COUNCIL OF ECONOMIC ADVISERS
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Methodological Appendix: Methods Used to Construct a
Consistent Historical Time Series of Health Insurance Coverage

A wide array of survey evidence, including new data out this week from the National Health Interview Survey (NHIS) conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics (NCHS), demonstrates that the United States has seen dramatic reductions in the share of the population without health insurance during 2014 (Sommers et al. 2014; Long et al. 2014; Cohen and Martinez 2014; Martinez and Cohen 2014; Collins, Rasmussen, and Doty 2014).

In light of these dramatic gains, a natural question is how the current level and trend in the uninsured rate compare to the last several decades of experience in the United States. To answer this question, the Council of Economic Advisers (CEA) has constructed a consistent historical series of the share of people without health insurance that stretches back to 1963. This document provides a detailed description of CEA's methodology.

In brief, for 1978-2013, CEA relied on historical data from the National Health Interview Survey. The NHIS is ideally suited to historical analyses of this kind because it first collected information on health insurance status in 1959 and is the only survey that routinely collected such information for the entire U.S. population prior to 1987. In analyzing these data, CEA relied heavily on earlier work by researchers at the National Centers for Health Statistics who developed a methodology to consistently identify different types of insurance coverage across different iterations of the NHIS (Cohen et al. 2009; Cohen 2012).

For years prior to 1978, the NHIS did not ask direct questions either about Medicaid coverage or, for individuals under age 65, Medicare coverage, so the survey does not generate reliable information about the share of individuals with public coverage, and therefore also gives a misleading picture of the overall uninsured rate. For these years, CEA estimated the overall uninsured rate by combining information from the NHIS on trends in private coverage (relying, once again, on the methodology developed by Cohen et al. (2009)) with administrative data on Medicare and Medicaid enrollment during those years (Klemm 2000; CMS 2009).

A potential concern with the resulting historical series is that differences between uninsured rates measured using different generations of the NHIS may reflect differences in survey methodology, rather than true differences in insurance coverage. While the careful work by Cohen et al. is intended to address this problem, the authors note that some effects of survey design changes may remain. To determine the extent of any such problems, CEA compared coverage trends measured in the NHIS and other available data sources around the two major NHIS design changes in 1982 and 1997. We estimate that the 1982 redesign slightly increased the measured uninsured rate in the NHIS, and we make a small upward adjustment to the pre-1982 rate on this basis. The evidence is more ambiguous for the 1997 redesign, but on balance suggests that the redesign either had little effect or slightly increased the measured uninsured rate; for this redesign, we make no adjustment to the final series.

Even with these adjustments, it is important to keep in mind that economic measurement is unavoidably imperfect due to wide variety of factors, including sampling error, survey non-response, and the difficulty of producing questionnaires that reliably elicit the information of interest. These challenges are particularly acute when making comparisons across long periods of time. The measurement of uninsured rates is no exception, so these estimates should be

interpreted with the same care as other economic data series, like those measuring poverty, income, or unemployment. Nevertheless, we believe that the final series provides an accurate picture of the broad trends in insurance coverage over the past 50 years and is helpful for putting recent developments in their appropriate historical context.

The remainder of this document provides a detailed description of CEA's methodology. Section 1 describes the National Health Interview Survey, the Cohen et al. (2009) methodology for analyzing the NHIS, and the administrative data on historical Medicare and Medicaid enrollment that CEA has drawn upon for this analysis. Section 2 describes how CEA used these data to construct its base historical series. The table at the end of this document reports the final series.

Section 1: Description of Data Sources

Background on the National Health Interview Survey

CEA's historical series is based primarily on data from the National Health Interview Survey, a household survey administered by the Centers for Disease Control and Prevention's National Center for Health Statistics. The survey collects information on various dimensions of health and well-being—including health insurance enrollment status—for individuals in a representative sample of the nation's households.

The NHIS is an ideal tool for studying long-term trends in health insurance coverage because it has collected information on health insurance status on a regular basis since 1959 and has generally done so every other year since 1968 and annually since 1989.[1,2] By contrast, the other Federal survey most commonly used to study trends in health insurance coverage, the Census Bureau's Current Population Survey Annual Social and Economic Supplement, first included questions on insurance coverage in 1979 and, prior to 1987, did not collect comprehensive information on the coverage status of children.[3] Private surveys of insurance coverage, including the Urban Institute's Health Reform Monitoring Survey and the Gallup-Healthways Well-Being Index provide at most several years of historical data.

An attractive feature of the NHIS is that it has historically achieved very high response rates, which limits the scope for changes in which types of households that respond to the survey to distort estimates of how insurance coverage has changed over time. In all years included in this analysis, the family response rate has been 75 percent or higher; this rate has been above 90 percent for most of the survey's history (Cohen et al. 2009; NCHS 2014). Similarly, the share of responding families who failed to answer the health insurance questions has historically been in

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[1] There are two exceptions to this general rule: the survey collected information on health insurance status every year from 1982 to 1984; and collection of health insurance data stopped for two years between 1986 and 1989.
[2] While the NHIS collected data on insurance coverage in 1959, microdata that facilitate calculating measures of insurance coverage comparable to those used in this analysis are not available.
[3] The Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System, the Census' American Community Survey, and the Agency for Health Care Research and Quality's Medical Expenditure Panel Survey also track health insurance coverage but provide even shorter historical series.

the low single digits in the NHIS (Cohen et al., 2009), limiting the scope for selective non-response to bias the survey's results.[4]

Methodology for Constructing Coverage Measures using the NHIS

Various aspects of the NHIS' design—including the questions it uses to collect information on health insurance coverage—have changed over its more than 50-year lifespan, due in part to the need to respond to changes in the health care system (Cohen et al. 2009). Changes in survey design can affect measured trends in health insurance coverage both because respondents may describe their status differently depending on how a question is phrased and because different questions may categorize coverage arrangements differently. It is therefore essential to take careful account of such changes when comparing data collected in different years.

To address these concerns, CEA relied heavily on earlier work by researchers at the National Center for Health Statistics (Cohen et al. 2009; Cohen 2012). The authors undertook a detailed review of the questions used by the NHIS in different years, and, on the basis of that review, developed a methodology for estimating the share of individuals who had health insurance coverage (or specific types of health insurance coverage) for a consistent set of coverage categories over most of the NHIS' history. As discussed in detail in Section 2, it appears that the authors' approach largely eliminates inconsistencies in the measurement of insurance coverage resulting from changes in the NHIS' methodology over time.

Background on Historical Medicare and Medicaid Enrollment Data and Population

As described in Section 2, for years before 1978, we used administrative data on Medicare and Medicaid enrollment to estimate trends in public insurance coverage. For Medicaid, we obtained estimated total Medicaid enrollment by year compiled by Klemm (2000).[5] For Medicare, we used published tallies from the Centers for Medicare and Medicaid Services that report the number of individuals enrolled in Part A of Medicare for the period 1996-2008. The CMS tallies separately report the number of enrolled individuals who are eligible for the program by virtue of age and disability (CMS 2009). Where we required population estimates, we used estimates of population by age from the United States Census Bureau (Census 2000).

Section 2: Methodology for Estimating Insurance Coverage

Estimating Health Insurance Coverage for 1978-2013

For the period 1978 through 2013, CEA estimated trends in uninsured rates using the NHIS, following the Cohen et al. methodology described above. Unfortunately, in some years, some data fields required to implement the Cohen et al. methodology are not available on the public use microdata files from NCHS, so we instead used the following approach.

For 1978-2011, estimates of the uninsured rate for individuals under age 65 using the Cohen et al. methodology are available directly from the NHCS website (Cohen 2012). The missing data

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[4] Surveys use various methods to account for non-response at the family and question level, including modifications to the "sample weights" used to tabulate results and imputation (i.e., statistical prediction) of missing data. Such methods are imperfect and generally cannot fully eliminate any biases resulting from non-response.

[5] These estimates are plotted in Figure 1 of Klemm (2000). The data underlying the figure were provided by the author.

fields are not relevant to identifying Medicare coverage, so incorporating those fields has very little effect on insurance coverage rates for individuals ages 65 and older. We therefore estimated the uninsured rate for the full population by computing an appropriately weighted average of the rate reported by Cohen (2012) for individuals under age 65 and a rate for individuals age 65 and older computed from the public use microdata. For 2012 and 2013, all needed fields are available on the public use microdata file, so we estimated the uninsured rate directly from the microdata using the Cohen et al. methodology.

The NHIS questionnaire was substantially revised twice during this period: in 1982 and 1997. While one goal of the careful work by Cohen et al. (2009) is to ensure that these types of changes in questionnaire design do not affect the measured uninsured rate, the authors note that some effects of the survey changes may remain. To evaluate whether this is in fact the case, CEA compared the trend in the uninsured rate measured in the NHIS using the Cohen et al. methodology to trends in other available data sources that did not see a change in methodology. As described in detail below, it appears that both redesigns generated at most a small discontinuity in the measured coverage trend; in the case of the 1982 redesign, we made a small adjustment to the series to reflect this modest effect.

- 1982 redesign: The NHIS' health insurance questions were redesigned significantly prior to the 1982 survey year (Cohen et al. 2009). First, respondents were asked a single question about whether they had private health insurance, rather than being asked separate questions about private hospital insurance and private surgical insurance. Second, the survey began asking a follow-up question about whether individuals were enrolled in "any other [than Medicaid] public assistance program that pays for health care." Third, the survey added an explicit question about whether respondents had military coverage. There is evidence that these changes to the NHIS questionnaire altered measured patterns of insurance coverage in the NHIS. Notably, using the Cohen et al. coding methodology, the NHIS shows reductions in private coverage and Medicaid coverage and a sharp increases in "other public" coverage, broadly consistent with the expected effects of the question revisions.

Figure 1: Uninsured Rates in Two Surveys, 1978-1986
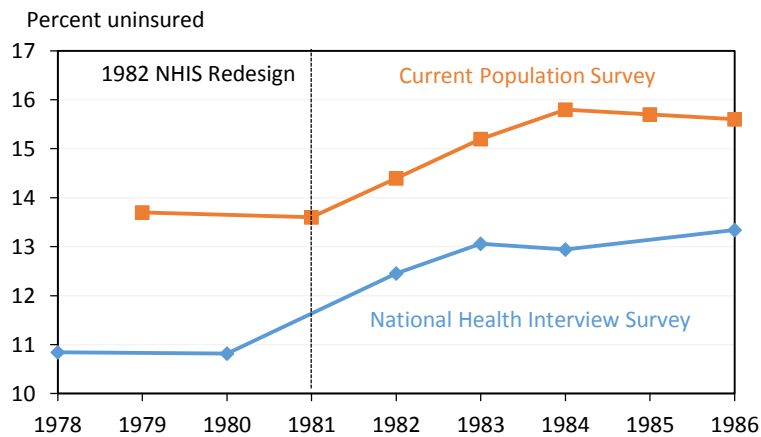
Source: For NHIS, CEA estimates using Cohen et al. (2009) methodology; for CPS, Levit, Olin, and Litsch (1991) tabulations.

To arrive at an estimate of how the redesign affected the measured trend in uninsurance in the NHIS from 1980 to 1982, we compared the uninsurance rates measured in the NHIS using the Cohen et al. methodology to the corresponding uninsurance rates reported in the Census Bureau's Current Population Survey (CPS), the only other survey that routinely collected data on insurance status in those years. The CPS began collecting this information in 1979, and it did so using a consistent methodology on an annual basis through 1986, except in 1980.[6] For this purpose, CEA used CPS tabulations reported by Levit, Olin, and Litsch (1991).[7]

As is evident from Figure 1, the two series track either other closely during this period. To arrive at a quantitative estimate of the relative trends in the two series, we estimated the increase the average uninsured rate measured in each survey from the pre-redesign period (1978/1980 in the NHIS and 1979 in the CPS) to matching years in the post-redesign period (1982, 1983, 1984, and 1986). The increase in the uninsured rate in the NHIS from before the redesign to after the redesign is only 0.6 percentage points larger in the NHIS than in the CPS, suggesting that the 1982 NHIS redesign generated a modest net increase in the measured uninsured rate. Limiting the post-redesign period to only the years that immediately followed the redesign generates slightly larger estimates, as large as 0.9 percentage points when only 1982 is used.

On the basis of this evidence, we added 0.6 percentage points to the uninsured rate estimated using the Cohen et al. methodology in all years prior to 1982. We based our adjustment on the smaller estimate of the effect of the NHIS redesign, both because this estimate benefits from a larger sample size and because we wished to be conservative when comparing contemporary insurance coverage rates to those seen in the past.

- 1997 redesign: The NHIS underwent another major redesign in 1997 (Cohen et al. 2009). Most importantly, the revised survey asked respondents to select the forms of coverage they had from a list, rather than asking respondents separate questions about whether they had each of several different types of coverage. The new survey also asked about new types of coverage that had not been explicitly included in the prior design.

  To assess the effects of the 1997 redesign we took an approach similar to the approach used to evaluate the effects of the 1982 redesign, but in this case we drew upon estimates of the uninsured rate from two other surveys. We first examined the Agency for Healthcare Research and Quality's Medical Expenditure Panel Survey (MEPS), which began in 1996. The MEPS is ideally suited to this task because it can be used to compute
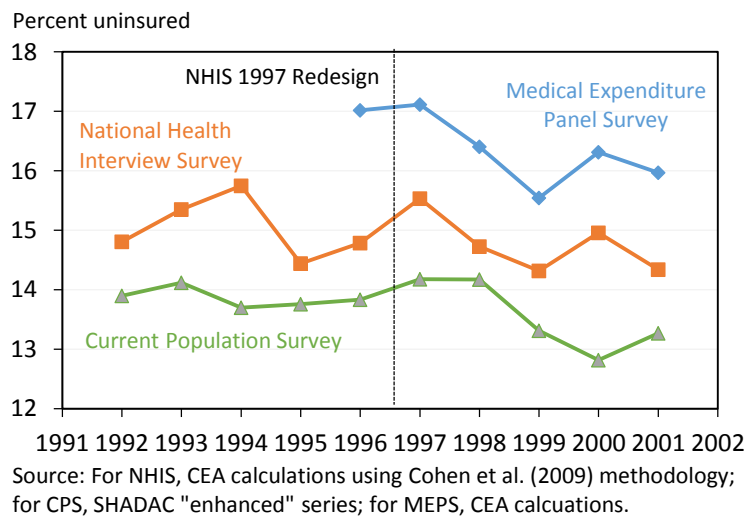
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[6] The CPS does have disadvantages for the purposes of measuring the trends the NHIS would have exhibited in the absence of the redesign. First, the CPS aims to measure the share of individuals who are uninsured for the entire year, whereas the NHIS aims to measure the share of individuals who are uninsured at a point in time. Second, the CPS is generally believed to have done a poor job of measuring insurance coverage for children prior to its 1987 redesign (Levit, Olin, and Litsch 1991). These factors could cause the CPS and the NHIS to exhibit different trends around the 1982 redesign for reasons other than the redesign itself. However, the CPS provides the only other available data on health insurance coverage trends in those years.

[7] Directly tabulating the public use microdata files released by the Census Bureau for coverage years 1982 and 1983 will lead to invalid results because the Census did not implement its usual algorithm for allocating coverage held by one member of a household to other members of the household (OTA 1989). Levit, Olin, and Litsch (1991) remedied this problem in their tabulations.

an estimate of the average point-in-time uninsured rate over the 12 months of the year, conceptually identical to the measure produced by the NHIS.

For this comparison, we compared the year before the redesign (1996) to the five-year period after the redesign (1997-2001). Between these periods, the uninsured rate measured in the NHIS increased by 0.7 percentage points relative to the MEPS, suggesting that the redesign exerted a modest upward effect on the uninsured rate measured in the NHIS. Varying the number of years included in the post-redesign average has very little effect on the estimated effect of the NHIS redesign.

Figure 2: Uninsured Rate in Three Surveys

Source: For NHIS, CEA calculations using Cohen et al. (2009) methodology; for CPS, SHADAC "enhanced" series; for MEPS, CEA calcuations.

We also compared the trend in the NHIS in these years to the trend in the Current Population Survey. Because the Current Population Survey aims to measure the share of individuals without health insurance for an entire year, trends may differ between the NHIS and CPS for reasons other than the NHIS redesign, but it also offers larger sample sizes and more years of data prior to the 1997 redesign. For these analyses, we use "enhanced" CPS-based estimates published by the State Health Access Data Assistance Center (SHADAC), which have been adjusted to account for methodological changes in the CPS and to implement improvements to the Census Bureau's methodology for imputing missing insurance coverage information (SHADAC 2009).

The comparisons using the CPS generally suggest small effects of the NHIS redesign, ranging from 0.4 percentage points if we compare the trend from 1996 to 1997 to -0.3 percentage points if we look at a three-year period before and after the redesign. On balance, in light of the superior match between the concept of uninsurance measured by the NHIS and MEPS, we view the evidence as suggesting that the 1997 NHIS redesign increased the measured uninsured rate. In the interest of being conservative when comparing contemporary insurance coverage rates to those seen in the past, we made no adjustments to the raw series for the 1997 NHIS redesign.

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Estimating Health Insurance Coverage for 1968-1976

For the years 1968-1978, we cannot rely on the NHIS alone to estimate trends in the uninsured rate because the survey did not include direct questions about Medicaid coverage for individuals of any age or Medicare coverage for individuals under the age of 65 (Cohen et al. 2009). Cohen et al. use responses to other survey questions to attempt to infer which respondents have Medicare and Medicaid coverage, but as the authors acknowledge, these approaches do not appear to generate reliable estimates of the share of individuals with coverage through Medicare and Medicaid in those years.

For example, Cohen et al. estimate that no individuals under age 65 had Medicare coverage in 1974, rising to 0.2 percent in 1976. By contrast, administrative data (described below) show that around 2 million people under age 65, or about 1 percent of the non-elderly population, were enrolled in Medicare in that year. Similarly, the share of the under 65 population with Medicaid coverage jumps sharply from 1976 to 1978 in the Cohen et al. series, while administrative data show that the number of people with Medicaid coverage was stable between those two years.

In light of the limitations of the NHIS in these years, CEA developed an alternative approach that combines information on trend in private coverage from the NHIS with administrative data on Medicare and Medicaid enrollment. For individuals who are age 65 or older, we assume that the uninsured rate is equal to 1.1 percent, the rate calculated from the NHIS for 1978 using the Cohen et al. methodology, for all survey years 1968-1976. The administrative data on Medicare enrollment support the assumption that coverage in this group was nearly universal and approximately stable over these years.

For individuals under age 65, we separately estimated trends in the share of the under 65 population with Medicare, Medicaid, and private insurance coverage for the years 1968-1978 using approaches described in greater detail below. We then estimated the uninsured rate for each survey year from 1968 to 1976 by computing the sum of: (a) the 1978 uninsured rate reported in the Cohen et al. series; and (b) the estimated change in the share of the population with private, Medicare, and Medicaid coverage from the year of interest through 1978 (except that, to avoid double counting gains across different forms of coverage, we discount the changes in Medicare and Medicaid coverage according to the share of individuals who report more than one of these forms of coverage in 1978).[8]

We estimated the 1968-1978 trend in private, Medicare, and Medicaid coverage for the under 65 population as follows:

- Private coverage: We considered two potential methodologies to estimate the trend in private coverage for the under 65 population for the period 1968-1978. Under the first methodology, we project private coverage backwards from 1978 using the trend in the share of the under 65 population with private coverage reported in the Cohen et al. series. Under the second approach, we instead use the trend in the share of the under 65 population with the employer-sponsored coverage for 1970-1978 and only use the overall trend in private coverage for 1968-1970.

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[8] In 1978, 66 percent of Medicare enrollees under age 65 report having either Medicaid or private coverage, so we discount the trend in Medicare coverage by a factor of 0.66. Similarly, in 1978, 12 percent of Medicaid enrollees report also having private coverage, so we discount the contribution of the trend in Medicaid coverage by 0.12.

The rationale for the second approach is that, in the absence of a direct question regarding Medicaid coverage and Medicare coverage for individuals under age 65, some individuals may have incorrectly reported such coverage as private hospital and surgical insurance, thereby masking the actual trend in private coverage.

In principle, this sort of distortion of the trend in private coverage should not have occurred. The NHIS interviewing manuals for those years direct interviewers to disregard Medicare and Medicaid coverage when considering responses to questions about private coverage (NCHS 1968; 1970; 1972; 1974; 1976). However, the available data provide suggestive evidence that these instructions were not always followed. The Cohen et al. series for the under 65 population shows a sharp increase in private coverage (particularly non-employer-sponsored private coverage) from 1972 to 1974, the survey years immediately preceding and following the expansion of Medicare to people with long-term disabilities. Similarly, non-employer sponsored private coverage declines sharply from 1976 to 1978, the year in which NHIS added a direct question on Medicare enrollment for individuals under the age of 65.

Focusing on the trend in employer-sponsored coverage could avoid this problem because coverage is coded as employer-provided only if respondents affirmatively describe it as such, and it is unlikely that respondents would have described Medicare or Medicaid coverage that way. On the other hand, this approach has the disadvantage that it will not appropriately capture actual changes in the prevalence of non-employer-sponsored private coverage. In light of the evidence presented above that some public coverage was sometimes erroneously reported as private coverage, we prefer the series that measures the trend in private coverage using the trend in employer-sponsored coverage. However, as shown in Figure 3, the two approaches generate very similar final series.

Figure 3: Uninsured Rate 1963-2014:Q2 Under Two Methodologies for Trending Private Coverage Before 1978
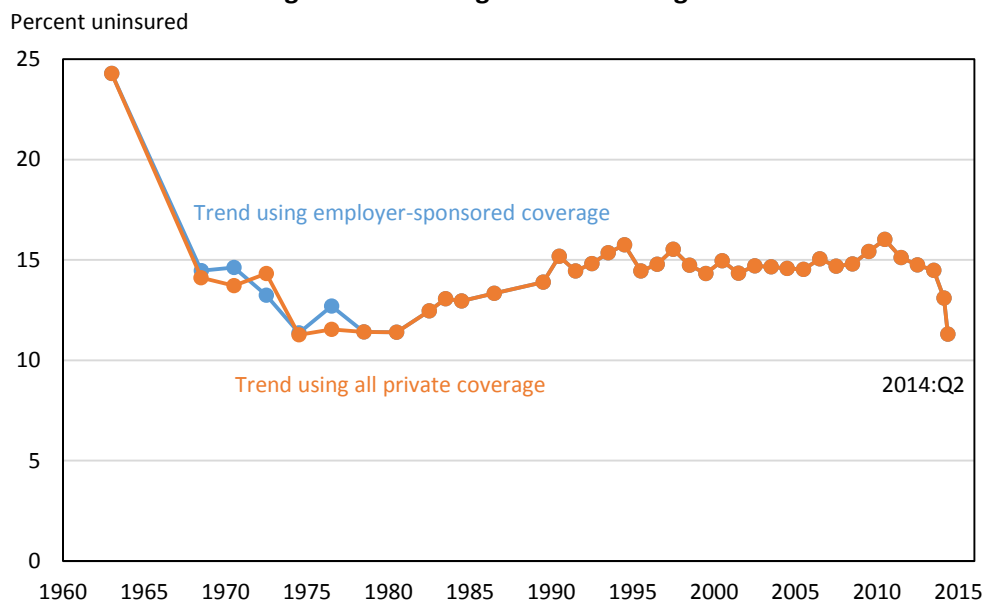
Source: Cohen et al. (2009); NHIS; Klemm (2000); CMS (2009); CEA calculations.
Note: Data are quarterly for 2014 and generally annual or bi-annual before 2014.

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- Medicare coverage: We began with the Cohen et al. estimate of the share of the under 65 population that had Medicare coverage in 1978, which is based on a direct NHIS question on Medicare enrollment. We then trended the Medicare share back through 1968 in proportion to the ratio of Medicare enrollment by people eligible due to a disability (as measured in the administrative data) to the under 65 population. As a test on the reliability of this procedure, we examined whether it would have done a good job of predicting the share of the under 65 population enrolled in Medicare if used to project Medicare enrollment after 1978. We found that it performed quite well, lending credibility to this approach for projecting this share backwards in time.

- Medicaid coverage: We began with the Cohen et al. estimate of the share of the under 65 population that had Medicaid coverage in 1978, which is based on a direct NHIS question on Medicaid enrollment. We then trended the Medicaid share back to 1968 in proportion to the ratio of Medicaid enrollment (as measured in the administrative data) to the total U.S. population. This approach assumes that the rate of enrollment growth for individuals under age 65 in these years was similar to the enrollment growth rate for those age 65 and older, which is likely reasonable, although data that speak directly to this question are not available. As above, however, we find that this procedure would have performed well if used to project the NHIS of the share of the under 65 population enrolled in Medicaid forward in time through the 1980s.

Estimating Health Insurance Coverage for 1963

For 1963, we estimated private coverage by estimating the share of individuals who reported having either private hospital or surgical insurance, consistent with the methodology Cohen et al. use for identifying private coverage in 1968-1980. The 1963 survey did not include questions that make it possible to identify the share of the population with military coverage, the only form of coverage measured in the 1968-1980 surveys that is applicable in 1963. To ensure comparability with the later estimates, we subtracted 2.3 percent from the resulting estimate of the uninsured rate in 1963, reflecting the share of the population with military coverage in the 1972 NHIS, following the Cohen et al. methodology.[9] (The 1972 NHIS was the first iteration of the NHIS in which it is possible to identify military coverage.)

Estimating Health Insurance Coverage in 2014

For 2014, we relied upon the quarterly estimates released by the National Center for Health Statistics under its NHIS "early release" program since the microdata are not yet readily available.[10] The Cohen et al. methodology differs slightly from the methodology used by NCHS to construct the current official NHIS uninsured series, including the "early release" estimates.

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[9] The variable necessary to identify military coverage on the NHIS 1972 is not available on the public use microdata files available from NCHS. Because virtually no individuals ages 65 or older report military coverage, we obtained the 2.3 percent estimate by multiplying the share of the under 65 population that Cohen et al. (2009) report as having military coverage in 1972 by the share of the population under age 65 in 1972 (90 percent).

[10] NHIS has released estimates for the first quarter of 2014 and for the first half of 2014 (Cohen and Martinez 2014; Martinez and Cohen 2014). Because the NHIS is fielded continuously, approximately half of the interviews used to construct the estimate for the first half of 2014 were conducted during the first quarter and half during the second quarter. Thus, we estimated the uninsured rate during the second quarter of 2014 by subtracting the first quarter

In principle, this means that comparing the "early release" estimates to the estimates based on the Cohen et al. methodology for 2013 and earlier could lead to invalid conclusions. In practice, however, it appears that any distortions resulting from this difference in methodology are very small. Figure 4 plots the full-population point-in-time uninsured rate for 1997-2013 as estimated by CEA as described above and as reported by NCHS in its official series. With the exception of a few years in the mid-2000s, the two series are virtually identical, with particularly small differences over the last few years.

**Figure 4: Estimated Uninsured Rate
Using Two NHIS Tabulations, 1997-2013**

Percent uninsured
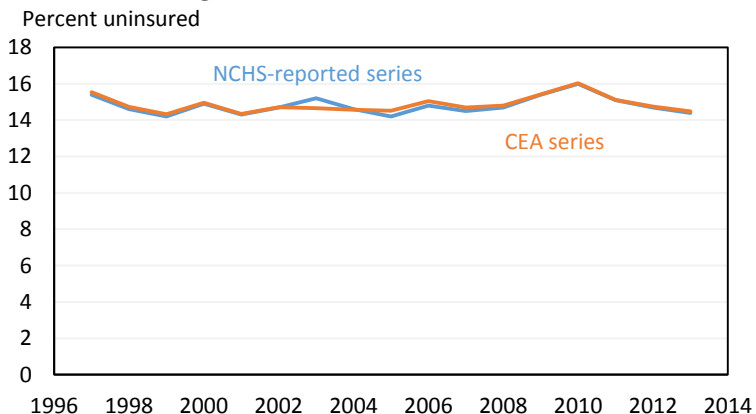
Source: Martinez and Cohen (2014); CEA estimates based on Cohen et al. (2009) methodology.

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estimate from twice the first half estimate. When applied to the under 65 population, for whom pure second quarter estimates are available from NCHS, this approach replicates the published results.

Table: Full Population Uninsured Rate Estimates, 1963-Present

Year/Quarter	CEA-Estimated Uninsured Rate (Percent)
1963	24.3
1968	14.5
1970	14.6
1972	13.2
1974	11.4
1976	12.7
1978	11.4
1980	11.4
1982	12.5
1983	13.1
1984	12.9
1986	13.3
1989	13.9
1990	15.2
1991	14.5
1992	14.8
1993	15.4
1994	15.8
1995	14.4
1996	14.8
1997	15.5
1998	14.7
1999	14.3
2000	15.0
2001	14.3
2002	14.7
2003	14.7
2004	14.6
2005	14.5
2006	15.0
2007	14.7
2008	14.8
2009	15.4
2010	16.0
2011	15.1
2012	14.7
2013	14.5
2014:Q1	13.1
2014:Q2	11.3

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