Commentary: Assessing the Health Effects of Medicare Coverage for Previously Uninsured Adults: A Matter of Life and Death?

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In contrast to a previous study we conducted and other evidence, a recent study found no significant effects of Medicare coverage after age 65 on overall health for previously uninsured adults and significant adverse effects on survival for some of these adults. We discuss explanations for these inconsistent findings, particularly the different ways in which deaths were handled, a key methodological challenge in longitudinal analyses of health. We demonstrate that analytic approaches suitable for examining effects of coverage on health measures may not be suitable for effects on mortality. Thus, estimates may be misleading when these different outcomes are jointly modeled. We also present new survival analyses that suggest Medicare coverage significantly attenuated the rising risk of death for previously uninsured adults.

Key Words. Medically uninsured, mortality, Medicare, insurance coverage, aging

Over the last decade, a substantial body of evidence has emerged that indicates health insurance coverage improves health. Rigorous research to characterize these potential health effects accurately is crucial for policy makers to make informed decisions about extending insurance coverage to uninsured Americans. Building on earlier experimental (Keeler et al. 1985), quasi-experimental (Lurie et al. 1984; Fihn and Wicher 1988), and observational research (Institute of Medicine 2002), numerous studies using strong

designs and a variety of data sources have demonstrated positive effects of insurance coverage on health outcomes for adults with a wide range of acute and chronic conditions (Institute of Medicine 2009; McWilliams 2009). In particular, recent quasi-experimental analyses have demonstrated greater use of health services, improved self-reported health outcomes, better disease control, and increased survival with near-universal Medicare coverage after age 65 (McWilliams et al. 2003; Card, Dobkin, and Maestas 2004, 2008, 2009; Decker and Remler 2004; Decker 2005; McWilliams et al. 2007a, b, 2009). Collectively, these findings suggest extending insurance coverage to uninsured Americans would not only afford them financial protection but also improve their health, thereby strengthening the rationale for this reform.

A key methodological challenge in quasi-experimental studies assessing effects of insurance coverage on health is how to handle deaths analytically, particularly when other health outcomes are of primary interest. In a study we conducted using longitudinal data from the nationally representative Health and Retirement Study (HRS), Medicare coverage after age 65 was associated with significantly improved health trends for previously uninsured adults relative to previously insured adults for a composite measure of health and several of its components (McWilliams et al. 2007a). In contrast to our study, a recent study published in this journal (Polsky et al. 2009) found no significant effects of age-eligibility for Medicare coverage on the health of previously uninsured adults. The authors attributed the contrasting results of their study and ours to differences in the way deaths were handled. In this commentary, we compare how these two studies treated deaths, present new empirical analyses of mortality that support our original conclusions, and describe other features of the two studies that may explain their differing results.

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ADDRESSING DEATHS IN QUASI-EXPERIMENTAL STUDIES OF MEDICARE COVERAGE AND HEALTH

These two longitudinal studies used a similar quasi-experimental approach to estimate effects of Medicare coverage on the health of previously uninsured adults but employed different strategies for handling deaths in the study cohort, thereby yielding different results (Tables 1 and 2). Death was addressed as a source of attrition (McWilliams et al. 2007a) or incorporated into the analysis as a health outcome under various assumptions (McWilliams et al. 2007a; Polsky et al. 2009). In comparing these strategies, it is important to consider how effects of Medicare coverage on mortality may differ from its effects on other health outcomes and how well the studies' quasi-experimental approach assesses these different clinical effects.

To estimate effects of Medicare coverage on the health of previously uninsured adults, both studies compared *observed* health for this group after age 65 with their *expected* or counterfactual health in the absence of Medicare.

Table 1: Summary of Study Features

	<i>McWilliams et al. (2007a,b)</i>	<i>Polsky et al. (2009)</i>
Data source	Health and Retirement Study	Health and Retirement Study
Sample sizes	5,006 previously insured adults 2,227 previously uninsured adults	4,741 previously insured adults 738 previously uninsured adults
Classification of insurance coverage before age 65	Based on multiple reports of insurance coverage from age 55 to 64	Based on single report of insurance coverage at age 59 or 60
Age range covered by analysis	55–73	59–73
Outcome measures	Six continuous component health measures One continuous summary health measure One continuous measure of cardiovascular outcomes	Six categorical component health measures Death incorporated into each measure as separate health state
Regression model	Linear spline	Multinomial logit
Strategy for handling nonresponse due to dropout	Inverse probability weighting to adjust for differences between responders and nonresponders	Listwise deletion
Strategy for handling deaths	Inverse probability weighting to adjust for differences between survivors and decedents Sensitivity analysis assigning decedents permanently low health scores	Deaths and other health outcomes jointly modeled

Table 2: Summary of Principal Study Findings on Effects of Medicare Coverage on Health Measures for Previously Uninsured Adults*

Health Measure	McWilliams et al. (2007a)		Polsky et al. (2009)			
	Differential Change in Trend after Age 65 [†] (p Value)		Differential Change in Probability of Health State by Age 73 [‡] (95% CI)			
	Entire Study Cohort	Cardiovascular Disease or Diabetes before 65	No Cardiovascular Disease or Diabetes before 65	Best Health State	Intermediate Health State	Worst Health State
General health	0.00 (0.90)	0.01 (0.64)	−0.01 (0.49)	−0.6 (−4.8, 3.4)	0.3 (−3.8, 4.1)	−2.5 (−7.4, 2.3)
Change in general health	0.02 (0.01)	0.02 (0.03)	0.01 (0.17)	0.4 (−1.8, 1.8)	−0.4 (−6.4, 5.5)	−1.9 (−5.2, 2.9)
Mobility	0.03 (0.06)	0.04 (0.05)	0.01 (0.74)	−0.9 (−7.6, 2.7)	2.1 (−0.6, 5.9)	−3.9 (−7.2, 2.0)
Agility	0.05 (0.004)	0.08 (0.003)	0.01 (0.51)	0.3 (−4.4, 3.9)	0.1 (−2.3, 3.6)	−2.7 (−7.5, 2.9)
Pain	0.02 (0.18)	0.02 (0.08)	0.00 (0.96)	1.7 (−5.0, 7.2)	−1.8 (−2.8, 0.6)	−1.9 (−5.0, 2.5)
Depressive symptoms	0.06 (0.01)	0.04 (0.32)	0.08 (0.002)	1.5 (−4.3, 4.7)	1.1 (−1.2, 6.1)	−5.1 (−9.3, −1.3)
	0.20	0.26	0.10			2.8 (−4.0, 10.0)
						1.9 (−6.1, 7.9)
						2.7 (−3.8, 9.3)
						2.3 (−4.4, 8.2)
						2.0 (−4.3, 8.2)
						2.5 (−4.5, 9.2)

Summary health measure	(0.002)	(0.006)	(0.17)	—	—	—
Adverse cardiovascular outcomes	−0.009 (0.006)	−0.015 (0.02)	−0.002 (0.52)	—	—	—

*Estimates in bold are statistically significant, as indicated by p values $\leq .05$ or confidence intervals that do not include zero. It is notable that Polsky and colleagues focused their principal and sensitivity analyses on the only component health measure, general health status, for which we found no effect of Medicare coverage for previously uninsured adults. Both studies found significant differential improvements of Medicare coverage on depressive symptoms for previously uninsured adults.

^bDifferential changes in health trends were estimated by fitting linear spline regression models of component or summary health scores as a function of insurance coverage before age 65, age in years, number of years over age 65, and interactions between insurance coverage and these two age variables. Thus, previously insured and previously uninsured adults were allowed to have different trends before age 65 and different changes in trends after age 65. Positive differential changes in trends for previously uninsured adults indicate relative improvements in health associated with gaining Medicare coverage for all component and summary health measures except adverse cardiovascular outcomes, for which negative differential changes indicate improvements. All estimates were adjusted for the complex design of the survey, nonresponse due to death, nonresponse due to dropout, and baseline demographic and socioeconomic characteristics.

^cDifferential changes in predicted probabilities of particular health states were simulated from a transition state model, for which transition probabilities were estimated by fitting multinomial regression models for each component health measure. These multinomial regression models estimated the log odds of being in particular health states at time $t+2$ years relative to a reference state as a function of: health states at time t ; insurance coverage before age 65; an indicator of age over 65; an interaction between insurance coverage and this age indicator; interactions between insurance coverage and health states at time t ; interactions between the age indicator and health states at time t ; three-way interactions between insurance coverage, health states at time t , and the age indicator; age; age squared; sex; race; education; and Census region. Thus, previously insured and previously uninsured adults were allowed to have different rates of transition between health states before age 65 and different changes in these rates after age 65, similar to the linear spline model estimated by McWilliams and colleagues. Accordingly, relative risks of transitioning to death for previously uninsured adults were held constant before age 65 and allowed to change once after age 65. Simulated changes reported in the table are the estimated effects of Medicare coverage on previously uninsured adults' probabilities of being in particular health states by age 73. Positive changes indicate beneficial effects of Medicare coverage for better health states, while negative changes indicate beneficial effects for worse health states.

These counterfactual outcomes for previously uninsured adults were predicted from their prior health trends before age 65 and from changes in trends occurring after age 65 for previously insured adults.

This analytic approach supports especially strong conclusions about the effects of Medicare coverage on health when abrupt changes in *level* are expected in proximal health outcomes, such as clinical markers of disease control among the chronically ill (McWilliams et al. 2009) or mortality among the acutely ill (Card et al. 2009), rather than changes in *trend* or other subtler changes in more distal outcomes (Shadish, Cook, and Campbell 2002). Abrupt discontinuities are less subject to bias from failures of the assumptions required for extrapolation (e.g., assumed continuation of an observed trend) and less subject to confounding by contemporaneous changes in the study sample or other factors related to health. Thus, because this quasi-experimental approach was applied to age-related declines (e.g., in physical functioning) that might be slowed over several years by improved access to care, the basis for conclusions about effects of Medicare coverage was slightly weakened in these two studies. Nevertheless, the linearity of summary health trends observed before and after age 65 in our study supported robust inferences from the differential improvements reported by previously uninsured adults after age 65 (see figure in McWilliams et al. 2007a), and these attenuated health trends were consistent with our hypotheses about how effects of Medicare coverage on health might be clinically mediated.

Mortality, however, is different. Unlike effects of acquiring Medicare coverage on intermediate outcomes, effects on mortality may be delayed well after age 65 for most uninsured individuals and diffused over many years depending on their burden of disease (Appendix SA2(A)). Moreover, mortality rates change with age in complicated ways that may vary from group to group. Thus, it is challenging to predict a priori changes in survival patterns after age 65 that would be expected from Medicare coverage or to convincingly project counterfactual mortality trends after 65 in Medicare's absence based on trends before 65, particularly when mortality data before age 65 are limited to a few years as in the study by Polsky and colleagues.

Due to these concerns, we focused on the effects of Medicare coverage on health for the living and used a linear spline model to compare component and summary health trends before and after age 65 by prior insurance coverage (McWilliams et al. 2007a) (Tables 1 and 2). Attrition due to death represented a potential source of bias in our study, because previously uninsured adults were sicker than previously insured adults, and sicker adults were more likely to die. In a naïve analysis, relative improvements in health trends after

age 65 could have been an artifact of greater censoring at death of previously uninsured adults who reported steeper health declines while alive. Therefore, we used an inverse-probability-weighting technique to obtain estimates that would have been observed had decedents remained alive with health status similar to respondents with comparable antecedent health trends, insurance coverage before age 65, and other characteristics (Appendix SA2 (B)).

In contrast to an analysis in which deaths would be ignored and censored observations treated as data missing completely at random, our approach relied on the more limited assumption that death occurred randomly conditional on antecedent health trends and other observed characteristics. Implicit in this approach was also the conservative assumption that Medicare coverage neither saves lives nor causes premature death. In fact, a recent quasi-experimental study has demonstrated a robust link between age eligibility for Medicare and improved survival for acutely ill hospitalized patients (Card et al. 2009).

Recognizing that periodic self-reports among the living may not fully capture health declines leading to death, and that death represents an important health decline, we also reported a sensitivity analysis in which decedents were permanently assigned low health scores at the 10th percentile of the study cohort's distribution. Our findings were robust to incorporating death into the health scale in this manner. This approach can be problematic, however, because it requires death to be assigned a value in terms of health measures for the living. Moreover, because mortality rates were higher for the previously uninsured after age 65, any true health benefits of acquiring Medicare coverage would eventually be nullified by sufficiently low health scores assigned to the deceased, as the cumulative number of low-scoring decedents grew disproportionately with age for the previously uninsured.

Using a different strategy to handle deaths, Polsky and colleagues constructed multinomial models that incorporated death into a discrete unordered set of health states, fitting a separate model for each component health measure (Tables 1 and 2). Estimates from this multinomial model were then used to simulate transitions between health states as HRS participants aged in worlds with and without Medicare coverage after age 65. This approach avoided the need to value death in terms of health scores for the living and freed the analysis from censoring due to death, because death was handled explicitly as a separate absorbing health state. However, this approach introduced other methodological problems.

By incorporating death into the set of health outcomes, the analysis implicitly assumed that the study design and statistical model were equally

appropriate for both types of outcomes—health and mortality. As noted above, however, the effects of Medicare coverage on mortality are likely more complex than effects on other health outcomes and likely require a different model to be identified correctly, if not a completely different quasi-experimental approach that would not rely on trends before age 65 to predict counterfactual trends after age 65. Moreover, this strong assumption is not well supported by the data presented by Polsky and colleagues or by the survival analyses we present below. In their comparisons of simulated predictions with observed data to assess model fit, cumulative mortality among previously uninsured adults with Medicare coverage was overpredicted by approximately 3 percentage points at age 73, thereby suggesting the findings were sensitive to model specification and extrapolation of prior trends (see fig. A1 in online appendix of Polsky et al. 2009). Indeed, in their analysis of general health status, Polsky and colleagues found Medicare eligibility was associated with a differential absolute increase of 2.8 percent in the cumulative incidence of death by age 73 for previously uninsured adults relative to previously insured adults (Table 2). The differential increase in mortality was particularly large and statistically significant for previously uninsured adults who were in very good or excellent health (see model estimates in Table 2 and predicted probabilities of death in table A5 of Polsky et al. 2009). Thus, the apparent overestimation of mortality after age 65 for previously uninsured adults may explain the unexpected adverse impact of Medicare coverage on their survival.

As estimated by Polsky and colleagues, this adverse effect of Medicare coverage on survival for previously uninsured adults offset consistently beneficial—and in one case statistically significant—effects on reported health measures, making the net health effects difficult to interpret. Medicare coverage was associated with a reduced probability of being in the worst health state at age 73 for each component health measure but with increased probabilities of death (Table 2). Because health and death were modeled jointly, accurately assessing the effects of Medicare coverage on health for the living depended on accurate assessment of its effects on death. If the latter estimates were biased, then so were the former.

NEW ANALYSIS OF MORTALITY IN THE HEALTH AND RETIREMENT STUDY

To illustrate how changes in model specification could lead to different conclusions about the effects of Medicare coverage on mortality (and therefore

health), we conducted new survival analyses comparing the cohorts of previously insured and uninsured adults defined in our original analysis, using up to 10 years of data before age 65 to explore how prior trends could be alternatively modeled to predict trends after age 65. We fitted Cox regression models to compare the hazard of death by insurance group and age using two different approaches (Collett 2003). First, the hazard ratio for previously uninsured relative to previously insured adults was allowed to change only once at age 65 (Model 1), analogous to the one-time change in previously uninsured adults' relative odds of dying that was allowed by the multinomial model fitted by Polsky and colleagues. Second, in a more nuanced specification, two additional parameters were added to allow the hazard ratio to change annually before age 65 at one rate, then to change annually after age 65 at a different rate (Model 2) (see Appendix SA2 (C) for details of these analyses).

As estimated in Model 1 (Table 3), the hazard ratio for previously uninsured adults relative to previously insured adults increased significantly from

Table 3: Mortality Risk before and after Age 65 for Continuously or Intermittently Uninsured Relative to Continuously Insured Adults*

	Cox Model Regression Coefficient β (SE)	Hazard Ratio (95% Confidence Interval)	p Value
Model 1 (unadjusted)			
Before age 65	0.15 (0.09)	1.16 (0.97, 1.39)	.11
One-time change after age 65	0.25 (0.14)	1.28 (0.98, 1.68)	.07
Model 1 (adjusted for baseline covariates) [†]			
Key coefficient			
One-time change after age 65	0.27 (0.14)	1.31 (1.00, 1.72)	.05
Model 2 (unadjusted)			
Baseline at first survey after age 55	− 0.25 (0.19)	0.78 (0.53, 1.14)	.19
Annual change before 65	0.08 (0.03)	1.08 (1.02, 1.14)	.01
One-time change after age 65	0.16 (0.22)	1.18 (0.76, 1.81)	.46
Change in annual change after 65	− 0.10 (0.04)	0.91 (0.83, 0.99)	.02
Model 2 (adjusted for baseline covariates) [†]			
Key coefficients			
Annual change before 65	0.09 (0.03)	1.10 (1.04, 1.16)	.002
One-time change after age 65	0.16 (0.22)	1.18 (0.77, 1.80)	.45
Change in annual change after 65	− 0.12 (0.05)	0.89 (0.81, 0.97)	.007

*All estimates have been adjusted for the complex design of the survey using sampling weights and robust design-based variance estimators.

[†]Adjusted for sex, race, ethnicity, education, and baseline household income, household assets, labor force status, smoking status, general health status, change in general health, mobility, agility, pain symptoms, depressive symptoms, and clinical conditions. $p = .002$ for likelihood ratio test comparing nested models, indicating superior fit of Model 2 relative to Model 1.

1.16 before age 65 to 1.49 ($e^{(0.15+0.25)}$) after age 65. This model suggests that Medicare coverage increased the risk of death for previously uninsured adults, consistent with the differential increase in deaths predicted by Polsky and colleagues.

Model 2 tells a different story. While the hazard ratio from Model 1 indicated similar mortality risks for insured and uninsured adults when averaged over all years before age 65, Model 2 reveals that the hazard ratio significantly increased with age for uninsured adults before age 65, consistent with a more rapid accumulation of chronic disease complications and adverse outcomes in this group. Given a mean starting age of 57 years in our study cohort, the hazard ratio for the uninsured increased from 0.78 at the outset to 1.60 by the first year of Medicare eligibility ($e^{(-0.25+9 \times 0.08)}$), a trend obscured in the simpler Model 1. Thereafter, this rate of increase in relative mortality risk slowed, so that by age 72 the predicted hazard ratio increased further only to 1.67 ($e^{(-0.25+9 \times 0.08+0.16+6 \times (0.08-0.10))}$). This change in the annual increase in the hazard ratio was statistically significant, while the one-time change after age 65 was reduced and became nonsignificant (Table 3), indicating the fit of the more flexible Model 2 was superior to Model 1. Thus, in contrast to the findings of Polsky and colleagues, these results suggest near-universal Medicare coverage was associated with a significant attenuation of the rising risk of death for previously uninsured adults.

The contrasting estimates from Models 1 and 2 illustrate the challenge of correctly defining counterfactual mortality trends after age 65 using a longitudinal quasi-experimental approach and the sensitivity of findings to the way in which prior mortality trends are extrapolated. When health and mortality were modeled jointly by Polsky and colleagues, the null effects of Medicare coverage on health may have been driven by oversimplified effects specified for mortality. Specifically, if the relative risk of death for previously uninsured adults was allowed to change with age as in our Model 2, the multinomial model estimated by Polsky and colleagues may have predicted differential reductions rather than increases in deaths for previously uninsured adults after age 65. Consequently, their simulation may have produced different results for effects on health, since many predicted transitions to death would have been replaced by transitions to other health states.

In supplementary analyses to explain why their findings differed, Polsky and colleagues refitted models with death censored rather than incorporated into the outcome as an absorbing state (see section C of online appendix of Polsky et al. 2009). Because the estimated health benefits of Medicare became larger as a result, they concluded that our findings of improved health trends

for previously uninsured adults were due to ignoring health declines represented by deaths. Specifically, because their simulations predicted relative increases in mortality associated with Medicare coverage after age 65 for previously uninsured adults, and because these increases were concentrated among those in excellent or very good health at age 65, they asserted that ignoring deaths would disproportionately obscure the more dramatic health declines in this group after age 65 (Appendix SA2 (D)).

As discussed above, however, deaths were not ignored in our empirical approach, and our sensitivity analysis in which death was incorporated into the summary health scale captured any dramatic health declines from excellent or very good health to death. Moreover, as demonstrated here and elsewhere among acutely ill patients (Card et al. 2009), near-universal Medicare coverage was associated with survival gains, suggesting we underestimated the total benefits of Medicare coverage for previously uninsured adults in our analyses of health among the living. Based on our survival analyses, a more likely explanation for the supplementary findings of Polsky and colleagues is that excluding death from the set of health states removed inaccurate predictions of factual and counterfactual mortality trends after age 65, thereby allowing a better fit of the model to health trends and a closer approximation of the true effects of Medicare coverage on health for the living (Appendix SA2 (E)).

The adverse effects of Medicare coverage on survival postulated by Polsky and colleagues are also difficult to reconcile with clinical logic, and the authors did not offer an explanation for these counterintuitive findings. Although one might invoke iatrogenic injury to explain this sizable adverse effect, Card et al. (2009) found near-universal Medicare coverage after age 65 coincided with an abrupt drop in mortality among emergently hospitalized patients, those at particularly great risk of iatrogenic injury. The unexpected findings of Polsky and colleagues are also inconsistent with several observational studies that have demonstrated lack of health insurance to be associated with significantly higher mortality rates (Franks, Clancy, and Gold 1993; McWilliams et al. 2004; Baker et al. 2006; Wilper et al. 2009). One observational study did not find a statistically significant association but did not suggest insurance coverage was actually harmful (Kronick 2009).

OTHER NOTABLE DIFFERENCES IN DESIGN BETWEEN STUDIES

Several other notable differences between the two studies may also explain the inconsistent findings (Table 1). Many of the component health effects by

Polsky and colleagues were similar in direction to those we estimated, but component health measures were not summed into an ordered composite index. Thus, the approach taken by Polsky and colleagues offered substantially less statistical power to assess the effects of Medicare on health. Summing effects estimated in their study across the six component health measures suggests Medicare was associated with an 18 percent absolute reduction by age 73 in reports of worst living health states by previously uninsured adults, a potentially sizable effect that was not tested for statistical significance. Summing these component measures augmented the power of our analysis considerably and stabilized linear trends before age 65 to support counterfactual predictions after age 65.

Statistical power was further sacrificed in the analysis conducted by Polsky and colleagues by the deletion of observations before age 59–60 from trends before age 65 and a limited definition of uninsurance based on cross-sectional reports at age 59–60 that produced a much smaller sample of uninsured adults (738 versus 2,227 in our study). We used reports of insurance coverage from age 55 to 64 to define comparison groups because intermittent uninsurance is common among the near-elderly and also predicts adverse health outcomes (Baker et al. 2001; Sudano and Baker 2003; Baker and Sudano 2005). The restricted sample of previously uninsured adults analyzed by Polsky and colleagues also likely biased their results toward the null, as many adults who they classified as previously insured became uninsured before age 65 and may have also benefited from acquiring continuous coverage through Medicare (Appendix SA2 (F)).

In addition, we found the benefits of gaining Medicare coverage were greatest for previously uninsured adults with cardiovascular disease or diabetes, conditions for which many effective therapies exist (Table 2). This pre-specified stratification was motivated by a clear conceptual framework supported by prior and subsequent research (McWilliams et al. 2003, 2007b, 2009). In contrast, Polsky and colleagues did not stratify by clinical conditions most likely affected by insurance coverage. For all of these reasons, the absence of evidence of an effect of Medicare coverage on health reported by Polsky and colleagues does not provide clear evidence of no effect.

IMPLICATIONS FOR RESEARCH AND POLICY

The contrasting findings of the two studies discussed in this commentary highlight the methodological challenges that arise in quasi-experimental

studies examining health outcomes among the living when there is censoring due to death. For researchers addressing this challenge, it is important to consider the suitability of the study design to different outcomes, to apply clinical insights in generating hypotheses and constructing models, and to explore alternative models for outcomes that may respond differently to the same change in exposure (e.g., provision of insurance coverage). In new survival analyses guided by these principles, we found Medicare coverage after age 65 was associated with a significant attenuation of the rising mortality risk for previously uninsured adults. This finding substantiates assumptions we previously made in analyzing effects of Medicare coverage on other health outcomes for this group and calls into question the validity of results from Polsky and colleagues suggesting Medicare coverage increases the risk of death for previously uninsured adults.

Thus, we conclude as we did previously that providing health insurance coverage for uninsured adults, particularly those with treatable chronic conditions, significantly improves their health outcomes. Based on a growing body of robust evidence (Institute of Medicine 2009; McWilliams 2009), policy makers can be increasingly confident that extending coverage to middle-aged uninsured adults will have important health benefits, especially for the sizable majority of this group with cardiovascular disease or diabetes.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

Appendix SA2. A. Short- vs. long-term effects of insurance coverage on health and mortality in the HRS. B. Addressing drop-out in the HRS. C. Details of survival analyses. D. Supplementary analyses on health scores preceding death. E. Supporting evidence that benefits of Medicare were not due to mishandling of deaths. F. Sensitivity analyses comparing health trends before and after 65 by fixed characteristics.

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