninsured, Medicaid policies, and Medicare Part D subsidies, the distributional consequences of policies for low-income groups are especially important to regulators.

Recent work by Handel et al. (2021*b*) does explicitly consider policy impacts across the income distribution using tools from public finance. However, there is room for much more work in this area, especially work that considers the interactions between these distributionally-oriented microfoundations and competition policy.

Overall, the health care and industrial organization literature has made substantial progress, especially over the last decade as new data have unlocked the ability to study myriad questions of interest. This list of potential topics for future research is a small slice of the many promising conceptual and empirical advances that we expect researchers to make going forward as data, methods, and institutions evolve.

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