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How Did the ACA's Individual Mandate Affect Insurance Coverage?

Evidence from Coverage Decisions by Higher-Income People

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Editor's Note

This white paper is part of the USC-Brookings Schaeffer Initiative for Health Policy, which is a partnership between the Center for Health Policy at Brookings and the USC Schaeffer Center for Health Policy & Economics. The Initiative aims to inform the national health care debate with rigorous, evidence-based analysis leading to practical recommendations using the collaborative strengths of USC and Brookings.

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Introduction

The tax legislation enacted in December 2017 repealed the tax penalty associated with the individual mandate—the Affordable Care Act (ACA) requirement that people who do not qualify for an exemption obtain health insurance coverage—thereby effectively repealing the mandate itself.[1] Repeal of the individual mandate will take effect in 2019, so understanding how the mandate has affected insurance coverage is important for predicting how insurance coverage and insurance markets, particularly the individual health insurance market, are likely to evolve in the coming years.

How the individual mandate has affected insurance coverage is controversial. Most formal analyses, including those produced by the Congressional Budget Office (CBO), conclude that the individual mandate substantially increased insurance coverage and, correspondingly, that the mandate's repeal will substantially reduce coverage (Blumberg et al. 2018; CBO 2017; CBO 2018). But some, including the Trump Administration and Congressional Republicans, have argued that the mandate has had little or no effect on insurance coverage (JEC 2017; OMB 2017). Those arguing that the mandate is ineffective have generally not provided rigorous evidence for that view, but it is certainly conceivable that CBO's and similar estimates, which have (at least until recently) been based largely on a combination of pre-ACA empirical research and economic theory, could have missed the mark.

Direct evidence on how the ACA's individual mandate has affected insurance coverage would be useful in resolving this debate. Unfortunately, isolating the mandate's effect is challenging because the mandate was implemented at the same time as the ACA's other major coverage provisions, including Medicaid expansion, subsidies for low- and middle-income people purchasing individual market coverage, and a range of regulatory changes affecting insurance markets, particularly the individual health insurance market. Largely for this reason, even though it is clear that the ACA as a whole substantially increased insurance coverage (Blumberg, Garrett, and Holahan 2016; Sommers, et al. 2015), the size of the mandate's contribution to that increase remains uncertain.

This paper aims to help fill this gap by analyzing how insurance coverage among people with family incomes above 400 percent of the federal poverty level (FPL) has changed since 2013. (Glied and Chakraborty (2018) take a related approach in recent research focusing on the coverage decisions of young men.) The advantage of focusing on this income group is that these individuals are not eligible for the ACA's subsidies, which makes it easier to isolate any effects of the individual mandate. I find that the share of non-elderly people in this income group who lacked health insurance at a point in time fell sharply from 2013 to 2016, with one survey showing a reduction of 24 percent (1.2 percentage points) and another showing a reduction of 39 percent (2.0 percentage points). The magnitude, timing,

[1] For simplicity, I generally refer to "repeal of the individual mandate" in this paper rather than "repeal of the individual mandate penalty" since removal of the penalty renders the mandate effectively moot.

and abruptness of this decline are strong evidence that the decline was caused entirely or almost entirely by the ACA, like the parallel decline in the population as a whole.

An important question, however, is whether this decline was caused by the mandate or by other ACA provisions. One potential non-mandate explanation is that the broader suite of ACA reforms, notably the introduction of guaranteed issue and modified community rating in the individual market (which barred insurers from denying coverage or varying premiums based on health status), changed the price and availability of individual market plans in ways that increased insurance coverage in this income group. But while these policies reduced the price and increased the availability of individual market coverage for people with greater health care needs, they generally raised premiums for healthier people, so it is unclear that they should have been expected to increase the number of people with health insurance on net. Indeed, pre-ACA research found little evidence that community rating and guaranteed issue on their own increase the number of people with insurance coverage, whatever their other benefits (Buchmueller and Dinardo 2002; Lo Sasso and Lurie 2009; Clemens 2015).

I present two pieces of direct evidence that changes in the price and availability of insurance coverage caused by ACA provisions (including both the introduction of guaranteed issue and modified community rating and other ACA provisions) cannot account for the observed trends in insurance coverage among people with family incomes above 400 percent of the FPL. First, I find no evidence that the uninsured rate rose among healthy people in this income range, and I find that the uninsured rate declined among young adults in this income range, even though changes in the price and availability of insurance coverage would, on their own, have been expected to increase the uninsured rate in these population groups. Second, I show that the uninsured rate in this income group fell by about the same amount in New York and Vermont as in the nation as a whole, despite the fact that New York and Vermont saw little change in the price and availability of insurance coverage at these income levels as a result of already having guaranteed issue and community rating requirements.

I also consider several other potential non-mandate explanations for coverage gains among people with family incomes above 400 percent of the FPL. There is some evidence that advertising and outreach associated with the ACA's rollout had some effect on insurance coverage (Karaca-Mandic et al. 2017). However, the available evidence suggests that these and similar factors can account for only a small fraction of the observed decline in the uninsured rate in this income group since 2013, which suggests that the mandate accounts for the lion's share of this decline.

The estimates presented in this paper thus suggest that the individual mandate made a meaningful contribution to the overall reduction in the uninsured rate under the ACA. While my estimates only apply directly to a small slice of the uninsured population, if the mandate had an important effect on coverage decisions among people with family incomes above 400 percent of the FPL, it likely also affected coverage decisions at lower income levels. That being said, the magnitude of the mandate's overall effect is uncertain because the mandate's effect likely varied across income groups.

To provide insight on the range of possibilities, I present estimates under varying assumptions about the mandate's relative effectiveness below 400 percent of the FPL. For these calculations, I assume that the individual mandate accounted for four-fifths of the overall decline in the uninsured rate among people with family incomes above 400 percent of the FPL, with the remaining one-fifth accounted for by outreach and advertising associated with the ACA's rollout and similar factors. If the probability that the mandate caused an uninsured person to obtain coverage was the same at all income levels (with narrow exceptions described later), then the estimates presented in this paper imply that the mandate reduced the number of uninsured people by 8.0 million in 2016. Even if the individual mandate's effect on people with family incomes below 400 percent of the FPL was half as large, then the mandate reduced the number of uninsured people by 4.6 million in 2016.

Looking to the future, these estimates suggest that the mandate's removal will cause a meaningful increase in the number of uninsured, although the full increase may take time to materialize. For a variety of reasons, the future increase in the number of uninsured caused by repealing the mandate may not be exactly the same as the reduction in the number of uninsured caused by the mandate in 2016. For comparison, however, my base estimate that the mandate reduced the number of uninsured people by 8.0 million in 2016 is similar to CBO's updated estimate of the long-run increase in the number of uninsured that will result from mandate repeal, but somewhat smaller than the 13 million estimate CBO issued during the legislative debate (CBO 2017; CBO 2018).

As a final note, the implied effect of the individual mandate on people with family incomes above 400 percent of the FPL is similar to or modestly smaller than what would have been expected in light of pre-ACA evidence, including prior research on the price sensitivity of insurance enrollment decisions and Hackman, Kolstad, and Kowalski's (2015) estimate of the effect of Massachusetts' individual mandate. The general agreement between my results and prior research strengthens the case for believing that the observed change in insurance coverage among people with family incomes above 400 percent of the FPL is, in fact, a result of the mandate. It also suggests that pre-ACA evidence remains relevant to a post-ACA world, which is important since the post-ACA literature remains limited and pre-ACA experience provides natural experiments that post-ACA experience does not.

The remainder of this paper proceeds as follows. The first section provides an overview of the ACA provisions that took effect in 2014 and briefly reviews empirical research on how the ACA as a whole and the individual mandate in particular affected insurance coverage. The second section documents the sharp decline in the uninsured rate among people with family incomes above 400 percent of the FPL. The third section argues that the individual mandate likely accounts for most of the observed decline in the uninsured rate in this income group. The fourth section considers what the estimated effects on people with family incomes above 400 percent of the FPL imply for the population as a whole. The fifth section examines how the effect of the individual mandate implied by these estimates compares to what would have been expected based on pre-ACA research. The final section concludes.

Background on the ACA's Major Coverage Provisions

The ACA implemented a broad set of policy changes designed to expand health insurance coverage in 2014. These provisions can be organized into four main groups:

- **Medicaid expansion:** The ACA allowed states to expand their Medicaid programs to cover all non-elderly adults with incomes up to 138 percent of the FPL ($16,243 for a single person and $33,465 for a family of four as of the start of 2016).[2] For 2014, 2015, and 2016, the federal government financed the full cost of the expanded coverage; over the long run, the federal share phases down to 90 percent.

- **Individual market regulatory changes:** The ACA changed how the individual health insurance market was regulated.[3] Individual market insurers were newly barred from denying coverage or varying premiums based on health status—policies referred to, respectively, as guaranteed issue and modified community rating. The ACA also newly required individual market plans to meet certain standards, including covering a minimum list of health care services known as "essential health benefits," having an actuarial value of at least 60 percent, and capping enrollees' annual out-of-pocket spending. The law also created a Health Insurance Marketplace in each state, an online portal operated by either the federal government or the state through which individuals could purchase insurance coverage.

- **Individual market subsidies:** The ACA introduced subsidies for people purchasing individual market coverage. People with family incomes up to 400 percent of the FPL ($47,080 for a single person and $97,000 for a family of four for the 2016 coverage year) became eligible for tax credits that reduced premiums of coverage purchased through the Health Insurance Marketplace, and people with family incomes up to 250 percent of the FPL ($29,425 for a single person and $60,625 for a family of four for the 2016 coverage year) also became eligible for reduced cost sharing. The ACA also created a reinsurance program that paid individual market insurers for a portion of the costs associated with high-cost enrollees in 2014, 2015, and 2016. This insurer-side subsidy likely reduced premiums, indirectly benefiting individual market enrollees with incomes too high to qualify for direct subsidies.

- **Individual mandate:** The main focus of this paper is the ACA's requirement that people have health insurance or pay a penalty, commonly referred to as an "individual mandate." That

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[2] The ACA initially required states to expand their Medicaid programs, but the Supreme Court's decision in *National Federation of Independent Business v. Sebelius* made expansion a state option.

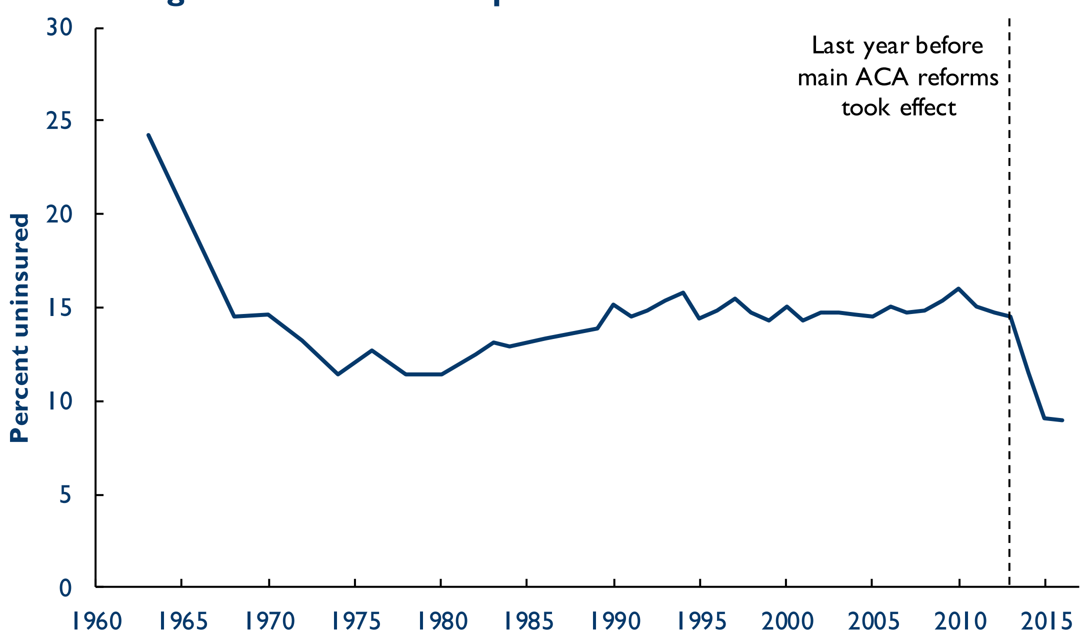
[3] The requirements discussed here applied only to individual market plans that were not considered "grandfathered" under the ACA or "transitional" under guidance issued by the Centers for Medicare and Medicaid Services. By 2016, only around one-sixth of individual market enrollment was in grandfathered or transitional plans. These requirements generally also applied to small group market plans. A subset of these changes, including a ban on annual limits and a requirement that plans cap enrollees' annual out-of-pocket spending, generally applied to all private insurance plans, including large employer plans.

penalty phased in starting in 2014, reaching the greater of $695 per person (half that for children) or 2.5 percent of income above the tax filing threshold in 2016, up to a maximum based on the national average cost of plans in the "bronze" actuarial value tier. Exemptions from the mandate were available in a range of circumstances, including if the least expensive coverage option available to an individual would cost more than a specified percentage of income, 8.13 percent for the 2016 coverage year. However, Rae et al. (2015) estimated that only 16 percent of enrollees not eligible for subsidies—the main population of interest in this analysis—qualified for an exemption in 2016.

The overall uninsured rate fell sharply as the ACA's coverage provisions took effect, as depicted in Figure 1. The timing and exceptional size of this decline are strong evidence that it was caused by the ACA. Consistent with the interpretation that this decline was caused by the ACA, research that has explicitly controlled for various economic and demographic changes during this period has concluded that these non-policy factors can do little to explain the large reductions in the uninsured rate observed after 2013 (Sommers et al. 2015; Blumberg, Garrett, and Holahan 2016).

While it is clear that the ACA sharply reduced the uninsured rate, isolating the individual mandate's role in that decline is challenging because the mandate was implemented at the same time as the various other ACA policy changes described above. To date, a few attempts have been made to overcome this problem, but the existing evidence has important limitations.

Figure 1: Share of People Without Health Insurance



Source: Council of Economic Advisers (2014); NHIS.

Table 1: Examining Enrollees' Planned Responses to Mandate Repeal

Survey	Population	Share of Enrollees Dropping Coverage Without Mandate		
		Survey Estimate	CBO December 2017 Estimates	
			2019	2027
Collins et al. (2018)	All insured, ages 19-64	5%	2%	5%
Kirzinger et al. (2018)	Individual market enrollees, ages 18-64	7%	18%	28%
Hsu et al. (2018)	Individual market enrollees in California, adults	18%	18%	28%

Notes: Collins et al. (2018) and Kirzinger et al. (2018) ask about how mandate repeal will change respondents' insurance coverage decisions for 2019. Hsu et al. (2018) ask whether enrollees would have purchased coverage in 2017 without the individual mandate. For the Collins et al. study, the CBO columns report the projected reduction in the overall number of insured individuals as percentage of enrollment in CBO's September 2017 baseline. For the other two studies, the CBO columns report the corresponding estimates for individual market enrollment only, consistent with the populations examined in those studies.

Some recent survey research has aimed to quantify the effect of the individual mandate on insurance coverage by asking people who currently have health insurance whether they would drop that coverage if the mandate were removed. Table 1 reviews three such survey estimates and compares each estimate to the most nearly comparable estimate from CBO's December 2017 analysis of repeal of the individual mandate (CBO 2017). In the near term, which is arguably the time horizon to which the survey estimates are most relevant, the survey estimates range from substantially larger to substantially smaller than CBO's December 2017 estimates. Over the longer term, two of the three estimates are smaller than CBO's December 2017 estimates, while one is comparably sized.[4]

While these survey estimates are interesting, they have the limitation that consumers' stated intentions may be a poor predictor of how they will actually respond to a policy change.[5] For example, some consumers may believe that maintaining insurance coverage is the more socially acceptable course of action and thus be reluctant to admit to researchers (or even themselves) that they would drop their coverage in the absence of the mandate. On the other hand, at least in the near term, inertia could lead some enrollees to continue their coverage despite stated intentions to drop that coverage.

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[4] CBO (2018) reports that its revised estimates of the effect of repealing the individual mandate are about two-thirds as large as its December 2017 estimates, so the survey estimates would look somewhat larger when compared to those. Unfortunately, CBO has not released sufficient detail on its revised estimates to facilitate incorporating those estimates into Table 1.

[5] These survey estimates also have limitations other than the potential for actual behavior to differ from stated intentions. They capture only the direct effect of repealing the mandate on coverage decisions, not indirect effects that would arise through changes in individual market premiums or changes in the types of plans employers offer. They also may understate the mandate's effects to the extent that enrollees' coverage decisions are "sticky," in which case a portion of the effect of the mandate would only be realized once current enrollees have churned out of their current coverage arrangements.

In light of these limitations, it would be preferable to estimate the effect of the individual mandate using data on actual enrollment decisions, rather than stated intentions. Frean, Gruber, and Sommers (2017) present such estimates as part of a broader study aimed at allocating the overall increase in insurance coverage under the ACA across its various provisions. The authors' strategy for isolating the effect of the individual mandate uses the fact that the penalty amount and eligibility for various exemptions vary across individuals based on their income and where they live. Using survey data that extends through 2015, the authors find no evidence that insurance coverage rose differentially in population groups that were more exposed to the individual mandate in these ways.

However, as the authors discuss, their results do not necessarily imply that the mandate was ineffective. This is because the authors' methodology can only identify effects of the individual mandate to the extent people understand the details of the rules governing the penalty amount and eligibility for exemptions *and* respond to the mandate based solely on how those rules apply to their particular situation. If individuals know that there is a penalty for not having insurance coverage but are not familiar with the details of its computation or respond to the mandate solely because of a generalized desire to comply with the law, then the authors' approach would miss the mandate's effects entirely. It seems quite possible that the mandate's effects have operated largely or entirely through these more diffuse mechanisms. That seems particularly likely for 2014 and 2015, the time period the authors examine, since individuals did not file a tax return on which the penalty was assessed until early 2015, making it even less likely that they would be familiar with the details of its design.[6]

The study most similar to this paper is Glied and Chakraborty (2018), which also examines trends in insurance coverage among people with family incomes above 400 percent of the FPL, with a particular focus on young men. They find substantial reductions in the uninsured rate in this income group similar to those documented in this paper, which they attribute to some combination of the individual mandate and changes in enrollee demand for health insurance driven by the ACA's rollout.

Trends in the Uninsured Rate Above 400 Percent of the FPL

The main objective of this paper is to shed additional light on the effect of the individual mandate on insurance coverage by examining trends in insurance coverage among people with family incomes above 400 percent of the FPL. As described earlier, the advantage of focusing on people in this income group is that they are not eligible for the ACA's Medicaid expansion or its subsidies for purchasing

[6] An additional limitation of the authors' approach is that it depends on having income information that is precise enough to allow them to determine how the mandate applies to each person in their sample. However, surveys capture respondents' income with some error, and the time period over which income is measured in the particular survey used by the authors does not always align with the time period used when applying the mandate's rules. This type of measurement error would likely cause the authors' approach to understate the effects of the mandate even if people were fully aware of the mandate's rules and responding to the mandate on that basis. The authors implement an instrumental variables strategy designed to mitigate this concern, but it likely does not eliminate it entirely.

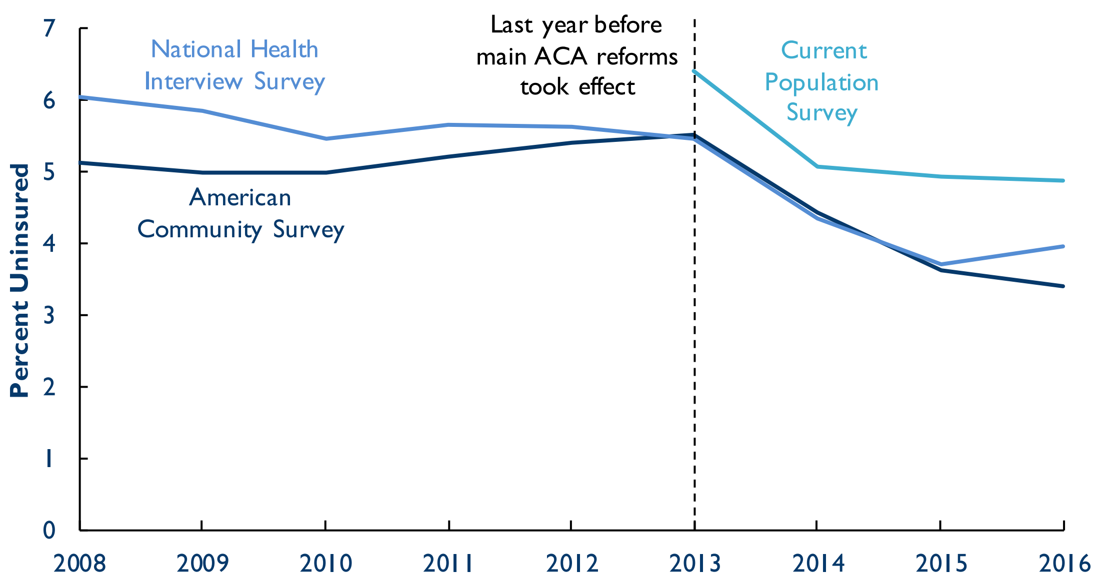
individual market coverage, which substantially narrows the set of non-mandate explanations for any changes in insurance coverage observed in this group.

This section of the paper documents the trends in insurance coverage in this income group since 2013 and presents evidence that this decline was indeed caused by the ACA. I measure coverage trends using data from three major federal surveys: the American Community Survey (ACS), the Current Population Survey (CPS) Annual Social and Economic Supplement, and the National Health Interview Survey (NHIS). Consistent with the objectives of this analysis, I define income and family units in ways aimed at approximating the definitions used to determine eligibility for the premium tax credit. Appendix A provides additional detail on how I measure family income.

In my initial analyses, I focus on adults ages 26 to 64 so that trends in the pre-2013 period are not affected by the ACA's provision allowing young adults to remain on a parent's insurance plan until age 26, which took effect in 2010. This facilitates a cleaner comparison between trends in the uninsured rate before and after implementation of the ACA's main coverage provisions. Later in the paper, where the main focus is on the size of the decline in the uninsured rate since 2013, I focus on all people under age 65. In any case, as the results will show, post-2013 trends in the uninsured rate are qualitatively similar whether one examines all non-elderly adults or limits the sample to adults ages 26 to 64.

Figure 2 displays overall trends in the uninsured rate for people ages 26 to 64 in families with incomes above 400 percent of the FPL, and the underlying point estimates and standard errors are reported in

Figure 2: Uninsured Rate for People Ages 26 to 64 with Family Income Greater Than 400% of the FPL, 2008-2016



Source: ACS; CPS; NHIS; author's calculations.

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Table 2: Uninsured Rate Among People with Family Incomes Greater Than 400 Percent of the FPL

	Data Source		
	ACS	CPS	NHIS
Panel A: Ages 26-64			
Percent uninsured in 2013	5.53	6.42	5.45
	(0.05)	(0.34)	(0.22)
Percent uninsured in 2016	3.41	4.87	3.97
	(0.04)	(0.16)	(0.20)
Percentage point change from 2013 to 2016	-2.13	-1.54	-1.48
	(0.05)	(0.38)	(0.30)
Percentage change from 2013 to 2016	-38.4	-24.1	-27.2
	(0.7)	(4.7)	(4.7)
Panel B: Ages 0-64			
Percent uninsured in 2013	5.10	5.57	4.93
	(0.05)	(0.28)	(0.21)
Percent uninsured in 2016	3.13	4.46	3.77
	(0.03)	(0.14)	(0.21)
Percentage point change from 2013 to 2016	-1.98	-1.11	-1.16
	(0.05)	(0.31)	(0.30)
Percentage change from 2013 to 2016	-38.7	-19.9	-23.6
	(0.7)	(4.7)	(5.3)

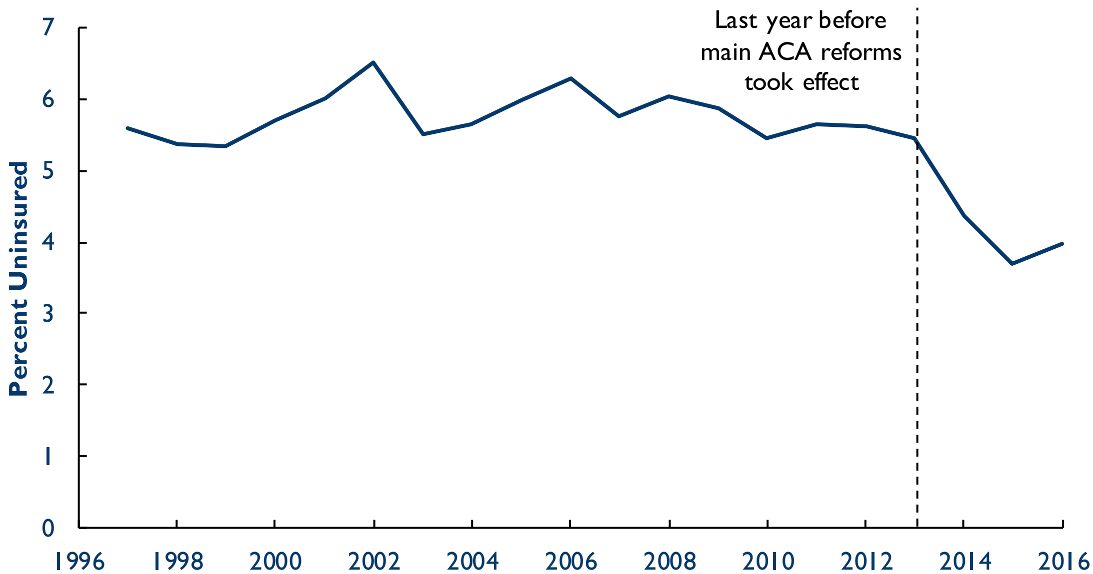
Notes: Standard errors reflecting each survey's complex sample design are displayed in parentheses. For the ACS and CPS, standard errors were obtained using the Census-provided replicate weights. For the NHIS, standard errors were calculated using the masked design variables on the NHIS public use file.

Panel A of Table 2.[7] All three surveys show sharp declines in the uninsured rate for this group from 2013 through 2016. These declines are large in proportional terms: 24 percent in the CPS; 27 percent in the NHIS; and 38 percent in the ACS. Panel B of Table 2 shows that the results are qualitatively similar in the full non-elderly population.

The somewhat smaller decline in the uninsured rate observed in the CPS relative to the other surveys may partially reflect the fact that the CPS counts people as uninsured only if they are uninsured for the full calendar year, while the ACS and NHIS count people as uninsured if they are uninsured at the time of the interview. Where possible, I rely on the ACS and NHIS estimates in what follows because "point

[7] The Census Bureau significantly revised the questions that the CPS used to measure insurance status starting in 2013, which is why the CPS series displayed in Figure 2 begins in 2013. The Census Bureau also used redesigned income questions to collect data for part of the sample in 2013 and for the full sample in later years. To ensure comparability over time, the estimates for 2013 used in this paper are based solely on the portion of the CPS sample that received the revised income questions.

Figure 3: Uninsured Rate for People Ages 26 to 64 with Family Income Greater Than 400% of the FPL, 1997-2016



Source: NHIS; authors' calculations.

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in time" estimates of insurance coverage are typically more useful than "full year" estimates, but I also present CPS-based estimates in cases where the CPS provides a capability the other surveys lack.

An important question for the remainder of this paper is whether the change in the uninsured rate for this income group was caused by the ACA or instead by other economic or demographic changes. To shed light on this question, Figure 3 uses the NHIS to examine trends in the uninsured rate for people with family incomes above 400 percent of the FPL over a longer time period, taking advantage of the fact that the NHIS has asked about insurance coverage in a consistent way since 1997. As depicted in the figure, the uninsured rate for this income group had been relatively stable for an extended period prior to 2014, and the decline from 2013 to 2016 is larger in absolute value than any three-year decline or increase during the pre-2014 period. The decline in the uninsured rate for this income group also left this rate far below its prior minimum. These facts are consistent with the change in the uninsured rate for this income group having been caused by an abrupt policy change rather than other economic and demographic changes, and the ACA is the only plausible candidate for such a policy change. This conclusion is consistent with prior research for the population as a whole, discussed above, which found that the ACA drove the decline in the overall uninsured rate during this period.

One potential shortcoming of these estimates is that surveys mis-measure income for some respondents, both because respondents sometimes fail to answer all the questions asked, forcing statistical agencies to impute the missing information, and because respondents sometimes provide inaccurate responses to the questions they do answer (see e.g., Meyer, Mok, and Sullivan 2015).

Income measurement error could cause some survey respondents who actually have family incomes below 400 percent of the FPL to appear to have family incomes above 400 percent of the FPL. If the uninsured rate for those misclassified lower-income respondents declined during this period—as seems likely—this could generate a spurious decline in the uninsured rate at higher income levels, even if there was no decline in the uninsured rate among truly high-income people.

To address the concern that income measurement error is driving the observed reduction in the uninsured rate among people with family incomes above 400 percent of the FPL, I also examined trends in the uninsured rate for people with family incomes above 500 percent of the FPL for whom little or no income was imputed. This smaller group is likely to include very few people who actually have family incomes below 400 percent of the FPL.[8] The results of this analysis are reported in Panel A of Appendix Table B1. This smaller group saw a broadly similar decline in its uninsured rate after 2013, at least when measured in proportional terms, suggesting that income measurement error cannot account for much, if any, of the observed decline in the uninsured rate among people with family incomes above 400 percent of the FPL.

Assessing Non-Mandate Explanations for Coverage Gains

The estimates presented above provide strong evidence that the ACA reduced the uninsured rate among people with family incomes above 400 percent of the FPL. In light of the fact that people at this income level are not eligible for the ACA's premium and cost-sharing subsidies or its Medicaid expansion, the most obvious explanation for this change is the introduction of the individual mandate. By increasing the cost of remaining uninsured, the mandate reduced the effective price of obtaining coverage; it may also have induced some individuals to obtain coverage out of a desire to comply with the law or by creating a social norm in favor of having health insurance (Auerbach et al. 2010).[9]

There are, however, several other ways that the ACA that could have increased insurance coverage in this income group, and this section considers several in turn. First, I examine whether the increase in insurance coverage in this income group could be explained by changes in the price or availability of insurance coverage attributable to the ACA's broader reforms, notably its introduction of guaranteed issue and modified community rating. Second, I consider a range of other potential explanations, including increased interest in insurance coverage driven by public discussion and outreach related to the ACA's rollout. I conclude that none of these factors can account for the observed decline in the

[8] In the ACS and CPS, I define "significant imputed income" as people for whom imputed income sources accounted for more than 10 percent of total family income; around one-fifth of the sample meets this criterion in the ACS and close to one-third of the sample meets it in the CPS. The NHIS only reports total family income, so I define "significant imputed income" as people for whom total income is imputed; around one-fifth of the sample meets this criterion in the NHIS.

[9] In other income groups, the mandate could also have spurred people to learn that they are eligible for subsidized coverage through the Marketplace or Medicaid, but those effects are not relevant to people with family incomes above 400 percent of the FPL because people at these income levels are not eligible for those programs.

uninsured rate among people with family incomes above 400 percent of the FPL, although advertising and outreach associated with the ACA's rollout may have played a contributing role.

Changes in the Price or Availability of Individual Market Insurance Coverage

Even for people with incomes too high to qualify for subsidies, non-mandate provisions of the ACA changed who could purchase coverage and at what price. Most directly, the ACA's modified community rating and guaranteed issue requirements barred insurers from varying premiums or denying coverage based on health status. Less directly, the introduction of subsidies for lower-income people likely changed the individual market risk pool in ways that may have changed the premiums insurers set, and the ACA's transitional reinsurance program reimbursed insurers for a portion of the cost of care for high-cost enrollees during 2014, 2015, and 2016, which likely also reduced premiums. The transition to the new individual market also appears to have led insurers to temporarily set premiums below their actual cost of delivering coverage in 2014, 2015, and 2016 (Fiedler 2017).

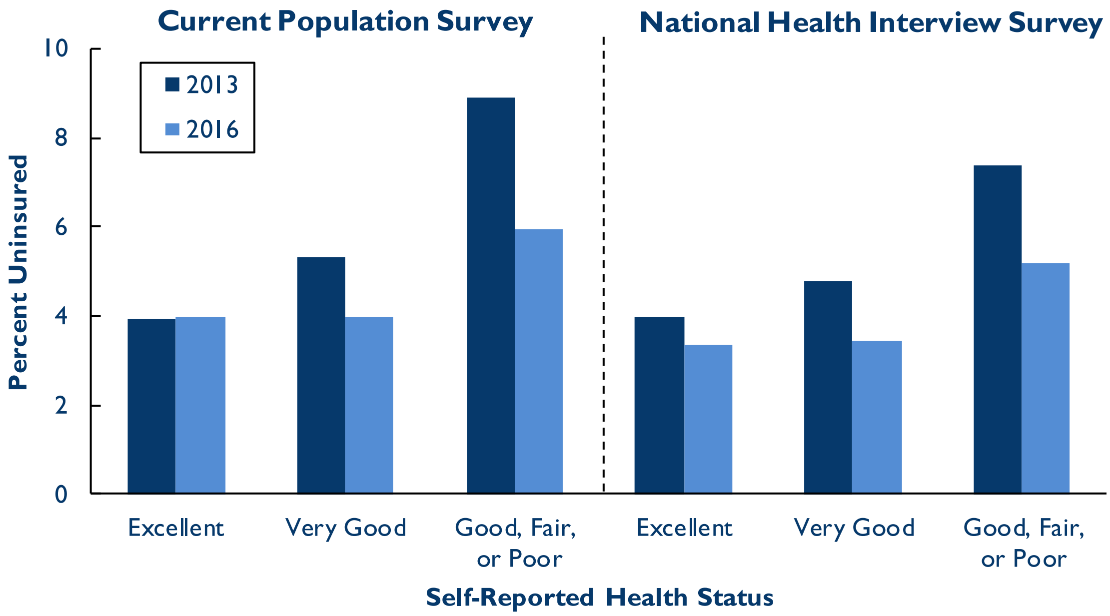
Whether changes in the price and availability of insurance coverage spurred by these other policy changes increased or decreased the uninsured rate in this income group is not clear *a priori*. Prior experience with guaranteed issue and community rating generally suggests that implementing these requirements on their own is unlikely to increase coverage on net and could reduce it (Buchmueller and Dinardo 2002; Lo Sasso and Lurie 2009; Clemens 2015). This is not necessarily surprising. While these requirements allowed many people with significant health care needs to newly enter the individual market or to obtain coverage at a lower premium, they also increased premiums for many healthier individuals. Nevertheless, it is conceivable that the combined effect of community rating, guaranteed issue, and the rest of the ACA's non-mandate reforms could generate a different result.

To explore this possibility, I examine coverage trends in segments of the population where it is comparatively straightforward to determine how the price and availability of insurance coverage changed under the ACA. For these populations, it is possible to directly evaluate whether changes in the price and availability of insurance coverage offer a plausible explanation for the observed trends in insurance coverage or whether some other factor, like the individual mandate, must have played a role. I examine two specific population subgroups: (1) healthy people and young adults; and (2) people in states that had pure community rating and guaranteed issue requirements in place in 2013.

Evidence from Coverage Trends by Health Status and Age

My first approach to evaluating whether changes in the price and availability of insurance coverage can account for the overall decline in the uninsured rate among people with family incomes above 400 percent of the FPL is to disaggregate trends in the uninsured rate by health status and age, focusing particularly on trends in the uninsured rate among healthy people and young adults. The advantage of

Figure 4: Uninsured Rate by Health Status and Year, Non-Elderly People with Family Income Greater Than 400% of the FPL



Source: CPS; NHIS; author's calculations.

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focusing on healthy people and young adults is that it is relatively clear how the price and availability of insurance coverage changed for these groups, at least in qualitative terms.[10]

In general, healthy people in this income range experienced significant premium increases due to the ACA's introduction of guaranteed issue and modified community rating, and they were unlikely to newly gain access to individual market insurance coverage because they were unlikely to have been denied coverage under the prior policy regime. Young adults in this income range were likely to have a similar experience, both because they tend to be healthier and because the ACA barred insurers from varying premiums by age by more than a factor of 3. Thus, changes in the price and availability of insurance coverage due to the ACA's broader reforms likely placed meaningful upward pressure on the uninsured rate for healthy people and young adults in this income range. If the uninsured rate for these types of people increased only slightly, held steady, or fell, that would imply that some other factor, such as the mandate, was exerting downward pressure on their uninsured rate.

To gauge trends in insurance coverage by health status, I use the CPS and the NHIS, both of which ask respondents to report whether their health is excellent, very good, good, fair, or poor; the ACS

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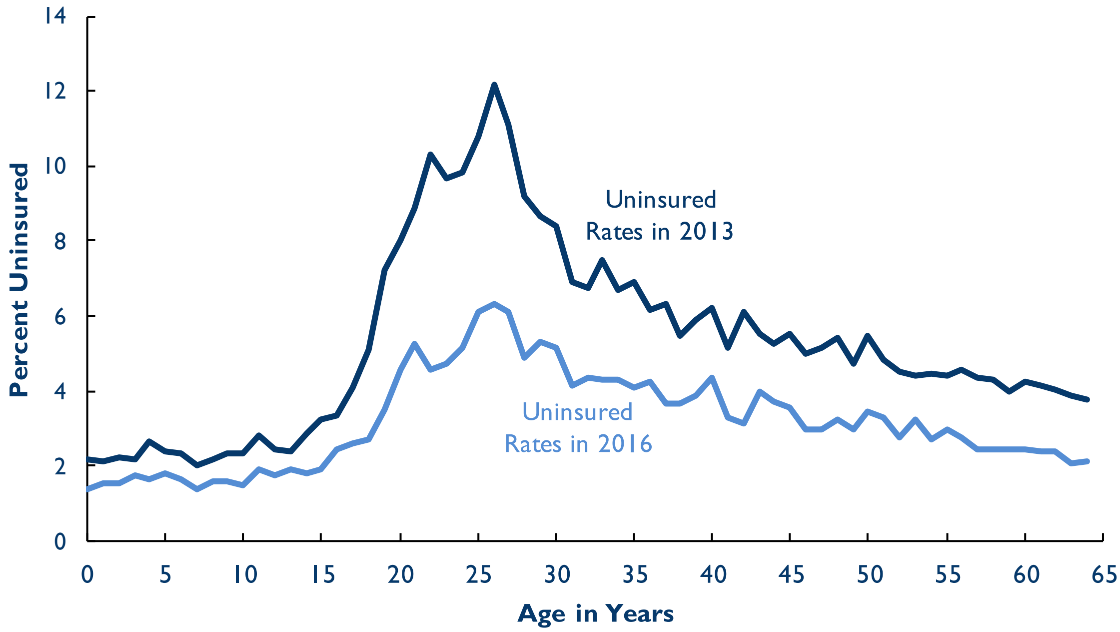
[10] Rigorous quantitative comparison of pre- and post-ACA premiums for different age and health status groups are generally not available, due largely to the limitations of pre-ACA data on individual market plan offerings, although Pauly, Harrington, and Leive (2015) provide estimates on premium changes by age for 2014. However, there is relatively broad consensus on the qualitative pattern of premium changes for different groups (see, for example, CBO (2016)).

Figure 5: Uninsured Rate by Age and Year, People with Family Income Greater Than 400% of the FPL



Source: ACS; author's calculations.

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unfortunately does not inquire about health status. Figure 4 reports the uninsured rate for non-elderly people with family incomes above 400 percent of the FPL in 2013 and 2016, broken down by health status.[11] Appendix Table B2 reports the underlying point estimates, as well as standard errors.

These data show that people with family incomes above 400 percent of the FPL who were in worse health experienced larger increases in insurance coverage, as expected. However, these data also suggest that the uninsured rate either held steady or fell slightly among people in excellent health in this income group from 2013 to 2016, depending on the survey used. Since, as discussed above, increases in premiums for healthier people would have been expected to put significant upward pressure on the uninsured rate for people in excellent health in this income group, this implies that some other factor, such as the mandate, was exerting downward pressure on their uninsured rate.

To gauge trends in insurance coverage by age, I rely on the ACS, which facilitates examining changes in insurance coverage by single year of age because of its large sample size. Figure 5 shows that individuals of all ages in this income range, including young adults, experienced substantial increases in insurance coverage; these changes are almost all highly statistically significant because of the large sample sizes available. As above, since premium changes would have been expected to put upward

[11] I place individuals with good, fair, or poor health in a single group because relatively small numbers of people report fair or poor health, which makes the estimates for those groups very noisy.

pressure on the uninsured rate for young adults in this income group, this implies that some other factor, such as the mandate, must have been exerting downward pressure on their uninsured rate.

Evidence from States with Community Rating and Guaranteed Issue in 2013

The preceding analysis of coverage trends by health status and age establishes that factors other than changes in the price and availability of insurance coverage, plausibly including the individual mandate, must have contributed to the increase in insurance coverage among people with family incomes above 400 percent of the FPL. However, a shortcoming of this analysis is that it does not deliver a quantitative estimate of the contribution made by these other factors.

To fill that gap, I now turn to an analysis focused on two states that had guaranteed issue and community rating requirements before 2014 and maintained those requirements without major changes thereafter: New York and Vermont (KFF 2012a; KFF 2012b).[12] Both states have "pure" community rating regimes, meaning that premiums for a given plan can vary solely based on geography and family composition. (The modified community rating regime under the ACA also permits premiums to vary based on age and tobacco use.)

Focusing on these two states has a pair of analytic advantages. First, because these states already had guaranteed issue requirements, no one in these states was previously unable to purchase individual market coverage, so there is no change in the *availability* of coverage to account for. Second, the fact that these states applied the same community rating rules before and after 2014 means that all individuals in these states should have experienced broadly similar premiums changes during this period.[13] This makes it feasible to use aggregate data to measure how premiums changed in these states during this period and makes it easier to estimate how these premium changes likely affected insurance coverage. (Note that while these states already had community rating and guaranteed issue in 2013, individual market premiums may have been affected by other aspects of the ACA's implementation, like the implementation of the subsidies for lower income people, the ACA's reinsurance program, or the mandate itself.)

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[12] Vermont did make one minor change to its community rating rules in 2014. Previously, insurers had been permitted to determine the relative premiums charged for single versus family coverage. Starting in 2014, all insurers were required to use the same ratios. It appears that New York made a similar change in 2014, although pre-2014 practice in New York is less clear. This change is unlikely to meaningfully affect the interpretation of the premium data discussed in this section.

[13] New York and Vermont were not the only states that maintained the same community rating and guaranteed issue regulations before and after 2014. Massachusetts also did so, but it already had an individual mandate so it is not suitable for this analysis. Additionally, while Maine and New Jersey both had guaranteed issue and modified community rating regulations both before and after 2014, both states made changes to those regulations during these years that make it harder to interpret premium trends observed in those states. Specifically, Maine phased in changes affecting age rating over a multi-year period prior to 2014; those changes are laid out at 24-A M.R.S 2736-C. New Jersey previously allowed insurers to vary premiums based on gender for some individual market plans, and placed somewhat different limitations on age rating, but conformed its rules to match federal law starting in 2014 (Ragone 2012; NJDBI 2013).

I use per member per month premium revenue as my measure of premiums in these states' individual markets. Using data from insurers' Medical Loss Ratio (MLR) filings with the Centers for Medicare and Medicaid Services, I estimate that per member per month premium revenue in these states fell by 3 percent cumulatively from 2013 through 2016, after adjusting for inflation using the personal consumption expenditure deflator. While an ideal premium measure would reflect the premium required to purchase an insurance policy with fixed characteristics, whereas this measure reflects the average premium for the policies actually purchased in each year, I argue below that the ways in which this measure deviates from the theoretical ideal do not meaningfully change the results.

The small observed premium change implies that premium changes on their own would have generated essentially no change in insurance coverage among people with family incomes above 400 percent of the FPL over this period. To convert this qualitative conclusion into a quantitative estimate, I assume that the elasticity of individual market enrollment with respect to premiums is -0.5 based on estimates from the pre-ACA literature (Fiedler 2017); however, any plausible elasticity would lead to qualitatively similar conclusions given the small observed premium change. Combining this elasticity with the observed change in premiums yields a counterfactual percentage change in individual market enrollment for each year through 2016, which I then multiply by the share of people with family incomes above 400 percent of the FPL who had individual market coverage in 2013 to obtain the implied change in individual market enrollment.[14] Under the additional assumption that the full increase in individual market enrollment would have come from the ranks of the uninsured, this yields the change in the uninsured rate for this income group that would have been expected in a counterfactual world in which the only change was the reduction in insurance premiums.[15]

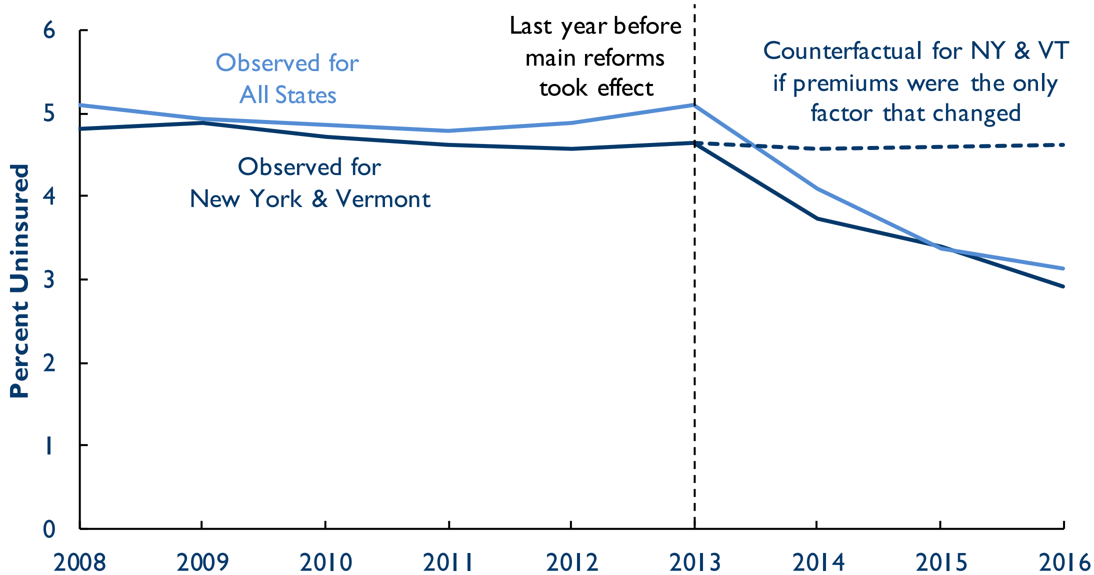
Figure 6 plots three series: (1) the actual path of the uninsured rate in New York and Vermont for this income group, as estimated using the ACS; (2) the corresponding path for the nation as a whole; and (3) a counterfactual path for New York and Vermont in which the only factor that changed was individual market premiums.[16] Table 3 reports the underlying point estimates. The figure shows that the uninsured rate among non-elderly people in New York and Vermont with family incomes above

[14] Estimating how many people in these states in this income range had individual market coverage in 2013 is complicated by the fact that total individual market enrollment as measured in the ACS does not match total individual market enrollment as reported in insurers' MLR filings. This mismatch likely largely reflects misreporting of coverage type in the ACS (see, e.g., Boudreaux et al. 2015). Since the administrative tallies are likely to be more accurate, I first use the ACS to estimate the share of people with family incomes above 400 percent of the FPL who report "direct purchase" coverage and no other coverage. I then scale this estimate down by the ratio of total individual market enrollment in these states as reported in MLR filings to the total number of people reporting direct purchase coverage and no other coverage in the ACS.

[15] In practice, some of these new individual market enrollees may have migrated from other types of insurance, particularly employer coverage, in which case this estimate may slightly overstate the decline in the uninsured rate that should have been expected based on premium changes alone.

[16] I do not present data from the NHIS because the publicly available version of those data does not include state identifiers.

Figure 6: Uninsured Rate for Non-Elderly People with Family Income Greater Than 400% of the FPL



Source: CPS; ACS; author's calculations.

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400 percent of the FPL fell by 1.7 percentage points from 2013 through 2016. By contrast, on the basis of premium changes alone, the uninsured rate should have been expected to change very little.

New York and Vermont thus saw large declines in the uninsured rate among people with family incomes above 400 percent of the FPL that cannot be accounted for by changes in the price or availability of insurance, indicating that some other factor, like the individual mandate, had a substantial effect on insurance coverage. Moreover, the amount by which the uninsured rate in this income group declined relative to the counterfactual in New York and Vermont is very similar to the nationwide decline in the uninsured rate for this income group from 2013 through 2016. Since there is little reason to expect New York and Vermont to be special in this regard, this suggests that that factors other than changes in the price or availability of insurance coverage account for essentially all of the nationwide change in the uninsured rate for this income group over this period.

It is important to note that because this analysis implicitly controls for premiums, it isolates only the *direct* effect of non-price factors (including the individual mandate) on insurance coverage. It will exclude *indirect* effects of non-price factors that arise through changes in individual market risk pool that, in turn, affect individual market premiums. I return to this issue later in the paper when I consider what my results imply about the total effect of the individual mandate on insurance coverage.

This analysis of coverage trends in New York and Vermont has several potential limitations, but these limitations are unlikely to affect the main conclusions. First, as noted earlier, the premium measure I use does not adjust for changes in plan generosity, so it does not measure the premium change for a

Table 3: Uninsured Rate Among Non-Elderly People with Family Incomes Greater Than 400 Percent of the FPL

	New York and Vermont		
	Actual	Counterfactual w/ premium changes only	Nationwide
Percent uninsured in 2013	4.65	4.65	5.10
	(0.12)	(0.12)	(0.05)
Percent uninsured in 2016	2.91	4.63	3.13
	(0.11)	(0.12)	(0.03)
Percentage point change from 2013 to 2016	-1.74	-0.02	-1.98
	(0.16)	(0.00)	(0.05)

Notes: Estimates were obtained using the ACS. Standard errors reflecting the ACS' complex sample design, which were obtained using Census-provided replicate weights, are displayed in parentheses.

plan with fixed characteristics, which would be the ideal for these purposes. However, per member per month claims spending rose by a relatively modest 6 percent cumulatively from 2013 to 2016, after adjusting for inflation.[17] That implies that any increases in plan generosity over this period must have been small. That is particularly true since the average age of individual market enrollees in New York and Vermont rose by around six months from 2013 through 2016, suggesting that a portion of this increase in claims spending resulted from a slight deterioration in the individual market risk pool.[18]

Second, in practice, not all types of plans experienced the same premium changes. In particular, the introduction of the ACA's risk adjustment program transferred resources from insurers that tended to attract sicker enrollees to insurers that tended to attract healthier enrollees (CCIIO 2016).[19] This implies that healthier enrollees likely experienced smaller premium declines (or experienced outright premium increases), while sicker enrollees likely experienced larger premium declines. Since healthier enrollees' enrollment decisions are likely more sensitive to premium changes, accounting for this heterogeneity would be likely to strengthen the results presented above.

Finally, there is one change in the availability of insurance coverage that is not captured in the above analysis. Both New York and Vermont required insurers to allow people to enroll in individual market coverage at any time during the year prior to 2014; insurers are now only required to allow enrollment during open and special enrollment periods, consistent with the structure introduced by the ACA.

[17] I measure claims spending as claims paid net of cost-sharing reduction payments since that is the concept of plan generosity that is relevant to people with family incomes above 400 percent of the FPL.

[18] This calculation reflects the average age of people under age 65 who report "direct purchase" coverage and no other source of coverage in the ACS.

[19] The ACA's transitional reinsurance program presumably had similar effects, although it had phased down to only around one-third of its initial size by 2016 and went away entirely in 2017.

Holding premiums fixed, switching away from continuous enrollment has two opposing effects on coverage. On the one hand, it presumably reduced the number of people signing up for coverage between open enrollments; on the other hand, it could have induced some people to sign up during open enrollment rather than waiting until they needed health care services. I find it unlikely that this change had much effect on observed coverage trends, but I cannot entirely exclude that possibility.

Other Ways the ACA Could Have Affected Insurance Coverage

The preceding results imply that changes in the price and availability of individual market coverage caused by the non-mandate provisions of the ACA cannot account for the observed decline in the uninsured rate among people with family incomes above 400 percent of the FPL. However, non-mandate provisions could have affected coverage decisions through other channels. While these other channels would have needed to be relatively powerful to fully explain the observed increase in insurance coverage, it is conceivable that they can explain a portion of that increase in coverage.

Perhaps the most plausible explanation in this category is that the rollout of the ACA's main coverage provisions spurred substantial discussion of insurance coverage, including high-profile debates among public officials, widespread media coverage, and a range of public and private advertising and outreach efforts (Karaca-Mandic et al. 2017; Franklin Fowler et al. 2017; Wesleyan Media Project 2017). In principle, these events could have increased enrollment by increasing awareness of coverage options, by increasing the perceived value of insurance coverage to enrollees, or through other mechanisms.

There is some evidence that these activities increased insurance coverage, but it appears likely that these effects were small relative to the overall increase in insurance coverage. Karaca-Mandic et al. (2017) show that areas that saw more ACA-related television advertising in 2014 saw larger declines in the non-elderly uninsured rate, but their estimates imply that this advertising can account for only around one-eighth of the overall reduction in the non-elderly uninsured rate from 2013 to 2014.[20] In principle, other types of media attention could have mattered as well, but the authors find no evidence that ACA-related political ads or local news coverage of the ACA increased insurance coverage.

The time pattern of changes in the uninsured rate in this income group also suggests that increased attention to insurance coverage is unlikely to account for a large fraction of the observed increase in insurance coverage. The volume of paid ACA-related advertising declined following 2014, and it is plausible that "free" media coverage fell even more sharply (Wesleyan Media Project 2017). Yet not only did the decline in the uninsured rate observed in 2014 persist into 2015 and 2016, it actually deepened. Advertising could theoretically have persistent effects on insurance coverage, but Shapiro

[20] Even to the extent advertising and outreach activities were effective, they could have worked in part by informing enrollees about the policy changes being implemented by the ACA, including the individual mandate. In that case, a portion of the change in insurance coverage attributable to outreach and advertising is also a causal effect of the mandate.

Table 4: Share of Non-Elderly People with Employer Coverage Among People with Incomes Greater Than 400 Percent of the FPL

	Data Source		
	ACS	CPS	NHIS
Percent with employer coverage in 2013	83.81	84.91	85.12
	(0.07)	(0.47)	(0.38)
Percent with employer coverage in 2016	83.82	84.21	85.09
	(0.07)	(0.26)	(0.48)
Percentage point change from 2013 to 2016	0.01	-0.70	-0.04
	(0.11)	(0.55)	(0.62)

Notes: Standard errors reflecting each survey's complex sample design are displayed in parentheses. For the ACS and CPS, standard errors were obtained using the Census-provided replicate weights. For the NHIS, standard errors were calculated using the masked design variables on the NHIS public use file.

(2017) presents evidence that, at least in the Medicare Advantage market, advertising by private insurers has only short-lived (and relatively small) effects on insurance enrollment decisions.

There are also several other mechanisms through which other ACA provisions might have contributed to coverage gains among people with family incomes above 400 percent of the FPL, but these appear even less likely to have had large effects on insurance coverage in this income group:

- **Creation of the employer mandate:** The ACA introduced a requirement that large employers offer affordable coverage or pay a penalty, a requirement commonly referred to as the ACA's employer mandate. In principle, the employer mandate could have induced some employers to newly offer coverage or to make their existing coverage more attractive. This could have increased the number of people who elected to enroll in employer coverage, including people with family incomes above 400 percent of the FPL.

  Two pieces of evidence cast doubt on this theory. First, the employer mandate was delayed, so it did not take effect for any firms until 2015 and did not take full effect until 2016. That means it is unlikely to explain any of the decline in the uninsured rate from 2013 to 2014. Second, Table 4 shows there is no evidence of an increase in employer coverage in this income group from 2013 through 2016. In principle, the employer mandate could have caused increases in employer coverage that exactly offset a shift from employer to individual market coverage caused by other ACA provisions, but this seems unlikely. The lack of empirical evidence for a large effect of the employer mandate on insurance coverage should not be terribly surprising. Earlier systematic modeling suggested the employer mandate would have only small net effects on insurance coverage (Blumberg, Holahan, and Buettgens 2013; CBO 2015).

- **Lower hassle costs due to introduction of guaranteed issue and modified community rating:** The most obvious effects of introducing guaranteed issue and modified community rating are on the price and availability of individual market insurance coverage, but the introduction of these regulations also changed the process of enrolling in individual market insurance coverage. Before 2014, insurers generally required prospective individual market enrollees to complete to a lengthy questionnaire about their health history so insurers could decide whether they wanted to deny coverage or charge a higher premium on that basis. Eliminating the underwriting process could have reduced the upfront hassle costs of enrolling in coverage and thereby increased enrollment.

The evidence on coverage trends in New York and Vermont presented in the last section casts doubt on this explanation. Because these states already had guaranteed issue and community rating requirements in their individual markets, there was no reduction in these types of hassle costs in those states. Thus, if this factor had large effects on insurance coverage, we would have expected to see much smaller declines in the uninsured rate among people with family incomes above 400 percent of the FPL in these states. As discussed earlier, this is not the case.

- **Lower hassle costs due to the introduction of the Marketplaces:** A final possibility is that the ACA's creation of the Health Insurance Marketplace substantially simplified the process of purchasing individual market insurance, thereby spurring additional insurance enrollment. However, if enrolling in coverage through the Marketplace was dramatically easier than the options that existed prior to the ACA—purchasing coverage directly from an insurer or through a broker—then one would expect enrollees purchasing ACA-compliant coverage to overwhelmingly do so through the Marketplace. In fact, however, around three-quarters of unsubsidized enrollees purchasing ACA-compliant coverage in 2016 purchased coverage outside the Marketplace. This fact does not rule out that the possibility that the Marketplaces reduced hassle costs, but it does suggest the reduction in hassle costs—and any concomitant effects of that reduction in hassle costs on coverage—are relatively small.

How Large Was the Mandate's Overall Effect on Coverage?

The evidence presented above strongly suggests that the individual mandate increased insurance coverage among people with family incomes above 400 percent of the FPL. A natural next question is what this evidence implies about the effect of the mandate on the population as a whole. Because people with family incomes above 400 percent of the FPL accounted for only around one-tenth of the overall uninsured population in 2013, the answer to that question depends in large part on what the evidence presented in this paper implies about the effect of the mandate at lower income levels.

It is implausible that the mandate had large effects on coverage decisions by uninsured people with family incomes above 400 percent of the FPL, but no effect at all at lower income levels. Nevertheless, there is considerable uncertainty about the *magnitude* of the mandate's effects at lower income levels.

Indeed, for a variety of reasons, the mandate's effects could have been either larger or smaller among lower-income people than among the higher-income people who are the focus of this analysis. Notably, the mandate penalty was larger in dollar terms at higher income levels and many low-income uninsured people likely qualified for exemptions from the mandate. On the other hand, many low-income uninsured individuals were eligible for free or near-free coverage through Medicaid or the Marketplace, which could conceivably have made the individual mandate more effective in this group. Awareness of the mandate and sensitivity to financial incentives may also have varied by income.

In light of this uncertainty, I present estimates reflecting a range of assumptions about how the effect of the individual mandate differed between people with family incomes above and below 400 percent of the FPL. The base estimates assume that the mandate caused the same fraction of uninsured people to obtain coverage above and below 400 percent of the FPL, except that I assume the mandate had no effect on people below 400 percent of the FPL who either were in the Medicaid "coverage gap" or were undocumented immigrants.[21] These latter two groups were exempt from the mandate, and, perhaps more importantly, are not eligible for any form of subsidized coverage, which likely greatly limited any non-financial effects of the mandate on their behavior. The other two sets of estimates assume that the effect of the mandate on people with family incomes below 400 percent of the FPL was, respectively, 50 percent smaller and 50 percent larger than the base estimates.

Constructing these estimates requires distilling the coverage trends presented earlier in this paper into a single estimate of the percentage reduction in the number of uninsured people with family incomes above 400 percent of the FPL in 2016 that was attributable to the individual mandate. In doing so, I assume that four-fifths of the observed decline in the uninsured rate in this income group from 2013 through 2016 was attributable to the direct effects of the mandate (that is, effects of the mandate not mediated through changes in individual market premiums). This four-fifths assumption aligns with the evidence presented earlier showing that: (1) all or almost all of the decline in the uninsured rate in this income group is attributable to the ACA; (2) essentially none of this decline can be explained by changes in the price or availability of insurance coverage; but (3) a modest portion of the decline may be attributable to outreach and advertising associated with ACA's rollout and similar factors.

I focus solely on the direct effects of the mandate for these purposes because people with incomes below 400 percent of the FPL will generally be insulated from any effects that the individual mandate may have had on individual market insurance premiums, either because they receive subsidies that offset premium changes or because they obtain their coverage outside the individual market. This will lead the calculations I present below to modestly understate the effect of the mandate on insurance

[21] The Medicaid "coverage gap" exists in Medicaid non-expansion states and extends from the state's Medicaid income eligibility limit up to 100 percent of the FPL, the lowest income at which people are eligible for premium tax credits.

coverage among people with family incomes above 400 percent of the FPL, but that understatement is likely to be small relative to the overall estimated effect of the individual mandate.[22]

One complication is that the ACS and NHIS show somewhat different declines in the uninsured rate and thus lead to somewhat different estimates. Choosing between the two estimates is difficult because each survey has methodological strengths and weaknesses for the current purpose. The ACS offers much larger samples, and, as discussed in Appendix A, provides more granular information on income sources and family relationships that make it easier to appropriately measure income. The NHIS, on the other hand, has a more robust battery of questions about insurance coverage. In light of the uncertainty about which estimate is better, I average the two in my calculations, which leads to an estimate that the number of uninsured people with family incomes above 400 percent of the FPL was 27 percent lower in 2016 than it would have been absent the individual mandate.[23]

To convert this estimate to a number of people, I combine it with estimates of the number of non-elderly uninsured people in each relevant population group in 2016.[24] I estimate the number of non-elderly uninsured people with family incomes above 400 percent of the FPL in 2016 by averaging the NHIS and ACS estimates of the size of that population. I use the same approach for people with family incomes below 400 percent of the FPL, except that I then subtract off estimates of the number of people in the Medicaid "coverage gap" and the number of uninsured undocumented immigrants based on estimates provided by Garfield et al. (2017); subtracting off people in these groups reflects my assumption, explained above, that these groups were not affected by the mandate.[25]

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[22] To see why this understatement is likely to be small, consider the following calculation. Applying the same method described in footnote 14 to the nation as a whole (except that I use both NHIS and ACS data and average the two estimates) implies that there were 6.4 million individual market enrollees with family incomes above 400 percent of the FPL in 2016. Without the direct effects of the mandate, that number would have been 5.1 million (if all of that reduction in insurance coverage had occurred in the individual market). Assuming that individual market premiums would have been 10 percent higher in 2016 without the individual mandate and assuming a demand elasticity of -0.5, the indirect effects of the individual mandate would have been expected to generate an additional reduction in insurance enrollment of around 240,000 people (=Exp[-0.5*Ln(1.1)]*5.1 million). This estimate is small relative to the estimates of the mandate's overall effects presented in Table 5.

[23] To be precise, for the NHIS-based calculation, I start with the NHIS estimate that the uninsured rate among non-elderly people with family incomes above 400 percent of the FPL fell by 24 percent from 2013 through 2016. The assumption that four-fifths of this reduction was attributable to the mandate implies that the number of uninsured people in this income group was 20 percent (=0.8*.24/[1 – 0.2*0.24]) lower in 2016 than it would have been absent the individual mandate. The corresponding calculation for the ACS leads to an estimate of 34 percent. The average of the two estimates is 27 percent.

[24] That is, for a population group that included x uninsured individuals in 2016, I calculate the effect of the mandate on the number of people with insurance coverage in that group as 0.27*x/(1-0.27).

[25] Specifically, I take the Garfield et al. (2017) estimates of the share of the uninsured population in 2016 that is in the Medicaid coverage gap or undocumented, multiply this by my slightly larger estimate of the non-elderly uninsured population, and subtract off the result from my estimate of the number of uninsured people with family incomes below 400 percent of the FPL. It is likely that a small number of the undocumented uninsured have family incomes above 400 percent of the FPL, but this issue is unlikely to meaningfully affect the results.

Table 5: Effect of the Individual Mandate on Insurance Coverage, 2016

	Effect of Mandate	
	Millions Uninsured	Share Uninsured
Non-elderly people with family incomes above 400% of the FPL	-1.2	-1.3%
Non-elderly people with family incomes below 400% of the FPL		
…if effect on the uninsured is the same above/below 400% of the FPL	-6.7	-3.9%
…if effect below 400% of FPL is 50% larger than base estimates	-10.1	-5.8%
…if effect below 400% of FPL is 50% smaller than base estimates	-3.4	-1.9%
Full non-elderly population		
…if effect on the uninsured is the same above/below 400% of the FPL	-8.0	-2.9%
…if effect below 400% of FPL is 50% larger than base estimates	-11.4	-4.2%
…if effect below 400% of FPL is 50% smaller than base estimates	-4.6	-1.7%

Notes: The base estimates assume that the individual mandate caused the same fraction of uninsured people to obtain coverage both above and below 400 percent of the FPL, except that the mandate is assumed to have had no effect on people below 400 percent of the FPL who are either undocumented or in the Medicaid "coverage gap." The other estimates assume that the effect of the individual mandate on insurance coverage below 400 percent of the FPL is 50 percent larger and 50 percent smaller than the base estimates. The estimated effect of the mandate above 400 percent of the FPL assumes that the mandate accounted for four-fifths of the observed decline in the uninsured rate in this income group from 2013 to 2016 and reflects the average of the relevant estimates from the NHIS and the ACS. The main text provides additional methodological detail.

Table 5 presents the resulting estimates of the mandate's effect. I estimate that the mandate reduced the number of uninsured people with family incomes above 400 percent of the FPL in 2016 by 1.2 million people (or 1.3 percent of the non-elderly population in this income group). The implied effects on people below 400 percent of the FPL are considerably larger, reflecting the much larger number of uninsured people at lower income levels. In my base estimates, I find that the mandate reduced the overall number of uninsured by 8.0 million (or 2.9 percent of the non-elderly population).

As foreshadowed by the discussion above, the implied effect of the individual mandate in the full population is sensitive to assumptions about how effective the mandate was among people with family incomes below 400 percent of the FPL, although the implied effect of the mandate is sizeable in all of the scenarios considered. If the effect of the mandate among people with family incomes below 400 percent of the FPL was 50 percent larger than in the base estimates, then the overall reduction in the number of uninsured due to the mandate would rise to 11.4 million (4.2 percent of the non-elderly population). On the other hand, if the effect of the mandate at lower income levels was 50 percent smaller than in the base estimates, then the overall reduction in the number of uninsured due to the mandate would fall to 4.6 million (1.7 percent of the non-elderly population).

How Consistent Are These Estimates with Pre-ACA Evidence?

A final question of interest is how the effect of the mandate estimated in this paper compare to what would have been expected on the basis of pre-ACA evidence. In this section, I show that my estimates of the effect of the mandate on insurance coverage among people with family incomes above 400 percent of the FPL are similar to or modestly smaller than what would have been expected based on pre-ACA evidence. This fact increases the plausibility of the estimates presented in this paper. It also strengthens the case that pre-ACA evidence remains useful in the post-ACA world. This latter finding is notable because the post-ACA literature remains relatively young and because the pre-ACA experience includes natural experiments that post-ACA experience does not.

Pre-ACA Estimates of the Elasticity of Demand for Individual Market Coverage

One body of pre-ACA research that provides a useful point of comparison is the literature examining how individual market enrollment depends on premiums. As discussed earlier, pre-ACA evidence suggested that the elasticity of individual market enrollment with respect to premiums of around -0.5. Additionally, estimates presented in Fiedler (2017) imply that the individual mandate directly reduced the effective price of individual market coverage for people with family incomes above 400 percent of the FPL by around 40 percent, on average, in 2016.[26]

Combining these estimates implies that we should have expected individual market enrollment in this income group to be around 23 percent lower in 2016 without the individual mandate. This translates to around 1.5 percent of non-elderly people with family incomes above 400 percent of the FPL. This estimate is broadly similar to the 1.3 percentage point reduction in the uninsured rate in this income group that was attributed to the mandate in Table 5.[27]

Of course, the elasticity-based estimate presented above could be somewhat overstated, because a portion of the elasticity of individual market enrollment with respect to premiums may reflect people shifting into the individual market from other forms of coverage. Alternatively, it could be somewhat understated, because the mandate may also induce people in this income group to take up employer

[26] Specifically, Fiedler (2017) estimates that the average mandate penalty for individual market enrollees with family incomes above 400 percent of the FPL was $2,165 if family members make coverage decisions individually and $1,402 on a per person basis if family members make coverage decisions jointly. These estimates represent, respectively 49 percent and 32 percent of the average annual individual market premium in 2016 of $4,425, as estimated using data from insurers' MLR filings. The midpoint between these two estimates is approximately 40 percent, and I use this estimate in the main text.

[27] To arrive at this figure, I estimate the share of non-elderly people with family incomes above 400 percent of the FPL who have individual market coverage by combining survey and administrative data according to the method described in footnote 14. This method yields an estimate of 6.0 percent when applied to the ACS and 6.9 percent when applied to the NHIS. For simplicity, I use the average of these two estimates in the calculations presented in the main text.

coverage and may affect coverage decisions through non-financial channels.[28] Regardless, this comparison suggests that the effect of the individual mandate estimated in this paper is at least broadly consistent with what would have been expected based on pre-ACA evidence on how decisions to enroll in individual market coverage depend on the price of that coverage.

Estimates of the Effect of Massachusetts' Individual Mandate

Research on the effects of Massachusetts' individual mandate is another relevant point of comparison. Estimates reported by Hackmann, Kolstad, and Kowalski (2015) imply that enrollment in the portion of Massachusetts' post-reform individual market that was open to unsubsidized enrollees would have been 29 percent lower absent its individual mandate. If the ACA's individual mandate had the same effect, then the share of non-elderly people with family incomes above 400 percent of the FPL enrolled in individual market coverage would have been 1.9 percentage points lower in 2016.[29] This estimate is larger than the change in the uninsured rate for this group that was attributed to the individual mandate in Table 5, but not dramatically so.

Of course, this comparison is also imperfect because it does not account for differences between Massachusetts health reform and the ACA, including differences in the structure of the mandate penalty and exemptions (Blumberg and Clemens-Cope 2012). It also does not account for the fact that the Hackman, Kolstad, and Kowalski estimate excludes changes in insurance coverage outside the individual market, or the fact that the estimate in Table 5 does not include effects of the mandate on insurance coverage mediated through the mandate's effects on individual market premiums. Nevertheless, this comparison also suggests that the effect of the individual mandate on insurance coverage among people with family incomes above 400 percent of the FPL estimated in this paper is at least broadly consistent with the Massachusetts experience.

Similarly, Chandra, Gruber, and McKnight (2011) provide evidence that Massachusetts' individual mandate substantially increased insurance enrollment among subsidy-eligible enrollees. While hard to directly compare with my estimates, their estimates are also qualitatively consistent with the evidence in this paper that an individual mandate can meaningfully increase insurance coverage.

Conclusion

The ACA's individual mandate appears to have meaningfully increased insurance coverage among people with family incomes above 400 percent of FPL. While extrapolating this estimate to the non-

[28] The elasticity-based calculation also does not account for effects of the mandate attributable to changes in the individual market risk pool. However, as noted earlier, these effects are also excluded from the estimate reported in Table 5, so this omission does not skew the comparison being made here.

[29] This calculation uses the same estimate of the share of non-elderly people with family incomes above 400 percent of the FPL who have individual market coverage that was described in footnote 27.

elderly population as a whole introduces considerable uncertainty, the estimates presented in this paper suggest that the individual mandate increased the number of people with insurance coverage by at least several million in 2016.

This suggests in turn that the mandate's impending disappearance will substantially reduce insurance coverage over time. For a variety of reasons, the future reduction in insurance coverage caused by repealing the mandate may not be exactly the same as the increase in insurance coverage caused by the mandate in 2016. However, my base estimate that the mandate increased insurance coverage by 8.0 million people in 2016 is similar to CBO's recent estimate of the long-run reduction in the number of people with health insurance that would result from repeal of the individual mandate and somewhat smaller than CBO's earlier 13 million estimate (CBO 2017; CBO 2018).[30]

A portion of the reduction in insurance coverage that will ultimately result from repeal of the individual mandate may have already occurred, as survey results reported by Kirzinger et al. (2018) indicate that a minority of the public erroneously believes that the mandate is no longer in effect in 2018. But for a variety of reasons, much of the reduction in insurance coverage resulting from the mandate's repeal may take several years to appear. Most important, Kirzinger et al. also show that a significant fraction of the public is not yet aware that the mandate has been repealed. It may take time for this confusion to dissipate, particularly since the first tax filing season without the penalty in effect will not occur until the spring of 2020. Additionally, some of those induced to obtain coverage by the mandate, particularly those induced to sign up for free or very-low-cost Medicaid or subsidized Marketplace coverage, may be governed by inertia and retain that coverage until their life circumstances substantially change. Notably, CBO's recent estimates also reflect a view that it will take time for repeal of the mandate to have its full effect on insurance coverage (CBO 2017; CBO 2018).

The reduction in insurance coverage due to repeal of the individual mandate will likely prove hard to reverse. Commonly proposed replacements for the individual mandate, including automatic enrollment and proposals to penalize people who do not maintain continuous insurance coverage when they attempt to re-enroll in coverage, would face serious implementation challenges and are of questionable effectiveness. And while it is clearly possible to replicate the financial incentives created by the individual mandate by increasing subsidies to people who obtain health insurance, this approach would have a large fiscal cost. For this reason, if future state and federal policymakers wish to surpass the high-water mark for insurance coverage attained under the ACA, restoring an individual mandate or something like it should be part of the policy conversation.

[30] CBO (2018) reports that its updated estimate of the long-run effect of repealing the individual mandate on insurance coverage is "about one-third smaller" than its previous estimate. CBO (2017) had previously estimated that repealing the mandate would increase the number of uninsured people by 13 million in the long run. Two-thirds of 13 million is 8.7 million.

References

Auerbach, David, Janet Holtzblatt, Paul Jacobs, Alexandra Minicozzi, Pamela Moomau, and Chapin White. 2010. "Will Health Insurance Mandates Increase Coverage? Synthesizing Perspectives from Health, Tax, and Behavioral Economics: Working Paper 2010-05." Congressional Budget Office. https://www.cbo.gov/publication/21600.

Blumberg, Linda J, Matthew Buettgens, and Robin Wang. 2018. "The Potential Impact of Short-Term Limited-Duration Policies on Insurance Coverage, Premiums, and Federal Spending." Urban Institute. https://www.urban.org/sites/default/files/publication/96781/2001727_updated_finalized.pdf.

Blumberg, Linda J and Linda Clemens-Cope. 2012. "Reconciling the Massachusetts and Federal Individual Mandates for Health Insurance: A Comparison of Policy Options." Urban Institute. https://www.urban.org/sites/default/files/publication/26301/412718-Reconciling-the-Massachusetts-and-Federal-Individual-Mandates-for-Health-Insurance-A-Comparison-of-Policy-Options.PDF.

Blumberg, Linda J, Bowen Garrett, and John Holahan. 2016. "Estimating the Counterfactual: How Many Uninsured Adults Would There Be Today Without the ACA?" *Inquiry* 53: 1-13. https://doi.org/10.1177/0046958016634991.

Blumberg, Linda J. John Holahan, and Matthew Buettgens. 2013. "It's No Contest: The ACA's Employer Mandate Has Far Less Effect on Coverage and Costs Than the Individual Mandate." Urban Institute. https://www.urban.org/research/publication/its-no-contest-acas-employer-mandate-has-far-less-effect-coverage-and-costs-individual-mandate.

Boudreaux, Michel H, Kathleen Thiede Call, Joanna Turner, Brett Fried, and Brett O'Hara. 2015. "Measurement Error in Public Health Insurance Reporting in the American Community Survey: Evidence from Record Linkage." *Health Services Research* 50(6): 1973-1995. https://doi.org/10.1111/1475-6773.12308.

Buchmueller, Thomas, John Dinardo. 2002. "Did Community Rating Induce an Adverse Selection Death Spiral Evidence from New York, Pennsylvania, and Connecticut." *American Economic Review* 92(1): 280-294. https://doi.org/10.1257/000282802760015720.

Center for Consumer Information and Insurance Oversight (CCIIO). 2016. "March 31, 2016, HHS-Operated Risk Adjustment Methodology Meeting Discussion Paper." Centers for Medicare and Medicaid Services. https://www.cms.gov/CCIIO/Resources/Forms-Reports-and-Other-Resources/Downloads/RA-March-31-White-Paper-032416.pdf.

Center on Budget and Policy Priorities (CBPP). 2017a. "Key Facts: Determining Household Size for Premium Tax Credits." http://www.healthreformbeyondthebasics.org/key-facts-determining-household-size-for-premium-tax-credits/.

---. 2017b. "Key Facts: Income Definitions for Marketplace and Medicaid Coverage." http://www.healthreformbeyondthebasics.org/key-facts-income-definitions-for-marketplace-and-medicaid-coverage/.

Chandra, Amitabh, Jonathan Gruber, and Robin McKnight. 2011. "The Importance of the Individual Mandate – Evidence from Massachusetts." *New England Journal of Medicine* 364(4):293-295. http://doi.org/10.1056/NEJMp1013067.

Clemens, Jeffery. 2015. "Regulatory Redistribution in the Market for Health Insurance." *American Economic Journal: Applied Economics* 7(2):109-34. https://doi.org/10.1257/app.20130169.

Collins, Sara R, Munira Z Gunja, Michelle M Doty, and Herman K Bhupal. 2018. "First Look at Health Insurance Coverage in 2018 Finds ACA Gains Beginning to Reverse." Commonwealth Fund. http://www.commonwealthfund.org/publications/blog/2018/apr/health-coverage-erosion.

Congressional Budget Office (CBO). 2015. "H.R. 30, Save American Workers Act of 2015." https://www.cbo.gov/publication/49873.

---. 2016. "Private Health Insurance Premiums and Federal Policy." https://www.cbo.gov/publication/51130.

---. 2017. "Repealing the Individual Health Insurance Mandate: An Updated Estimate." https://www.cbo.gov/publication/53300.

---. 2018. "Federal Subsidies for Health Insurance Coverage for People Under Age 65: 2018 to 2028." https://www.cbo.gov/publication/53826.

Fiedler, Matthew. 2017. "Taking Stock of Insurer Financial Performance in the Individual Health Insurance Market Through 2017." The Brookings Institution. https://www.brookings.edu/research/taking-stock-of-insurer-financial-performance-in-the-individual-health-insurance-market-through-2017/.

Franklin Fowler, Erika, Laura M. Baum, Colleen L. Barry, Jeff Niederdeppe, and Sarah E. Gollust. 2017. "Media Messages and Perceptions of the Affordable Care Act During the Early Phase of Implementation." *Journal of Health Politics, Policy, and Law* 42(1):167-195. https://doi.org/10.1215/03616878-3702806.

Frean, Molly, Jonathan Gruber, and Benjamin D. Sommers. 2017. “Premium Subsidies, the Mandate, and Medicaid Expansion: Coverage Effects of the Affordable Care Act.” *Journal of Health Economics* 53:72-86. https://doi.org/10.1016/j.jhealeco.2017.02.004.

Garfield, Rachel, Anthony Damico, Julia Foutz, Gary Claxton, and Larry Levitt. 2017 “Estimates of Eligibility for ACA Coverage among the Uninsured in 2016.” Kaiser Family Foundation. https://www.kff.org/uninsured/issue-brief/estimates-of-eligibility-for-aca-coverage-among-the-uninsured-in-2016-october-2017-update/.

Glied, Sherry A. and Ougni Chakraborty. 2018. “How the Affordable Care Act Has Affected Health Coverage for Young Men with Higher Incomes.” Commonwealth Fund. http://www.commonwealthfund.org/publications/issue-briefs/2018/apr/aca-health-coverage-young-men.

Hackmann, Martin B., Jonathan T. Kolstad, and Amanda E. Kowalski. 2015. “Adverse Selection and an Individual Mandate: When Theory Meets Practice.” *American Economic Review* 105(3):1030-66. https://doi.org/10.1257/aer.20130758/.

Hsu, John, Vicki Fung, Michael E. Chernew, Alan M. Zaslavsky, William Dow, and Joseph P. Newhouse. 2018. “Eliminating the Individual Mandate Penalty in California: Harmful but Non-Fatal Changes in Enrollment and Premiums.” *Health Affairs Blog*. https://doi.org/10.1377/hblog20180223.551552.

Kaiser Family Foundation (KFF). 2012a. “Health Insurance Market Reforms: Guaranteed issue.” https://kaiserfamilyfoundation.files.wordpress.com/2013/01/8327.pdf.

---. 2012b. “Health Insurance Market Reforms: Rate Restrictions.” https://kaiserfamilyfoundation.files.wordpress.com/2013/01/8328.pdf.

Karaca-Mandic, Pinar, Andrew Wilcock, Laura Baum, Colleen L. Barry, Erika Franklin Fowler, Jeff Niederdeppe, and Sarah E. Gollust. 2017. “The Volume of TV Advertisements During the ACA’s First Enrollment Period Was Associated With Increased Insurance Coverage.” *Health Affairs* 36(4):747-754. https://doi.org/10.1377/hlthaff.2016.1440.

Kirzinger, Ashley, Liz Hamel, Cailey Muñana, and Mollyann Brodie. 2018. Kaiser Health Tracking Poll – March 2018: Non-Group Enrollees. Kaiser Family Foundation. https://www.kff.org/health-reform/poll-finding/kaiser-health-tracking-poll-march-2018-non-group-enrollees/.

Lo Sasso, Anthony T. and Ithai Z. Lurie. 2009. “Community Rating and the Market for Private Non-Group Health Insurance.” *Journal of Public Economics* 93(1-2):264-279. https://doi.org/10.1016/j.jpubeco.2008.07.001.

Meyer, Bruce D., Wallace K.C. Mok, and James X. Sullivan. 2015. “Household Surveys in Crisis.” *Journal of Economic Perspectives* 29(4):199-226. https://doi.org/10.1257/jep.29.4.199.

New Jersey Department of Banking and Insurance (NJBDI). 2013. “Bulletin No. 13-14.” The State of New Jersey. http://www.state.nj.us/dobi/bulletins/blt13_14.pdf.

Office of Management and Budget (OMB). 2017. “Statement of Administration Policy: Conference Report on H.R.1 – Tax Cuts and Jobs Act.” https://www.whitehouse.gov/wp-content/uploads/2017/11/saphs1hr_20171218.pdf.

Pauly, Mark, Scott Harrington, and Adam Leive. 2015. “‘Sticker Shock’ in Individual Insurance Under Health Reform?” *American Journal of Health Economics* 1(4): 494-514. https://doi.org/10.1162/AJHE_a_00027.

Rae, Matthew, Anthony Damico, Cynthia Cox, Gary Claxton, and Larry Levitt. 2015. “The Cost of the Individual Mandate Penalty for the Remaining Uninsured.” Kaiser Family Foundation. https://www.kff.org/health-reform/issue-brief/the-cost-of-the-individual-mandate-penalty-for-the-remaining-uninsured/.

Ragone, Tara Adams. 2012. “Evaluating Federal and New Jersey Regulation of Rating Factors and Rate Bands.” Center for Health and Pharmaceutical Law and Policy, Seton Hall University School of Law. https://law.shu.edu/Health-Law/upload/evaluating-federal-nj-regulation-9490.pdf.

Ruggles, Steven, Katie Genadek, Ronald Goeken, Josiah Grover, and Matthew Sobek. 2017. Integrated Public Use Microdata Series: Version 7.0. Minneapolis: University of Minnesota. https://doi.org/10.18128/D010.V7.0.

Shapiro, Bradley T. 2017. “Advertising in Health Insurance Markets.” *SSRN eLibrary*. https://dx.doi.org/10.2139/ssrn.2789904.

Sommers, Benjamin D, Munira Z. Gunja, Kenneth Finegold, and Thomas Musco. 2015. "Changes in Self-reported Insurance Coverage, Access to Care, and Health Under the Affordable Care Act." *Journal of the American Medical Association* 314 (4): 366-374. https://10.1001/jama.2015.8421.

United States Congress Joint Economic Committee (JEC). 2017. “Obamacare’s Unstable Because of...Obamacare!” https://www.jec.senate.gov/public/index.cfm/republicans/2017/6/obamacare-s-unstable-because-of-obamacare.

Wesleyan Media Project. 2017. “With Only 45 Days to Spread the Word, Health Insurance Advertising Spikes.” http://mediaproject.wesleyan.edu/releases/dec-2017/.

Appendix A: Method for Defining Family Income

This appendix provides additional detail on the method used to measure family income in this analysis. Consistent with the objectives of the analysis, I aim to define family units and measure income in ways that align as closely as possible with the rules used to determine eligibility for the premium tax credit.

In brief, for the purposes of the premium tax credit, the family unit consists of a tax filer, his or her spouse (if applicable), as well as anyone the filer claims as a tax dependent. The income measure is the total modified adjusted gross income (MAGI) earned by all members of that family unit, excluding income earned by dependents who have too little income to be legally required to file a tax return. MAGI includes most common types of cash income. The most prominent types of income excluded from MAGI are Supplemental Security Income benefits and benefits paid under the Temporary Assistance for Needy Families program. CBPP (2017a; 2017b) describe the premium tax credit eligibility rules in much greater detail.

The remainder of this appendix discusses how these rules are applied in each survey in turn.

American Community Survey

The ACS collects a range of information on the relationships of household members as well as their sources of income. I first use that relationship and income information to determine tax filing and dependent status under Internal Revenue Service rules and assemble family units on that basis. Code for doing so is available upon request. This analysis uses the processed versions of the ACS family relationship variables produced by the IPUMS Project (Ruggles et al. 2017).

Once family units are assembled and dependent status is determined, I compute MAGI for each family unit. Consistent with the definition of MAGI, I compute each person's MAGI by summing the following ACS fields: wage and salary income; self-employment income; retirement income; interest, dividend, and rental income; Social Security income, and "other" income. These variables capture most major income sources included in MAGI with the exception of capital gains income. Omitting capital gains income is not likely to meaningfully bias the results of my analysis because the main threat to my research design is erroneously identify some families as having incomes above 400 percent of the FPL. However, omitting this source of income will typically lead me to understate families' actual income.

Current Population Survey

For the CPS, I follow the same basic approach as for the ACS, with two main exceptions. First, I rely solely on the family relationship variables reported directly on the CPS, rather than relying on the processed versions provided by IPUMS. Second, I use a different set of income sources, reflecting the more granular set of income variables available in the CPS. Specifically, I include amounts reported under earnings, other wage and salary income, self-employment income, farm income, unemployment compensation, Social Security income, survivor's income, disability income, retirement income, interest income, dividend income, rental income, and "other" income (excluding amounts reported as being derived from worker's compensation or public assistance). As above, the main missing source of income information is capital gains, and this omission is unlikely to meaningfully bias the results.

National Health Interview Survey

Unlike the ACS and CPS, the NHIS does not collect detailed information on the relationships of household members and simply groups people into families based on its own set of rules. The NHIS also does not collect detailed information on the types of income each member of a household received. Rather, it asks each family (as defined in the NHIS) to report its total cash income from all sources. For that reason, for the analyses that use the NHIS, I must rely on the income and family unit variables provided by the NHIS rather than constructing income and family unit definitions that align with premium tax credit rules. To evaluate whether these shortcomings of the NHIS are likely to affect the results, Panel B of Table B1 in Appendix B examines how the estimated change in the uninsured rate in the ACS and CPS would change if income and family unit definitions similar to the NHIS were used. It appears that results from these alternative analyses would be qualitatively similar.

Appendix B: Supplemental Tables

Table B1: Robustness Checks for Main Uninsured Rate Results

	Data Source		
	ACS	CPS	NHIS
Panel A: Ages 26-64, Family Income > 500% of FPL, Limited/No Imputed Income			
Percent uninsured in 2013	2.90	4.51	3.88
	(0.04)	(0.36)	(0.23)
Percent uninsured in 2016	1.79	3.87	2.97
	(0.03)	(0.21)	(0.21)
Percentage point change from 2013 to 2016	-1.11	-0.63	-0.91
	(0.05)	(0.44)	(0.31)
Percentage change from 2013 to 2016	-38.3	-14.1	-23.4
	(1.3)	(8.8)	(7.1)
Panel B: Ages 26-64, Family Income > 400% of FPL, Income Defined to Match NHIS			
Percent uninsured in 2013	7.33	7.25	N/A
	(0.06)	(0.32)	
Percent uninsured in 2016	4.45	5.36	N/A
	(0.04)	(0.17)	
Percentage point change from 2013 to 2016	-2.89	-1.89	N/A
	(0.07)	(0.35)	
Percentage change from 2013 to 2016	-39.3	-26.0	N/A
	(0.7)	(3.9)	

Notes: In Panel A, people with "limited/no imputed income" are, in the ACS and CPS, people for whom imputed income sources account for less than 10 percent of total family income and, in the NHIS, people for whom no income was imputed. Standard errors are displayed in parentheses. In Panel B, income is measured in the ACS and CPS in a way designed to mimic the income measures used in the NHIS, as described in Appendix A. Standard errors reflecting each survey's complex sample design are displayed in parentheses. For the ACS and CPS, standard errors were obtained using the Census-provided replicate weights. For the NHIS, standard errors were calculated using the masked design variables on the NHIS public use file.

Table B2: Uninsured Rate by Health Status, Non-Elderly People with Incomes Greater Than 400% of the FPL

	Self-Reported Health Status		
	Excellent	Very Good	Good, Fair, or Poor
Panel A: Current Population Survey			
Percent uninsured in 2013	3.92	5.32	8.88
	(0.32)	(0.45)	(0.69)
Percent uninsured in 2016	3.98	3.99	5.96
	(0.18)	(0.21)	(0.30)
Percentage point change from 2013 to 2016	0.07	-1.33	-2.92
	(0.34)	(0.50)	(0.73)
Percentage change from 2013 to 2016	1.7	-25.0	-32.9
	(8.8)	(7.6)	(6.0)
Panel B: National Health Interview Survey			
Percent uninsured in 2013	3.97	4.78	7.37
	(0.25)	(0.29)	(0.50)
Percent uninsured in 2016	3.37	3.45	5.16
	(0.33)	(0.26)	(0.47)
Percentage point change from 2013 to 2016	-0.61	-1.33	-2.21
	(0.41)	(0.39)	(0.70)
Percentage change from 2013 to 2016	-15.3	-27.9	-29.9
	(9.9)	(7.1)	(8.1)

Notes: Standard errors reflecting each survey's complex sample design are displayed in parentheses. For the CPS, standard errors were obtained using the Census-provided replicate weights. For the NHIS, standard errors were calculated using the masked design variables on the NHIS public use file.

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