Health Information and the Timing of Social Security Entitlements

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Abstract: This study examines whether new health information, obtained through medical screening, affects entitlements to Social Security benefits. Random assignment of information is derived from a unique feature of the Continuous National Health and Nutrition Examination Survey. The survey data are matched to administrative data from the Social Security Administration. The results suggest that new health information leads to entitlement delays, particularly among workers near the early retirement age.

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I. Introduction

In the literature on health and labor market outcomes, studies often conceptualize health by its effect on the ability to work.[1] An alternative concept – and the focus of this study – is health information, which includes knowledge of medical conditions that may be asymptomatic. While health information may not directly affect labor market outcomes, it could affect outcomes indirectly by altering expectations of medical expenditures and mortality. These effects have numerous implications, including for life-cycle models of economic behavior, policy regarding health insurance and healthcare, and guidelines for medical-screening.[2] Despite these implications, the effect of health information on economic outcomes is relatively understudied.

To identify the effects of new health information, this paper exploits a unique feature of the National Health and Nutrition Examination Survey (NHANES). Unlike other health surveys, the NHANES is designed to measure the prevalence of both diagnosed and undiagnosed conditions. To do so, survey participants first report if they have ever been diagnosed with certain conditions, and then are tested for these conditions by medical examination. Importantly, the results of the medical exam are revealed to participants. Participants who report that they have never been diagnosed with a particular condition, but who subsequently test positive for the condition through the survey's medical exam, are assumed to have gained new information of their health status.

Variation in new health information is obtained by exploiting a particular feature of the data collection process. More precisely, medical exams were scheduled in either the morning or afternoon, but three laboratory tests – fasting plasma glucose, LDL (bad) cholesterol, and triglycerides – were administered only to morning examinees. This is because these three tests require fasting, which is best achieved overnight. As a result, participants assigned to a morning exam received information about their levels of fasting plasma glucose, LDL cholesterol, and

[1] For a discussion of health and labor market outcomes, see Currie and Madrian (1999). For a discussion of health and retirement specifically, see Lumsdaine and Mitchell (1999). Studies that examine health and retirement include Anderson and Burkhauser (1985), Bazzoli (1985), Bound (1991), Sammartino (1987), Rust (1989), Quinn, Burkhauser, and Meyers (1990); Rust and Phelan (1997), Coile et al. (2002), McGarry (2004), and Benitez-Silva and Dwyer (2005).

[2] The US Preventive Services Task Force provides medical screening guidelines numerous health conditions and diseases, including diabetes, hypertension, and certain cancers. These guidelines reflect the cost and efficacy of medical screening and the benefit of early medical intervention, but do not account for the effects of new health information on economic behavior.

triglycerides, whereas respondents assigned to an afternoon exam did not. To ensure the representativeness of morning examinees, exam time was assigned through sampling. Therefore, the effect of new health information on economic outcomes can be measured as the difference in outcomes between exam groups.

In this paper, the outcome of interest is entitlement to Social Security benefits. Benefits include old-age (OA) and disability insurance (DI) benefits for workers, and spousal and survivor (widow and widower) benefits for their spouses. Benefit entitlement is a proxy for retirement behavior, though workers may receive benefits and continue to work. Data on entitlements come from Social Security's Master Beneficiary Record. These data are merged to the NHANES for survey years 1999/2000, 2001/2002, and 2003/2004. The analysis is limited to participants who are matched to administrative data, who are not entitled to Social Security benefits prior to the survey, and who are ages 40 to 61 at the time of survey. Entitlements are examined within two calendar years after the second calendar year of the survey.

The results suggest that new health information delays benefit entitlements. These delays are concentrated among survey participants aged 59 to 61, and most delays are due to OA benefits. Workers first become eligible for OA benefits at age 62, known as the early retirement age, and most participants aged 59 to 61 reach 62 shortly after the survey. Thus, the decrease in OA benefits suggests that new health information delayed OA entitlements beyond the early retirement age.

One possible mechanism is that the detection of a latent medical condition increases the demand for health insurance coverage, and this demand encourages employment either to obtain or retain employer-provided health insurance. This is similar to employment lock, whereby a worker's primary motivation for employment is to obtain insurance coverage (Garthwaite, Gross, and Notowidigdo 2013). This mechanism is particularly relevant to individuals who are less than 65 years old and, as such, are not yet universally eligible for Medicare.

The mechanism is also more plausible if the cost to treat a newly diagnosed condition is high. In regards to diabetes, the cost of treatment can be substantial. Standard care for diabetes – which includes medication, physician visits, and self-testing devices – costs up to $1,400 per year (Zhuo, Zhang and Hoerger 2013). Complications due to diabetes cost significantly more. For example, chest discomfort due to poor blood flow, known as angina, costs $8,464 at the time of onset and $2,187 per year thereafter (Zhuo et al. 2013). End-stage renal disease or a stroke can cost $80,000 and more (Zhuo et al. 2013). On average, diabetics spend $13,700 per year on medical expenditures, $7,900 of which is directly attributable to diabetes (ADA 2013).

The proposed mechanism is supported by auxiliary analysis. First, entitlement delays are more pronounced among individuals with higher education and greater attachment to the labor force. Ostensibly, these individuals have greater incentive and discretion to delay entitlement. Second, entitlement delays are more pronounced among individuals who were not previously diagnosed with diabetes or high cholesterol at the time of the survey. This suggests that the effects are concentrated among individuals for whom a diagnosis reveals new health information. And finally, new health information appears have increased employment, measured by an indicator of earnings subject to Social Security taxes.

The proposed mechanism is also supported by related studies. One study, by Edwards (2013), examines whether a new diabetes diagnosis affects medication use and physical activity. For identification, he exploits the fact that biomarkers were collected in the Health and Retirement Survey using rotating groups. He finds that individuals newly diagnosed with diabetes subsequently increase medication usage and physical activity and reduce self-reported weight. Another study, by Benitez-Silva and Dwyer (2005), examines whether a change in health status affects expectations of retirement. Consistent with this study, they find that a new report of diabetes is associated with delays in expected retirement.[3]

There are at least three important limitations to the analysis. First, despite the attempt to randomize survey participants into exam groups, there are some observable differences between morning and afternoon examinees. However, these differences cannot account for the entitlement delays among morning examinees. Second, the NHANES data do not contain longitudinal information on health care utilization or health behaviors. Thus, the role of these factors in the link between health information and entitlements cannot be directly tested. Third, it is unclear whether the effects of health information on entitlements is due, in part, by individuals who previously thought they had a health condition, but laboratory tests revealed otherwise. However, a recent study by Oster, Shoulson, and Dorsey (2013) suggests that individuals may be overly optimistic about their health risks. If so, the results from this study are likely due to new diagnoses among the previously undiagnosed population.

[3] A related study, by McGarry (2004), finds that a deterioration of subjective health hastens expected retirement.

If correct, the proposed mechanism implies that workers facing high or uncertain medical expenditures may choose employment to obtain employer-provided health insurance. This has important implications for policy regarding health insurance and health care. One implication is that expansions in non-employment based health insurance may induce older workers to exit the labor market. This is consistent with Gruber and Madrian (1995), who find that retiree health insurance encouraged early retirement, and with Garthwaite et al. (2013), who find that decreases in Medicaid eligibility had increased employment. Another implication is that the effect of health information on entitlements is determined, in part, by the availability of non-employment based insurance. In particular, if non-employment based insurance is readily available, then new health information may instead hasten entitlements and decrease employment. Thus, the effect of health information on labor supply may be different after the implementation of the Affordable Care Act, which both expanded Medicaid eligibility and provided subsidies for private insurance.

II. Data

The data come from the Continuous National Health and Nutrition Examination Survey (NHANES). The survey is representative of the US population, excluding persons in nursing homes, members of the armed forces, institutionalized persons, and US nationals living abroad, and oversamples blacks, Mexican Americans, adolescents, and older persons aged 60 and over.[4] The surveys are conducted annually, but public-use data are pooled across two consecutive years. The first survey covers years 1999 and 2000.

A unique goal of the NHANES is to measure the prevalence of both diagnosed and undiagnosed medical conditions. This is achieved in two stages. In the first stage, survey participants answer questions regarding previous health diagnoses, as well as questions regarding demographic characteristics, socioeconomic status, and dietary habits. This stage occurs in a participant's home. In the second stage, survey participants undergo a medical examination, which includes physical assessments, dental assessments, and laboratory tests. This stage occurs in a Mobile Examination Center (MEC), a medical clinic constructed from four mobile trailers and staffed by 17 medical personnel. Importantly, all medical exams are performed after the at-home interview, and the average time between the at-home interview and the medical exam is

[4] The number of observations by age roughly doubles at age 60.

two weeks.[5] For research purposes, medical conditions that are not reported during the at-home survey, but are subsequently revealed during the medical examination, are deemed undiagnosed.

Importantly, survey participants are notified of their medical exam results. Results that are immediately available – such as physical measurements, blood pressure, and dental assessments – are provided upon exiting the MEC. Results that are not immediately available are reported to participants by mail, usually within 12 to 16 weeks after the medical exam. If the exam identifies a condition that requires medical attention, MEC personnel may offer to contact the participant's physician, or recommend a physician, for follow-up care. However, according to survey documentation, MEC personnel provide no clinical treatments or interventions.

The goal of this study is to determine whether new health information – obtained through medical screening – affects entitlements to Social Security benefits. To obtain variation in health information, the analysis exploits the fact that survey participants were assigned to either a morning or afternoon exam, and that three laboratory tests – fasting plasma glucose, LDL (bad) cholesterol, and triglycerides – were administered only during morning exams. This is because these tests require fasting, which is best achieved overnight. The results of the tests are used to diagnose type 2 diabetes (fasting plasma glucose) and to determine risk for a heart attack or stroke (LDL cholesterol and triglycerides).[6] To ensure the representativeness of morning examinees, participants were randomly assigned to a morning or afternoon exam, generating random assignment of new health information.

Although the assignment of information provides ideal variation for empirical identification, there are additional aspects of the survey that require mention. First, although afternoon examinees were not directly tested for fasting plasma glucose, LDL cholesterol, and triglycerides, both exam groups were administered tests that are predictive of diabetes and high LDL cholesterol. One test measures glycohemoglobin A1C levels, a measure of average blood glucose during the past three months. This measure is correlated with fasting plasma glucose and thus predictive of diabetes. The other tests measure total cholesterol and HDL (good)

[5] 89.9 percent of exams are performed within two months of the at-home interview. This figure is determined from the public-use data by comparing the age in months at the interview to the age in months at the time of the exam.

[6] The test of plasma glucose measures sugar in the blood; the test of LDL cholesterol measures bad cholesterol; the test of triglycerides measures fat.

cholesterol, and high total cholesterol and low HDL cholesterol are correlated with high LDL cholesterol.

Despite tests shared by both exam groups, morning examinees presumably received more information from the additional tests. First, at the time of the survey, the test of glycohemoglobin A1C was used only to monitor blood glucose levels, not to diagnose diabetes.[7] A definitive diagnosis required a test of fasting plasma glucose. And second, LDL cholesterol is considered a better measure of risk for a heart attack or stroke than total cholesterol and HDL cholesterol combined. In fact, according to the Mayo Clinic (2014), LDL cholesterol is considered the main focus of cholesterol-lowering treatment.

A second aspect of the survey is the efforts to ensure that examinees complied with their assigned exam time. The time of the exam was assigned during the at-home survey. To ensure compliance, the schedule was flexible to allow survey participants to choose a variety of exam dates. The MEC remained open for approximately 6 weeks, for five days a week, and the days of closure changed weekly. Once the date and time of the examination were scheduled, survey participants received two reminders: one by mail a week before the scheduled exam, and another by phone 48 hours before the exam. If the participant could not make the scheduled appointment, an alternative appointment was arranged with an expressed attempt to preserve exam assignment.[8]

To measure the effect of health information on benefit entitlements, the survey data are matched to SSA administrative data. These data are available only for survey years 1999/2000, 2001/2002, and 2003/2004. Data on benefit entitlements come specifically from the Master Beneficiary Record (MBR), which reports participation in Social Security's DI, OA, spousal, and survivor programs. The data report the date and type of initial and current entitlements – the latter measured at the end of calendar year 2008. The survey data are also matched to mortality data, which are derived from death certificate records reported to the National Center for Health Statistics. Dates of death are available through calendar year 2006.

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[7] In 1997 and 2003, an expert committee recommended against using hypoglycemic A1C levels to diagnose diabetes (Expert Committee 1997, Expert Committee 2003). Another committee reversed this recommendation in 2009, publishing guidelines on the use of hypoglycemic A1C as a diagnostic tool (International Expert Committee 2009).

[8] Based on conversations with personnel at the National Center for Health Statistics, rescheduling of exam dates was not uncommon, but in most cases, the assignment to a morning or afternoon exam was preserved.

III. Sample

A. Full Sample

To measure the effect of new health information on benefit entitlements, the research design exploits the fact that survey participants were randomly assigned to a morning or afternoon exam. Thus, if participants complied with the assignment, morning and afternoon examinees should be comparable up to a margin of sampling error. This can be tested by estimating differences in observable characteristics between exam groups.

Differences in observable characteristics are examined first among the full NHANES sample, before deriving the sample specific to the analysis. The full sample is derived by pooling NHANES data across survey years 1999/2000, 2001/2002, and 2003/2004, as administrative data are only available for these years. The sample is further restricted to participants who are ages 20 and older (49.3 percent of the full sample) and who have completed a MEC exam (92.7 percent of the remaining sample). The remaining sample contains 14,213 participants, and approximately half (48.9 percent) of the sample completed a morning exam.[9] The roughly equal split of participants to the morning and afternoon suggests that most respondents complied with assigned exam time.

To assess the comparability of morning and afternoon examinees, differences in observable characteristics are estimated along several dimensions: demographics, labor supply and health insurance coverage, self-reported health, laboratory and examination results, and new health diagnoses. Overall, morning and afternoon examinees appear similar along most dimensions, with a few notable exceptions.

Demographic characteristics are reported in the left panel of **Table 1.** Characteristics include age, race, educational attainment, and marital status. The table also reports the percent of respondents who report being married and living with three or more family members, which serves as a proxy for children in the household. The first and second columns of the panel correspond with morning and afternoon examinees, respectively, and the third column reports the difference in estimates between the two groups. As shown, demographic characteristics appear

[9] Unfortunately, the survey data do not explicitly report exam assignment. Instead, assignment is determined by whether the survey participant is contained in the data file that reports plasma-glucose results. This file is labeled “LAB10AM” according to the survey documentation.

similar between morning and afternoon examinees, and all differences are statistically insignificant.

Labor supply and health insurance coverage are reported in the left panel of **Table 2**. Overall, the figures suggest that morning and afternoon examinees are similarly attached to the labor force, but morning examinees are 1.42 percentage points more likely to have a ratio of family income to poverty greater than five. Morning examinees are also 2.98 percentage points more likely to report health insurance through an employer, but this difference is statistically insignificant. One reason for this difference is that information on employer-provided health insurance is only available for the 1999/2000 survey, leading to smaller samples and thus higher sampling error.

Self-reported health conditions collected during the at-home survey are reported in the left panel of **Table 3**. The conditions listed first are those most relevant to this study: diagnosed diabetes, including and excluding borderline diagnoses, and high cholesterol. Most reports of diabetes are non-borderline cases, and the rates of non-borderline cases are similar between exam groups. However, the rate of high cholesterol is 1.57 percentage points greater among morning examinees, which is statistically significant at the five percent level. The other conditions in the table include high blood pressure, arthritis, and overweight. As shown, most of the differences in these conditions are statistically insignificant. The one exception is arthritis, which is 2.04 percentage points greater among morning examinees. To convey a sense of overall health, health conditions are aggregated using two measures: any health condition and total number of conditions, both of which include borderline diabetes. As shown, these aggregate measures are similar among morning and afternoon examinees.

The results of laboratory tests and examinations are reported in the left panel of **Table 4**. The results listed first are from laboratory tests administered only to morning examinees: fasting plasma glucose, LDL cholesterol, and triglycerides. (The results from the laboratory tests were translated into diagnostic categories using the medical definitions given in **Appendix Table 1**.) As shown, slightly more than one third of morning examinees are diagnosed with at least borderline diabetes (38.24 percent), at least borderline high LDL cholesterol (37.46) and at least borderline high triglycerides (36.26 percent). Excluding borderline cases, the rate of diabetes, high LDL cholesterol, and high triglycerides is 9.91 percent, 13.44 percent, and 20.26 percent, respectively. These diagnoses are further aggregated using four measures: any diagnosis and total number of diagnoses, both including and excluding borderline cases. As shown, 69.24 percent of morning examinees were diagnosed with at least one borderline condition, and 32.83 percent were diagnosed with at least one non-borderline condition.

The remaining estimates in the **Table 4** are results from laboratory tests administered to both exam groups: glycohemoglobin A1C, total cholesterol, HDL cholesterol, blood pressure, and BMI. The most notable difference is that morning examinees are 2.13 percentage points less likely to be diagnosed with at least borderline high cholesterol, which is statistically significant at the five percent level. However, excluding borderline cases, the difference in high total cholesterol is small and statistically insignificant.

Rates of new health diagnoses are reported in the left panel of **Table 5**. These rates represent the percent of participants who did not report a particular condition during the at-home survey, but subsequently tested positive for the condition during the medical examination. The results listed first are from tests that were administered only to morning examinees. As shown, 29.03 percent of morning examinees were newly diagnosed with at least borderline diabetes, and 3.08 percent were newly diagnosed with diabetes. The rates are similarly high for LDL cholesterol and triglycerides. The table also reports results of total cholesterol for both exam groups. As shown, morning examinees were 2.29 percentage points less likely to be diagnosed with at least borderline high cholesterol, which is statistically significant at the five percent level. However, excluding borderline cases, the difference in newly diagnosed high cholesterol is small and statistically insignificant.

A comparison of **Tables 3 through 5** reveals two notable patterns. First, survey respondents who report a health condition during the at-home survey do not necessarily test positive for the condition during the MEC exam. For example, 9.74 percent of morning examinees self-report a diabetes diagnosis (**Table 3**), 9.91 percent of morning examinees test positive for diabetes (**Table 4**), but 3.08 percent of morning examinees are newly diagnosed for diabetes (**Table 5**). This implies that approximately 2.9 percent of morning examinees reported a diabetes diagnosis, but did not test positive for diabetes during the MEC exam. These false-positive self-reports may arise if individuals had been previously diagnosed with diabetes, but reduced their fasting plasma glucose levels at the time of the survey.[10]

[10] The survey question regarding diabetes asks if respondents have ever been diagnosed with diabetes, not whether they believe they currently have clinical diabetes.

A second pattern is that morning examinees are more likely to self-report high cholesterol (**Table 3**), but are less likely to test be diagnosed with at least borderline diabetes (**Table 4**). This partially accounts for the lower rate of newly diagnosed borderline diabetes cases among morning examinees (**Table 5**). It is important to note, however, that the at-home survey does not differentiate between types of cholesterol – LDL versus total cholesterol – or between borderline and non-borderline cases.

B. Analysis Sample

The analysis sample of interest is derived by imposing several restrictions to the full NHANES sample. First, by necessity, the sample is restricted to survey participants who are matched to Social Security administrative records, which depends on whether the survey participant provided consent. This restriction retains 85.20 percent of the sample.[11]

Second, the sample is restricted to survey participants who are not entitled to DI, OA, spousal, or survivor benefits before the first calendar year of the survey. For example, participants in the 1999/2000 survey are dropped from the sample if entitled to benefits on or before the end of 1998. This restriction retains 68.19 percent of the sample.

Third, the sample is restricted to ages 40 to 61. The motivation for this restriction is illustrated in **Figure 1**, which graphs the percent of survey participants receiving benefits prior to the first calendar year of the survey (the second restriction above). As shown, benefit receipt is relatively low before age 40, so a model of benefit entitlements at these ages would be imprecise. Conversely, benefit receipt is relatively high after age 61, when most participants are eligible for OA benefits. Thus, using participants at these ages would raise concerns about small-sample and sample-selection biases.[12] The restriction to ages 40 to 61 retains 43.87 percent of the sample.

Fourth, the sample is restricted to participants who are not deceased by period year four, defined as the fourth calendar year after the first calendar year of the survey. For example,

[11] The likelihood of a match is not random and is related to age, race, education, and marital status. In particular, older respondents are more likely to be matched than younger respondents; white and black respondents are more likely to be matched than "other" races; respondents with a high school diploma or greater are more likely to be matched than respondents without a high school diploma; and respondents who are married, divorced, or single are more likely to be matched than respondents who are single.

[12] The early retirement age, when benefits first become available, is 62. The normal retirement age is 65 for individuals born in 1938 or earlier, and increases by 2 months for each annual birth cohort from 1939 to 1943.

period year four for the 1999/2000 survey corresponds to calendar year 2002. The reason for this restriction is that mortality data are only available through calendar year 2006, and this year corresponds with period year four for the 2003/2004 survey. This restriction also simplifies the analysis of benefit entitlements by period four, since entitlement is only defined for the non-deceased. This restriction retains 98.73 percent of the sample.[13]

Finally, observations are dropped from the sample if they have missing values for education (five observations), any health insurance coverage (two observations), and self-reported high total cholesterol (two observations). These variables are chosen because they only have a few missing values. This is important because, in the models of benefit entitlement below, missing values are addressed by additional dummy variables, but the effects of these dummy variables are not well identified if they apply to only a few observations. This restriction retains 99.81 percent of the sample, yielding an analysis sample of 1,751 morning examinees and 1,818 afternoon examinees.

Importantly, all five sample restrictions applied equally to morning and afternoon examinees, as shown in **Appendix Table 2**. This provides additional suggestive evidence that morning and afternoon examinees are comparable.

Having derived the analysis sample from the full NHANES sample, it is important to determine again whether observable characteristics are similar between morning and afternoon examinees. Summary statistics of the analysis sample are presented in the right panels of **Tables 1** through **5**. In contrast to the left side of **Table 2,** the right side also reports measures of labor supply derived from Social Security administrative data. The first measure is an indicator of whether the participant had any Social Security quarters of coverage during the first calendar year of the survey. To receive at least one quarter of coverage in 1999, workers must have earned at least $740 in Social Security taxable earnings. The second measure is an indicator of whether the participant is insured for DI benefits at the time of survey. To be insured, workers must have at least 20 quarters of coverage during the previous ten calendar years before the survey.

[13] Importantly, there is no statistically significant difference in the percent deceased by period year four between morning and afternoon examinees (**Appendix Table**). This suggests that health information in this context does not have an immediate effect on mortality.

As shown, most of the estimated differences between morning and afternoon examinees are comparable. Notable exceptions are self-reported arthritis (**Table 3**), self-reported emphysema (**Table 3**), a diagnosis of at least borderline high cholesterol (**Table 4**), and a new diagnosis of at least borderline high cholesterol (**Table 5**). These differences will be addressed in the empirical analysis below.

C. New Health Information

The right panel of **Table 4** reports the results from laboratory tests and examinations among the analysis sample. Again, only morning examinees were administered tests for fasting plasma glucose, high LDL cholesterol, and triglycerides. Based on the laboratory results, 42.95 percent of morning examinees are diagnosed with at least borderline diabetes, 42.49 percent with borderline high LDL cholesterol, and 37.66 percent with borderline high triglycerides. Excluding borderline cases, 10.39 percent are diagnosed with diabetes, 15.61 percent are diagnosed with high LDL cholesterol, and 21.42 percent are diagnosed with high triglycerides. Some examinees are diagnosed with two or more of these conditions, so that, excluding borderline cases, 35.68 percent are diagnosed with diabetes, high LDL cholesterol, or high triglycerides.

Table 5 reveals the extent to which morning examinees received new information. In regards to diabetes, 33.69 percent of morning examinees had been newly diagnosed with at least borderline diabetes, and 3.17 percent had been newly diagnosed with diabetes. In regards to cholesterol, 24.98 percent of morning examinees had been newly diagnosed with at least borderline high LDL cholesterol, and 7.80 percent had been newly diagnosed with high LDL cholesterol. A comparison of **Tables 4 and 5** suggests that a substantial portion of conditions that were diagnosed during the medical exam were previously undiagnosed.

Mentioned above, both exam groups were administered tests for glycohemoglobin A1C and total cholesterol, and these levels are associated with diabetes and LDL cholesterol. This means that, although afternoon examinees were not directly tested for diabetes or LDL cholesterol, examinees could have updated their beliefs of these conditions based on levels of glycohemoglobin A1C and total cholesterol. To examine the extent to which this is possible, diagnostic rates of diabetes and high LDL cholesterol are calculated across categories of glycohemoglobin A1C and total cholesterol levels, using data only from morning examinees.

In regards to glycohemoglobin A1C, 8.65 percent of morning examinees were diagnosed with high glycohemoglobin A1C levels (**Table 4**). Based on laboratory tests for fasting plasma glucose, all of these examinees tested positive for at least borderline diabetes, and nearly all tested positive for diabetes (90.90 percent). However, among examinees with low glycohemoglobin A1C levels, 36.5 percent tested positive for at least borderline diabetes, and 2.9 percent tested positive for diabetes. Thus, the test of fasting plasma glucose provided additional health information to morning examinees, particularly to those with low glycohemoglobin A1C levels.

In regards to total cholesterol, morning examinees were separated into three categories: low cholesterol (46.15 percent), borderline high cholesterol (34.65 percent), and high cholesterol (19.20 percent). Across these groups, the rates of at least borderline high LDL cholesterol were 4.95 percent, 64.96 percent, and 97.78 percent, and the rates of high LDL cholesterol were 0 percent, 8.12 percent, and 73.45 percent. Thus, total cholesterol appears to be highly correlated with LDL cholesterol. Nonetheless, a test of LDL cholesterol is necessary for a definitive diagnosis (US Preventive Services Task Force).

IV. Results

The empirical objective is to determine whether new health information affects entitlements to Social Security benefits. Assuming that additional health information was randomly assigned to morning examinees, the effect of information can measured by the difference in entitlement rates between exam groups.

To illustrate differences in entitlements, **Figure 2** plots rates of entitlement by exam group and survey age. Entitlement is defined as the receipt of DI, OA, spousal, or survivor benefits by period year four. As shown, there is a noticeable degree of sampling error at ages 40 to 58, but there is no systematic difference in entitlements between morning and afternoon examinees. However, at ages 59 to 61, entitlements are systematically lower among morning examinees. At these ages, the rates of entitlement are 49.57 percent among morning examinees and 60.66 percent among afternoon examinees. Most of this difference is due to entitlements to OA benefits: the rates of OA entitlement are 41.81 percent and 48.34 percent among morning and afternoon examinees, respectively.[14] Workers first become eligible for OA benefits at age 62, and most survey participants at ages 59 to 61 reach 62 by period year four, so the results suggest that new health information delays some OA entitlements beyond the early retirement age.

One concern with this interpretation is that morning and afternoon examinees differ along observable characteristics, and these characteristics could lead to differences in entitlements between exam groups. To control for observable characteristics, the likelihood of entitlement is estimated using a regression framework. This framework allows for estimating differences in entitlement rates between exam groups, while simultaneously controlling for observable differences between them. The regression takes the following form:

$$y_i = \alpha_0 + \alpha_1 m_i + \alpha_2 x_i + \varepsilon_i. \quad (1)$$

The outcome variable y_i indicates entitlement to benefits by period year four, equaling one if entitled and zero otherwise. The variable m_i is an indicator of exam time, equaling one if the participant completed a morning exam and zero otherwise. The vector x_i controls for observable characteristics, including demographic characteristics (**Table 1**), labor supply and health insurance coverage (**Table 2**), self-reported health characteristics (**Table 3**), and results from laboratory tests and examinations shared by morning and afternoon examinees (**Table 4**). The control variables are described in more detail in the Appendix. For each variable with missing values, the vector also includes an indicator variable that equals one if missing and zero otherwise.[15] The residual is ε_i, which is specified to account for heteroskedasticity. The coefficient of interest is α_1, which represents the difference in entitlement rates between morning and afternoon examinees.

A series of estimates of α_1 are reported in **Table 6**. In column (1), the sample contains participants aged 40 to 61, and the model does not include the vector of observable characteristics. As shown in the row labeled *Morning*, morning examinees were -1.23

[14] The rest of the decline is due to DI benefits. The decrease may reflect that DI beneficiaries must wait two years before Medicare eligibility, so an increase in demand for immediate health insurance coverage may decrease demand for DI benefits. There is no statistically significant difference in entitlements to spousal and survivor benefits.

[15] For example, marital status is defined by four categories: single, married, other, and missing. The model includes dummy variables for married, other, and missing, leaving single participants as the "left-out" group. Summary statistics of missing variables is provided in **Appendix Table 3**.

percentage points less likely to become entitled to benefits relative to afternoon examinees. While this estimate suggests that new health information delays benefit entitlements, the estimate is statistically insignificant.

In column (2), the sample remains the same, but the model includes the vector of observable characteristics. As shown, the estimate of α_1 changes slightly to -1.65 and becomes statistically significant. The change in significance is partially due to a decrease in the estimate's standard error, which reflects an increase in the explanatory power of the model. This is evident by the increase in the R-square from 0.0004 to 0.3817.

Although the difference in entitlements is statistically significant for the entire analysis sample, **Figure 2** suggests that the difference is most pronounced at ages 59 to 61. To estimate differences by age, the morning variable is interacted with an indicator of ages 59 to 61. The results, reported in column (3), confirm that the difference in entitlements is concentrated among older respondents. At ages 59 to 61, morning examinees were 9.44 percentage points less likely to become entitled to benefits relative to afternoon examinees; at ages 40 to 58, this difference is -0.48 percentage points.[16] Importantly, the difference in estimates of α_1 between age groups is statistically significant: the p-value from the F-test is 0.02.

A limitation of the model in the third column is that the effects of the control variables are restricted to be similar among younger and older respondents. This restriction may not be accurate since respondents at ages 59 to 61 become increasingly eligible for OA benefits, while younger respondents do not. To address this concern, the model is estimated separately by age groups, which allows the effects of control variables to vary by age category. Column (4) corresponds to ages 40 to 58, and column (5) corresponds to ages 59 to 61. As shown, the estimates of α_1 in columns (4) and (5) are similar to their respective estimates in column (3). Thus, the baseline results are not sensitive to the assumption that the effects of the control variables are the same for both age groups.

Another limitation of the model in column (3) is that it restricts the effect of a morning exam to be similar within each age category. To relax this restriction, the indicator of a morning exam is interacted with individual age fixed effects. The coefficients of these interaction terms,

[16] Although the estimate of α_1 is statistically significant at ages 59 to 61, its standard error is consistent with a wide range of effects. Additionally, because entitlements are low at ages 40 to 58, any difference in entitlements between exam groups would be difficult to detect using a linear probability model.

and their corresponding 95 percent confidence intervals, are plotted by age in **Figure 3**. As shown, the coefficients at ages 40 to 58 are centered at zero, whereas estimates at ages 59 to 61 are centered around -10 percentage points. Although these estimates are consistent with the baseline results, none of the individual estimates are statistically significant.

Because the difference in entitlements is most pronounced at ages 59 to 61, a particular concern is whether exam groups at these ages differ substantially with respect to observable characteristics. For this purpose, summary statistics are reported for each age group in **Appendix Tables 4 through 8**. As shown, exam groups at ages 59 to 61 differ along several dimensions. The most notable differences are in self-report diabetes, self-report high cholesterol, self-reported emphysema, high glycohemoglobin A1C, and at least borderline high cholesterol. While some of these differences are statistically significant, others are not.

While the purpose of the regression framework is to control for observable differences between exam groups, it is important to understand how these differences affect the relative rate of entitlements between exam groups. To do so, the percentage-point difference of each characteristic can be factored by each characteristic's partial effect on entitlements. For example, at ages 59 to 61, morning examinees are 7.45 percentage points less likely to self-report diabetes (Appendix **Table 5)**, and the partial effect of self-reported diabetes on entitlements is 2.38 percentage points (column 5, **Table 6)**. This implies that the difference in self-reported diabetes accounts for just 0.12 percentage points in the 9.44 percentage point difference in entitlements between exam groups. The same calculation for other characteristics yields similarly small effects. Thus, observable characteristics cannot account for the difference in entitlements between exam groups.

Another consideration is whether the estimates are robust to the use of the probit model, rather than the linear probability model. The estimates from the probit model are presented in **Table 7**. In column (1), the sample is limited to ages 59 to 61, and the model includes the vector of control variables. As shown, the probit estimate of α_1 is -0.32 and is statistically significant at the five percent level. In percentage points, the estimate implies that morning examinees are

12.34 percentage points less likely to become entitled to benefits relative to afternoon examinees.[17]

To determine how unobservable factors could affect the association between exam time and entitlement outcomes, the bivariate probit model is used to estimate the likelihood of benefit entitlement jointly with the likelihood of a morning examination. Importantly, the bivariate model allows the error terms of the two outcomes to be correlated, measured by the covariance parameter ρ. By construction, ρ is equal to zero in the probit model in column (1) of **Table 7**. The question is how large must the parameter ρ be to explain the difference in entitlements between morning and afternoon examinees.[18]

The results of this exercise are presented in columns (2) through (5) of **Table 7**. In each column, the value of ρ is increased by 0.05. As shown, setting ρ to 0.05 decreases the probit estimate of α_1 to -0.23 and renders it statistically insignificant. When ρ reaches 0.20, the estimate of α_1 is close to zero. This implies that if the covariance of unobservable characteristics of the two models is 0.20, then the implied effect of health information on entitlements would be zero. While these results do not rule out the possibility that selection bias accounts for the baseline results, they do imply that selection would need to relatively high to fully explain the difference in entitlements between exam groups.

Overall, the results suggest that health information significantly decreases benefit entitlements, particularly at ages 59 to 61. At these ages, the mean entitlement rate is 58.85 percentage points, and the regression-adjusted difference in entitlements between exam groups is 9.44 percentage points. Thus, if the entire difference is due to new health information, then new information decreased the rate of benefit entitlement by as much as 16.04 percent. Additionally, the decrease in entitlements is substantial relative to the amount of new health information provided to morning examinees. For example, 32.80 percent of morning examinees were newly diagnosed with at least borderline diabetes (Appendix Table 7). If these diagnoses account for

[17] The probit estimate is converted to percentage points numerically by estimating two predicted probabilities: one with the morning indicator equaling one, and another with the morning indicator equaling zero. For both predictions, the control variables are set at their means.

[18] This approach is motivated by Altonji, Elder, and Taber (2005), who examine the effect of attending a Catholic high school on education outcomes and test scores.

the entire decrease in benefit entitlements among morning examinees, then one third of newly diagnosed diabetics had delayed benefit entitlement.

V. Mechanism

The baseline results suggest that new health information delays entitlements to Social Security benefits. One possible mechanism is that the detection of a latent medical condition increases demand for health insurance coverage, and this demand increases employment to obtain or retain employer provided health insurance. This mechanism is similar to employment lock, whereby a worker's primary motivation for employment is to obtain insurance coverage (Garthwaite, Gross, and Notowidigdo 2013). This mechanism yields several testable implications.

A. Demographic Characteristics

If proposed mechanism is correct, then the delays in entitlements should be concentrated among individuals who are likely to claim OA benefits at age 62, but have the greatest incentive or discretion to delay claiming beyond 62. To test this implication, the effect of health information is estimated across three demographic categories: sex, marital status, and educational attainment. First, married males have a greater incentive to delay entitlements than either females or unmarried males, since delaying entitlements also increases spousal and survivor benefits (Coile, Diamond, Gruber, and Jousten 2002). Thus, the claiming decisions of married males should be more sensitive to new health information. Second, if education is a proxy for wealth, then the effect of health information on entitlements should be more pronounced among the more educated. (Unfortunately, wealth is not reported in the NHANES.) This prediction is based on results by Coile et al. (2002). They show that the association between wealth and early entitlement is U-shaped, and argue that the positive effect of wealth on early entitlement is likely due to income effects.[19] This means that some individuals with high wealth claim benefits early, but these individuals presumably have greater discretion to delay entitlements.

To test these predictions, the morning indicator is interacted with dummy variables for being male, married, and more educated – the latter defined as having some college education. For this analysis, the sample is restricted to ages 59 to 61, and the model includes the vector of

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[19] They argue that early entitlements at low levels of wealth likely reflect poor health.

observable characteristics. Given the small sample size, one model is estimated for each demographic characteristic.

The results are reported in columns (1) through (3) in **Table 8**. In column (1), the morning variable is interacted with a dummy variable for male. As shown, the effect of health information appears greater among males compared to females. Among females, the difference in entitlements between exam groups is -7.29 percentage points; among males, this difference is -12.49 percentage points. Although these results are consistent with the proposed mechanism, the difference in estimates between males and females is not statistically significant.

In column (2), the morning variable is interacted with a dummy for married. As shown, the effect of health information appears greater among the non-married, but the difference between marital groups is statistically insignificant. This means that the additional incentive for married individuals to delay entitlements does not translate into a greater sensitivity of entitlements to health information. This is consistent with Coile et al. (2002): although married males have a greater incentive to delay entitlements, they do not delay entitlements more than single males.

In column (3), the morning variable is interacted with a dummy for more education. As predicted, the effect of health information is concentrated among the more educated. Among the more educated, the difference in entitlements between exam groups is -20.49; among the less educated, this difference is -1.40 percentage points. Although these estimates are consistent with the proposed mechanism, the difference in estimates across education groups is statistically insignificant.

B. Labor Supply and Health Insurance Status

The proposed mechanism also implies that the effect of health information on entitlements should be more pronounced among individuals with greater attachment to the labor force. The reason is that obtaining or retaining health insurance through formal employment is costly, and these costs are presumably lower for individuals who are employed or are covered by employer-provided health insurance (Madrian 1994).

To test these predictions, the effect of health information is estimated separately across two measures of labor supply. The first measure is labor force participation; the second is DI insured status. The results for each measure are presented in columns (4) and (5) in **Table 8**. As predicted, the effect of health information is greater among individuals who are in the labor force and insured for DI benefits. The difference is greater by DI insured status. Among the DI insured, the difference in entitlements between exam groups is -15.67, whereas this difference among the non-DI insured is 3.80. Although these estimates are consistent with the proposed mechanism, the differences in estimate between labor-supply categories are statistically insignificant.

To estimate the effect of health information across health insurance status, the morning indicator is interacted with a dummy for any health insurance coverage. Information on employer-provided health insurance is not used because it is only available in the 1999/2000 survey. The results are presented in column (6) of **Table 8**. As shown, the effect of health information appears similar for both insurance groups: the coefficient on the interaction term is 0.51. Thus, given the available data, it does not appear that the effect of health information on entitlements varies by health insurance status.

C. New Health Information

If new health information delays benefit entitlements, then the difference in entitlements between exam groups should be greater among individuals who were not previously diagnosed with diabetes or high cholesterol at the time of the survey. To test this prediction, the morning indicator is interacted with a dummy for self-reported diabetes and self-reported high cholesterol. The results for self-reported diabetes are reported in column (7) of **Table 8**, and the results for self-reported high cholesterol are reported in column (8) of **Table 8**. As shown, the effects of health information are greatest among those who were not previously diagnosed with diabetes or high cholesterol. For example, among individuals who were not previously diagnosed for diabetes, the difference in entitlements between exam groups is -11.30 percentage points, whereas this difference among individuals who were previously diagnosed with diabetes is -3.79 percentage points. Although these results are consistent with the proposed mechanism, the differences in estimates between diagnosis groups are not statistically significant.

D. Increased Employment

Finally, if the proposed mechanism is correct, then the delay in entitlements should correspond with greater labor force participation and employment. To test this prediction, the models in **Table 6** are used to estimate differences in employment between exam groups. Employment is measured as any Social Security quarters of coverage in period year four. For the 1999/2000 survey, the employment variable equals one if earnings subject to Social Security taxes exceed $870 and equals zero otherwise.

The results are presented in **Table 9**. The three columns of this table correspond with columns (1) through (3) of **Table 6**. In column (1), the sample contains participants aged 40 to 61, and the model does not include the vector of observable characteristics. As shown, morning examinees are 3.12 percentage points more likely to have any quarters of coverage by period year four compared to afternoon examinees. This estimate is robust to controls for observable characteristics, which is reported shown in column (2).

To estimate the effect of health information on employment by age, the morning variable is interacted with a dummy for ages 59 to 61. The results are presented in column (3) of **Table 9**. As shown, the effect of health information on employment is concentrated among older individuals. At ages 59 to 61, the increase in employment is 8.41 percentage points. This estimate translates into an increase in employment of 16.63 percent, relative to the mean of the dependent variable of 50.56 percent. Interestingly, the effect of health information on is similar in magnitude to its effect on entitlements, reported in column (3) of **Table 6**. This suggests that a one-for-one relationship between entitlement delays and employment.

VI. Conclusion

This study shows that new health information delays entitlements to Social Security benefits, particularly among older workers near the early retirement age. One possible mechanism for the results is that the detection of a latent medical condition increases demand for health insurance coverage, and this demand encourages employment either to obtain or retain employer provided health insurance. This mechanism is generally supported by auxiliary analysis.

This study is related to a large literature that examines the effects of health on labor supply and retirement. In general, these studies conclude that poor health reduces labor supply and hastens retirement (Currie and Madrian 1999; Lumsdaine and Mitchell 1999). While this conclusion may seem to contradict the findings presented here, an important distinction is that most studies focus on health as it pertains to the ability to work, whereas this study focuses on health information, independent of work capacity.

If correct, the proposed mechanism raises additional questions regarding when and how health information is collected over the life cycle. Several studies show that, in regards to the detection of latent medical conditions, incentives matter. Kubik (1999) shows that an expansion of Supplemental Security Income benefits for disabled children encouraged the detection and treatment of mental health conditions among children; Cullen (2003) finds that a change in supplement funding for schools to accommodate disabled children affected the percent of children defined as disabled; Thornton (2008) shows that monetary incentives affected the decision to learn one's HIV status; and Singleton (2009) shows that an expansion of disability benefits for Vietnam veterans with diabetes increased the prevalence and treatment of diabetes. Understanding how health information is acquired over the life-cycle, and how this information affects economic outcomes, is an important area for further research.

References

Altonji, Joseph, Todd Elder, and Christopher Taber. 2013. "Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools." *Journal of Political Economy* 113(11): 151-184.

American Diabetes Association. 2014. "Economic Costs of Diabetes in the U.S. in 2012." *Diabetes Care*. Published online at: http://care.diabetesjournals.org/content/early/2013/03/05/dc12-2625.full.pdf+html.

Anderson, Kathryn and Richard Burkhauser. 1986. "The Retirement-Health Nexus: A New Measure of an Old Puzzle." *Journal of Human Resources* 20(3): 315-330.

Bazzoli, Gloria. 1985. "The Early Retirement Decision: New Empirical Evidence on the Influence of Health." *Journal of Human Resources* 20(2): 214-234.

Benitez-Silva, Hugo, and Debra Dwyer. 2005. "The Rationality of Retirement Expectations and the Role of New Information." *Review of Economics and Statistics* 87(3): 587-592.

Bound, John. 1991. "Self-Reported Health vs Objective Measures of Health in Retirement Models." *Journal of Human Resources* 26(1): 106-138.

Coile, Courtney, Peter Diamond, Jonathan Gruber, and Alain Jousten. 2002. "Delays in Claiming Social Security Benefits." *Journal of Public Economics* (84): 357-385.

Cullen, Julie Berry. 2003. ''The Impact of Fiscal Incentives on Student Disability Rates." *Journal of Public Economics* 87(7–8): 1557–89.

Currie, Janet and Brigitte Madrian. 1999. "Chapter 50: Health, Health Insurance and the Labor Market." In *Handbook of Labor Economics* (3), eds. O. Ashenfelter and D. Card (Elsevier Science), 3309-3416.

Edwards, Ryan. 2013. "If My Blood Pressure is High, Do I Take it to Heart? Behavioral Impacts of Biomarker Collection in the Health and Retirement Study." *NBER Working Paper* #19311.

Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. 1997. "Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus." *Diabetes Care* 1997(20): 1183-1197.

Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. 2003. "Follow-Up Report on the Diagnosis of Diabetes Mellitus." *Diabetes Care* 2003(26): 3160-3167.

Garthwaite, Craig, Tal Gross, and Matthew Notowidigdo. "Public Health Insurance, Labor Supply, and Employment Lock." *NBER Working Paper*, No. 19220.

Gruber, Jonathan and Brigitte Madrian. 1995. "Health Insurance Availability and the Retirement Decision." *American Economic Review* 84(4): 938-948.

International Expert Committee. 2009. "International Expert Committee Report on the Role of the A1C Assay in the Diagnosis of Diabetes." *Diabetes Care* 32(7): 1327-1334.

Kubik, Jeffrey. 1999. ''Incentive for the Identification and Treatment of Children with Disabilities: The Supplemental Security Income Program.'' Journal of Public Economics 73(2): 187–215.

Lumsdaine, Robin and Olivia Mitchell. 1999. "Chapter 49: New Developments in the Economic Analysis of Retirement." In *Handbook of Labor Economics* (3), eds. O. Ashenfelter and D. Card (Elsevier Science), 3261-3307.

Madrian, Brigitte. 1994. "Employment-Based Health Insurance and Job Mobility: Is there Evidence of Job-Lock?" *Quarterly Journal of Economics* 109(1): 27-54.

Mayo Clinic. "Cholesterol Levels: What Numbers Should You Aim For?" Accessed online on September 27, 2014, at http://www.mayoclinic.org/diseases-conditions/high-blood-cholesterol/in-depth/cholesterol-levels/art-20048245.

McGarry, Kathleen. 2004. "Health and Retirement: Do Changes in Health Affect Retirement Expectations?" *Journal of Human Resources* 48(3): 624-648.

Oster, Emily, Ira Shoulson, and Ray Dorsey. 2013. "Optimal Expectation and Limited Medical Testing: Evidence from Huntington Disease." *American Economic Review* 103(2): 804-830.

Quinn, Joseph, Richard Burkhauser, and Daniel Meyers. 1990. "Retirement and Labor Force Behavior of the Elderly." In *Demography of Aging*, eds. L. Martin and S. Preston (Kalamazoo, MI: W. E. Upjohn Institute on Employment Research), 50-101.

Rust, John. 1989. "A Dynamic Programming Model of Retirement Behavior." In *The Economics of Aging*, ed. D. Wise (Chicago, IL: University of Chicago Press), 359-398.

Rust, John and Christopher Phelan. 1997. "How Social Security and Medicare Affect Retirement in a World with Incomplete Markets." *Econometrica* 65(4): 781-831.

Sammartino, Frank. 1989. "The Effect of Health on Retirement." *Social Security Bulletin* 50(2): 31-47.

Singleton, Perry. 2009. "The Effect of Disability Insurance on Health Investment: Evidence from the Veterans Benefits Administration's Disability Compensation Program." *Journal of Human Resources* 44(4): 998-1022.

Thornton, Rebecca. 2008. "The Demand for, and Impact of, Learning HIV Status." *American Economic Review* 98(5): 1829-1863.

US Preventive Services Task Force. "Recommendations." Accessed online on September 14, 2014, at http://www.uspreventiveservicestaskforce.org/recommendations.htm.

Zhuo, Xiaohui, Ping Zhan, and Thomas Hoerger. 2013. "Lifetime Direct Medical Costs of Treating Type 2 Diabetes and Diabetic Complications." *American Journal of Preventive Medicine* 45(3): 253-261.

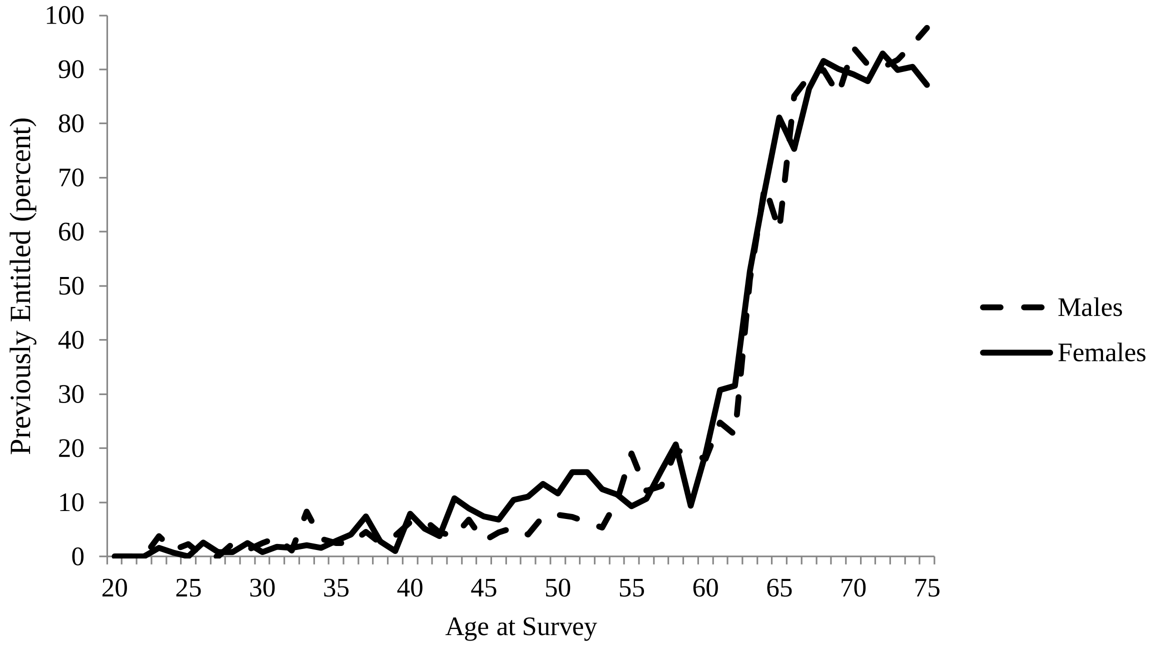

Figure 1: Percent of Survey Respondents Entitled to DI or OA Benefits Prior to the Survey

Notes: The sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The sample is limited to respondents who are matched to SSA data.

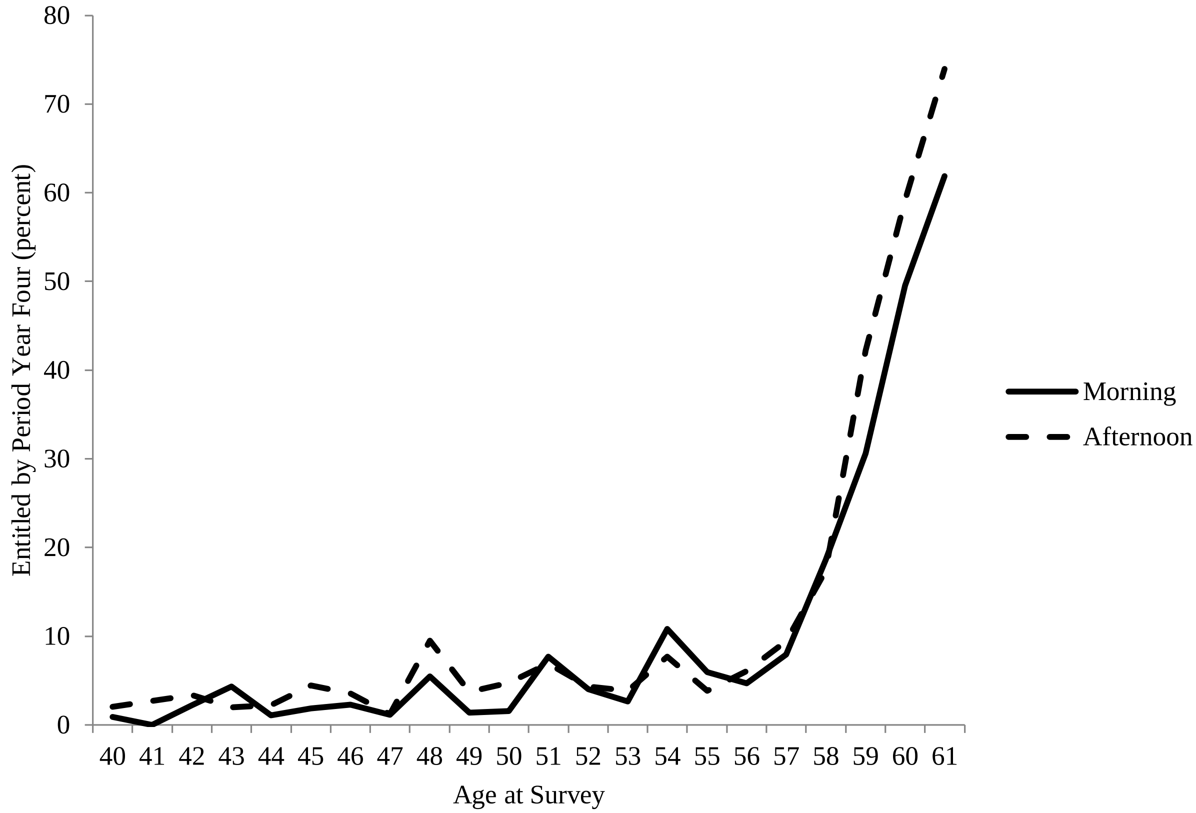

Figure 2: DI or OA Entitlement by Period Year Four, Analysis Sample

Notes: Notes: The analysis sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The sample is limited to respondents who are matched to SSA data and are not entitled to DI or OA benefits before the survey.

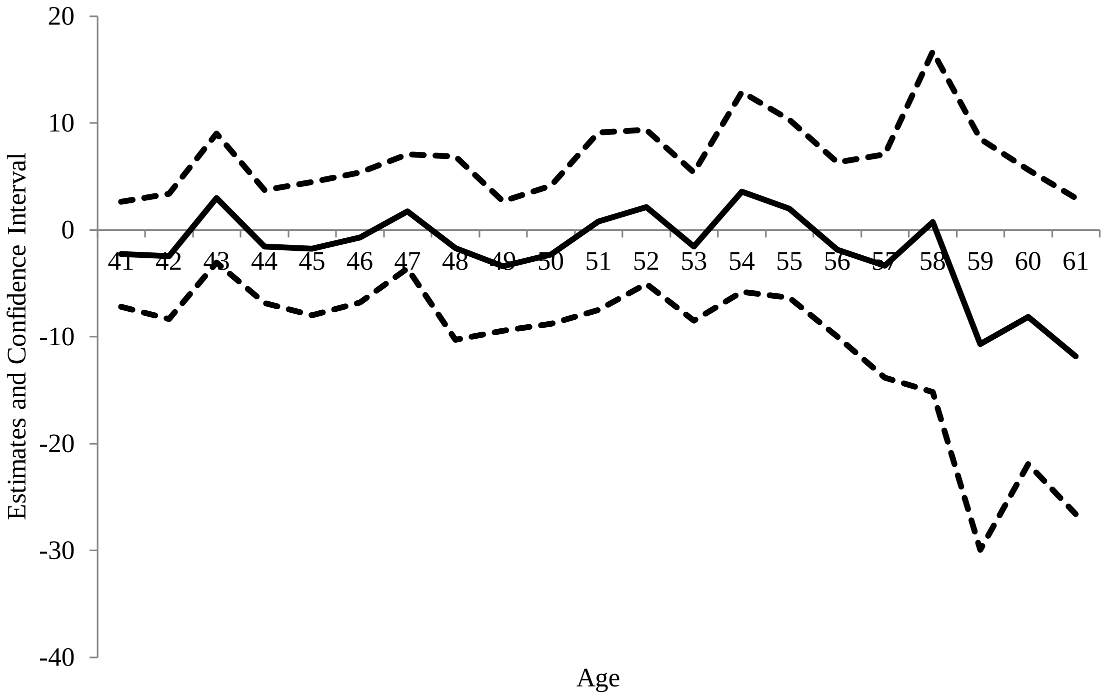

Figure 3: Estimates and 95 Percent Confidence Interval of the Interactions of the Morning Variable and Age

Notes: Notes: The analysis sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The sample is limited to respondents who are matched to SSA data and who are not entitled to DI or OA benefits before the survey.

Table 1: Demographics

	Full Sample			Analysis Sample		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Age (years)	50.04	49.51	0.53	49.66	49.32	0.34
	(0.23)	(0.23)	(0.32)	(0.15)	(0.15)	(0.21)
Male	47.26	47.51	-0.25	50.14	50.77	-0.63
	(0.60)	(0.59)	(0.84)	(1.20)	(1.17)	(1.67)
White	49.88	50.04	-0.16	51.23	49.50	1.72
	(0.60)	(0.59)	(0.84)	(1.19)	(1.17)	(1.67)
Black	19.47	19.19	0.28	19.93	21.23	-1.30
	(0.48)	(0.46)	(0.66)	(0.95)	(0.96)	(1.35)
Other race	30.65	30.77	-0.12	28.84	29.26	-0.42
	(0.55)	(0.54)	(0.77)	(1.08)	(1.07)	(1.52)
Less than high school	32.94	32.65	0.29	27.13	25.91	1.22
	(0.57)	(0.55)	(0.79)	(1.06)	(1.03)	(1.48)
High school	23.48	24.05	-0.57	22.39	22.99	-0.61
	(0.51)	(0.50)	(0.72)	(1.00)	(0.99)	(1.40)
Some college or more	43.58	43.30	0.28	50.49	51.10	-0.61
	(0.60)	(0.58)	(0.83)	(1.20)	(1.17)	(1.67)
Married	56.74	55.30	1.44	67.10	66.13	0.97
	(0.61)	(0.59)	(0.85)	(1.14)	(1.13)	(1.61)
Single	21.03	22.19	-1.16	12.34	14.08	-1.74
	(0.50)	(0.50)	(0.70)	(0.80)	(0.83)	(1.15)
Other marital status	22.23	22.51	-0.28	20.56	19.78	0.77
	(0.51)	(0.50)	(0.71)	(0.98)	(0.95)	(1.37)
Married & three or	32.88	32.65	0.22	41.82	44.87	-3.05
more family members	(0.57)	(0.56)	(0.80)	(1.20)	(1.19)	(1.69)
Observations	6943	7270		1751	1818	

Notes: The sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The full sample is limited to respondents who are ages 20 and older; the analysis sample is limited to respondents who are matched to SSA data, who are not entitled to DI, OA, spousal, or survivor benefits prior to the survey, and who are ages 40 to 61. Estimates are conditional on non-missing values and are in percentage points, unless otherwise noted. Standard errors are in parentheses. In the difference column, * indicates significance at the 5 percent level.

Table 2: Labor Supply and Health Insurance

	Full Sample			Analysis Sample		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Labor force	56.06	55.83	0.23	78.81	77.23	1.58
participation	(0.60)	(0.58)	(0.83)	(0.98)	(0.98)	(1.39)
Employed	51.98	51.12	0.86	73.73	71.51	2.22
	(0.60)	(0.59)	(0.84)	(1.05)	(1.06)	(1.49)
Employed full time	36.58	36.42	0.16	56.11	55.53	0.58
	(0.58)	(0.57)	(0.81)	(1.19)	(1.17)	(1.66)
Family income to poverty	18.28	19.21	-0.93	13.09	15.24	-2.15
ratio <1	(0.49)	(0.48)	(0.69)	(0.83)	(0.87)	(1.20)
Family income to poverty	26.10	26.82	-0.72	19.09	17.58	1.51
ratio 1-2.99	(0.55)	(0.54)	(0.78)	(0.97)	(0.92)	(1.34)
Family income to poverty	37.04	36.81	0.23	38.85	41.15	-2.30
ratio 3-4.99	(0.61)	(0.59)	(0.85)	(1.20)	(1.19)	(1.69)
Family income to poverty	18.57	17.15	1.42	28.97	26.03	2.94
ratio 5+	(0.49)	(0.46)	(0.67)*	(1.12)	(1.06)	(1.54)
Quarters of coverage -	-	-	-	75.84	74.04	1.80
any				(1.02)	(1.03)	(1.45)
DI insured	-	-	-	73.73	74.70	-0.97
				(1.05)	(1.02)	(1.47)
Health insurance -	80.36	80.53	-0.16	80.33	79.33	1.00
any	(0.48)	(0.47)	(0.67)	(0.95)	(0.95)	(1.35)
Health insurance -	57.78	57.68	0.10	71.39	70.85	0.53
private	(0.60)	(0.59)	(0.84)	(1.09)	(1.07)	(1.53)
Health insurance -	63.38	60.40	2.98	68.98	68.81	0.17
employer	(1.39)	(1.41)	(1.98)	(2.31)	(2.31)	(3.26)
Observations	6943	7270		1751	1818	

Notes: The sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The full sample is limited to respondents who are ages 20 and older; the analysis sample is limited to respondents who are matched to SSA data, who are not entitled to DI, OA, spousal, or survivor benefits prior to the survey, and who are ages 40 to 61. Estimates are conditional on non-missing values and are in percentage points, unless otherwise noted. Data on employer-provided health insurance is available only for the 2003/2004 sample. Standard errors are in parentheses. In the difference column, * indicates significance at the 5 percent level.

Table 3: Self-Reported Health

	Full Sample			Analysis Sample		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Diabetes, including	10.89	11.68	-0.79	10.22	11.17	-0.94
borderline	(0.37)	(0.38)	(0.53)	(0.72)	(0.74)	(1.03)
Diabetes	9.74	10.17	-0.43	8.97	9.90	-0.93
	(0.36)	(0.36)	(0.50)	(0.68)	(0.70)	(0.98)
High cholesterol	27.28	25.71	1.57	32.67	29.87	2.80
	(0.54)	(0.51)	(0.74)*	(1.12)	(1.07)	(1.55)
High blood pressure	31.92	31.61	0.31	31.19	31.29	-0.10
	(0.56)	(0.55)	(0.79)	(1.11)	(1.09)	(1.56)
Arthritis	26.56	24.52	2.04	24.07	20.98	3.09
	(0.53)	(0.51)	(0.73)*	(1.02)	(0.96)	(1.40)*
Heart failure	3.41	3.15	0.26	1.60	1.32	0.28
	(0.22)	(0.21)	(0.30)	(0.30)	(0.27)	(0.40)
Heart disease	4.22	4.73	-0.52	2.57	2.32	0.25
	(0.24)	(0.25)	(0.35)	(0.38)	(0.35)	(0.52)
Angina	3.56	3.90	-0.34	1.66	2.37	-0.71
	(0.22)	(0.23)	(0.32)	(0.31)	(0.36)	(0.47)
Heart attack	4.53	4.69	-0.16	2.86	2.48	0.38
	(0.25)	(0.25)	(0.35)	(0.40)	(0.36)	(0.54)
Stroke	3.73	3.46	0.28	1.49	1.32	0.16
	(0.23)	(0.21)	(0.31)	(0.29)	(0.27)	(0.39)
Emphysema	2.06	1.80	0.26	1.48	0.72	0.77
	(0.17)	(0.16)	(0.23)	(0.29)	(0.20)	(0.35)*
Overweight	28.96	29.07	-0.10	34.38	34.58	-0.20
	(0.55)	(0.53)	(0.76)	(1.14)	(1.12)	(1.59)
Chronic bronchitis	6.12	5.91	0.21	6.01	6.23	-0.22
	(0.29)	(0.28)	(0.40)	(0.57)	(0.57)	(0.80)
Liver condition	3.32	3.12	0.20	4.35	4.19	0.16
	(0.22)	(0.20)	(0.30)	(0.49)	(0.47)	(0.68)
Any condition, including	63.99	62.74	1.25	70.01	67.54	2.46
borderline diabetes	(0.58)	(0.58)	(0.82)	(1.10)	(1.11)	(1.56)
Total conditions (number)	1.55	1.51	0.04	1.54	1.49	0.05
	(0.02)	(0.02)	(0.029)	(0.04)	(0.04)	(0.05)
Observations	6943	7270		1751	1818	

Notes: The sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The full sample is limited to respondents who are ages 20 and older; the analysis sample is limited to respondents who are matched to SSA data, who are not entitled to DI, OA, spousal, or survivor benefits prior to the survey, and who are ages 40 to 61. Estimates are conditional on non-missing values and are in percentage points, unless otherwise noted. Standard errors are in parentheses. In the difference column, * indicates significance at the 5 percent level.

Table 4: Laboratory and Examination Results

	Full Sample			Analysis Sample		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Diabetes, including	38.24	-	-	42.95	-	-
borderline	(0.60)			(1.21)		
Diabetes	9.91	-	-	10.39	-	-
	(0.37)			(0.75)		
High LDL cholesterol,	37.46	-	-	42.49	-	-
including borderline	(0.63)			(1.27)		
High LDL cholesterol	13.44	-	-	15.61	-	-
	(0.44)			(0.93)		
High triglycerides,	36.26	-	-	37.66	-	-
including borderline	(0.60)			(1.19)		
High triglycerides	20.26	-	-	21.42	-	-
	(0.50)			(1.01)		
Any condition, including	69.24	-	-	73.52	-	-
borderline	(0.60)			(1.13)		
Any condition	32.83	-	-	35.68	-	-
	(0.61)			(1.23)		
Total conditions, including	1.08	-	-	1.19	-	-
borderline (number)	(0.01)			(0.02)		
Total conditions (number)	0.39	-	-	0.43	-	-
	(0.01)			(0.02)		
High glycohemoglobin	8.68	9.36	-0.67	8.65	10.02	-1.37
	(0.35)	(0.35)	(0.49)	(0.68)	(0.72)	(0.99)
High total cholesterol,	49.56	51.70	-2.13	54.67	60.02	-5.36
including borderline	(0.62)	(0.61)	(0.87)*	(1.22)	(1.18)	(1.70)*
High total cholesterol	17.32	18.43	-1.11	19.45	21.49	-2.04
	(0.47)	(0.47)	(0.67)	(0.97)	(0.99)	(1.39)
Low HDL cholesterol	74.58	73.03	1.55	75.88	73.41	2.47
	(0.66)	(0.67)	(0.94)	(1.27)	(1.31)	(1.82)
High blood pressure	22.36	21.48	0.88	18.84	19.91	-1.06
	(0.52)	(0.50)	(0.72)	(0.96)	(0.96)	(1.36)
Body mass index (index)	28.29	28.36	-0.07	29.00	29.16	-0.16
	(0.08)	(0.08)	(0.11)	(0.15)	(0.15)	(0.22)
Observations	6943	7270		1751	1818	

Notes: The sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The full sample is limited to respondents who are ages 20 and older; the analysis sample is limited to respondents who are matched to SSA data, who are not entitled to DI, OA, spousal, or survivor benefits prior to the survey, and who are ages 40 to 61. Estimates are conditional on non-missing values and are in percentage points, unless otherwise noted. Standard errors are in parentheses. In the difference column, * indicates significance at the 5 percent level.

Table 5: New Diagnoses

	Full Sample			Analysis Sample		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Diabetes, including	29.03	-	-	33.69	-	-
borderline	(0.56)			(1.16)		
Diabetes	3.08	-	-	3.17	-	-
	(0.21)			(0.43)		
High LDL cholesterol,	23.96	-	-	24.98	-	-
including borderline	(0.55)			(1.11)		
High LDL cholesterol	7.38	-	-	7.80	-	-
	(0.34)			(0.69)		
High triglycerides,	22.43	-	-	20.22	-	-
including borderline	(0.52)			(0.99)		
High triglycerides	11.79	-	-	10.74	-	-
	(0.40)			(0.76)		
Any condition, including	53.66	-	-	54.73	-	-
borderline	(0.65)			(1.28)		
Any condition	18.57	-	-	18.40	-	-
	(0.50)			(0.99)		
Total conditions, including	0.74	-	-	77.66	-	-
borderline (number)	(0.01)			(2.18)		
Total conditions (number)	0.08	-	-	8.87	-	-
	(0.00)			(0.73)		
High total cholesterol,	31.83	34.12	-2.29	31.79	36.80	-5.01
including borderline	(0.58)	(0.58)	(0.82)*	(1.14)	(1.16)	(1.63)*
High total cholesterol	7.96	7.88	0.08	10.48	11.15	-0.67
	(0.34)	(0.33)	(0.47)	(0.75)	(0.76)	(1.07)
Observations	6943	7270		672	659	

Notes: The sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The full sample is limited to respondents who are ages 20 and older; the analysis sample is limited to respondents who are matched to SSA data, who are not entitled to DI, OA, spousal, or survivor benefits prior to the survey, and who are ages 40 to 61. Estimates are conditional on non-missing values and are in percentage points, unless otherwise noted. Standard errors are in parentheses. In the difference column, * indicates significance at the 5 percent level.

Table 6: Linear Probability Model of Benefit Entitlement

Specification	(1)	(2)	(3)	(4)	(5)
Morning	-1.23	-1.65	-0.48	-0.60	-9.89
	(1.03)	(0.84)*	(0.71)	(0.71)	(4.45)*
Morning*(Age 59 to 61)			-9.44		
			(4.45)*		
Male		-0.07	-0.09	0.79	-5.18
		(0.88)	(0.88)	(0.74)	(5.31)
Black		-1.27	-1.29	-0.26	-7.42
		(1.18)	(1.18)	(1.03)	(7.01)
Other race		-1.23	-1.25	-0.12	-7.58
		(1.13)	(1.12)	(0.95)	(6.15)
High school diploma		0.88	0.82	-0.35	3.95
		(1.36)	(1.36)	(1.19)	(6.64)
Some college or more		-1.20	-1.20	0.10	-10.32
		(1.04)	(1.04)	(0.88)	(5.74)
Single		-1.95	-2.03	1.05	-22.53
		(1.70)	(1.70)	(1.45)	(9.07)*
Other marital status		-1.67	-1.65	1.20	-10.85
		(1.54)	(1.53)	(1.32)	(6.45)*
Married with children		-1.65	-1.72	0.21	-8.74
		(1.23)	(1.23)	(1.02)	(5.23)
Diabetes, including		1.02	1.36	-2.46	19.64
borderline (Q)		(4.03)	(3.99)	(2.91)	(12.65)
Diabetes (Q)		2.73	2.24	7.07	-17.26
		(4.43)	(4.40)	(3.41)*	(14.05)
High cholesterol (Q)		-0.67	-0.61	0.13	-5.41
		(1.07)	(1.07)	(0.92)	(4.86)
High glycohemoglobin (L)		1.27	1.16	1.26	-1.52
		(2.34)	(2.34)	(2.09)	(8.47)
High total cholesterol		0.40	0.37	-0.14	4.77
including borderline (L)		(0.93)	(0.92)	(0.77)	(5.23)
High total cholesterol (L)		2.39	2.35	1.17	4.82
		(1.26)	(1.26)	(1.10)	(5.91)
Ages	40 to 61	40 to 61	40 to 61	40 to 58	59 to 61
Control variables	No	Yes	Yes	Yes	Yes
Dependent variable mean	10.56	10.56	10.56	3.72	58.85
R-square	0.04	0.38	0.38	0.12	0.29
Observations	3569	3569	3569	3126	443

Notes: The analysis sample is derived from the Continuous National Health and Nutrition Examination Survey. (Q) indicates information derived from the at-home questionnaire, and (L) indicates information derived from laboratory tests. See Appendix for further discussion of control variables. Estimates are in percentage points. * indicates significance at the 5 percent level.

Table 7: Probit and Bivariate Probit Model of Entitlement

Specification	(1)	(2)	(3)	(4)	(5)
Morning	-0.32	-0.23	-0.15	-0.07	0.01
	(0.14)*	(0.14)	(0.14)	(0.14)	(0.14)
Male	-0.17	-0.16	-0.16	-0.16	-0.15
	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)
Black	-0.22	-0.21	-0.20	-0.20	-0.19
	(0.21)	(0.21)	(0.21)	(0.21)	(0.21)
Other race	-0.27	-0.27	-0.26	-0.26	-0.26
	(0.19)	(0.19)	(0.19)	(0.19)	(0.19)
High school diploma	0.11	0.11	0.11	0.11	0.11
	(0.21)	(0.21)	(0.21)	(0.21)	(0.21)
Some college or more	-0.31	-0.31	-0.31	-0.30	-0.30
	(0.19)	(0.19)	(0.19)	(0.19)	(0.19)
Single	-0.74	-0.73	-0.73	-0.71	-0.70
	(0.27)*	(0.27)*	(0.27)*	(0.27)*	(0.27)*
Other marital status	-0.37	-0.38	-0.38	-0.38	-0.39
	(0.21)	(0.21)	(0.21)	(0.21)	(0.21)
Married with children	-0.31	-0.30	-0.30	-0.29	-0.28
	(0.19)	(0.19)	(0.19)	(0.19)	(0.19)
Diabetes, including	0.66	0.65	0.63	0.62	0.60
borderline (Q)	(0.47)	(0.47)	(0.47)	(0.47)	(0.47)
Diabetes (Q)	-0.53	-0.51	-0.49	-0.46	-0.44
	(0.52)	(0.52)	(0.52)	(0.52)	(0.52)
High cholesterol (Q)	-0.19	-0.19	-0.20	-0.20	-0.21
	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)
High glycohemoglobin (L)	-0.08	-0.07	-0.07	-0.06	-0.05
	(0.29)	(0.29)	(0.29)	(0.28)	(0.28)
High total cholesterol,	0.20	0.21	0.21	0.22	0.23
including borderline (L)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)
High total cholesterol (L)	0.12	0.12	0.13	0.13	0.13
	(0.20)	(0.20)	(0.20)	(0.20)	(0.19)
Constraint: ρ	0.00	0.05	0.10	0.15	0.20
Dependent variable mean	58.85	58.85	58.85	58.85	58.85
Observations	443	443	443	443	443

Notes: The analysis sample is derived from the Continuous National Health and Nutrition Examination Survey. (Q) indicates information derived from the at-home questionnaire, and (L) indicates information derived from laboratory tests. See Appendix for further discussion of control variables. The parameter ρ represents the covariance of unobservables in the model of morning exam and the model of Social Security benefit entitlement. * indicates significance at the 5 percent level.

Table 8: Linear Probability Model of Benefit Entitlement

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Interaction term	Male	Married	High education	Labor force	DI insured	Any health insurance	Borderline Diabetes (Q)	Borderline high cholesterol (Q)
Morning	-7.29	-13.02	-1.40	-4.47	3.80	-10.30	-11.30	-12.42
	(6.30)	(8.50)	(6.00)	(7.13)	(8.48)	(9.98)	(5.07)	(5.93)
Morning*Interaction	-5.20	4.51	-19.09	-8.30	-19.48	0.51	7.52	5.90
	(8.89)	(9.90)	(9.22)	(9.25)	(10.14)	(11.37)	(11.16)	(8.84)
Observations	443	443	443	443	443	443	443	443

Notes: The analysis sample is derived from the Continuous National Health and Nutrition Examination Survey. See Appendix for further discussion of control variables. Estimates are in percentage points. * indicates significance at the 5 percent level.

Table 9: Linear Probability Model of Any Quarters of Coverage

Specification	(1)	(2)	(3)
Morning	3.12	2.52	1.48
	(1.54)*	(1.12)*	(1.17)
Morning*(Age 59 to 61)			8.41
			(3.85)*
Male		-1.38	-1.37
		(1.26)	(1.26)
Black		-2.12	-2.10
		(1.57)	(1.57)
Other race		0.02	0.03
		(1.53)	(1.53)
High school diploma		-3.10	-3.06
		(1.82)	(1.82)
Some college or more		0.19	0.18
		(1.44)	(1.44)
Single		2.94	3.00
		(2.10)	(2.10)
Other marital status		1.83	1.82
		(1.94)	(1.94)
Married with children		2.51	2.58
		(1.58)	(1.58)
Diabetes, including		-2.80	-3.10
borderline (Q)		(4.38)	(4.40)
Diabetes (Q)		1.69	2.12
		(4.98)	(5.01)
High cholesterol (Q)		-0.56	-0.62
		(1.33)	(1.33)
High glycohemoglobin (L)		-6.16	-6.07
		(2.87)*	(2.87)*
High total cholesterol,		-0.19	-0.17
including borderline (L)		(1.28)	(1.27)
High total cholesterol (L)		-0.87	-0.84
		(1.66)	(1.66)
Ages	40 to 61	40 to 61	40 to 61
Control variables	No	Yes	Yes
Dependent variable mean	69.63	69.63	69.63
R-square	0.00	0.49	0.49
Observations	3569	3569	3569

Notes: The analysis sample is derived from the Continuous National Health and Nutrition Examination Survey. (Q) indicates information derived from the at-home questionnaire, and (L) indicates information derived from laboratory tests. See Appendix for further discussion of control variables. Estimates are in percentage points. * indicates significance at the 5 percent level.

Appendix

The models of benefit entitlement and Social Security quarters of coverage include control variables for demographic characteristics, labor supply and health insurance coverage, self-reported health characteristics, and results from laboratory tests administered to both groups. The models also contain dummy variables for each characteristic with missing values, equaling one if missing and zero otherwise. Summary statistics regarding missing values are reported in Appendix Table 3.

In regards to demographic characteristics, the models control for individual age fixed effects, sex (male and female), race (white, black, and other), education (less than high school, high school diploma, and some college or more), marital status (married, single, and other), and an indicator for married and living with three or more family members. This variable serves as a proxy for married couples with children.

In regards to labor supply, the models control for labor force participation, employed status, and full-time employed status. Full-time employed status is measured as being employed and working 40 hours or more hours. The models also control for family income to poverty ratio (<1, 1-2.99, 3-4.99, and >5), any Social Security quarters of coverage at the time of the survey, and DI insured status. The models also control for any health insurance coverage at the time of the survey.

In regards to self-reported health characteristics, the models control for self-reported borderline diabetes, diabetes, high total cholesterol, and high blood pressure. The models also control for other self-reported conditions: arthritis, health failure, heart disease, angina, heart attack, stroke, emphysema, overweight, chronic bronchitis, and liver condition. A missing value for any one of these other conditions is controlled using an indicator variable, equaling one if missing and zero otherwise. This variable is labeled in Appendix Table 8 as "self-reported diagnosis." In the tables, self-reported conditions labeled with "(Q)", indicating that this information is derived from the health questionnaire during the at-home survey.

In regards to laboratory and examination results, the models control for high glycohemoglobin A1C, at least borderline high total cholesterol, high total cholesterol, high HDL cholesterol, high blood pressure, and BMI. In the tables, laboratory and examination results are labeled with "(L)", indicating that this information is derived from MEC exam.

Appendix Table 1: Diagnostic Criteria

Condition	Criteria	Morning	Afternoon
Diabetes, including borderline (plasma glucose)	>100 mg/dL	Yes	No
Diabetes (plasma glucose)	>160 mg/dL	Yes	No
High LDL cholesterol, including borderline	>130 mg/dL	Yes	No
High LDL cholesterol	>160 mg/dL	Yes	No
High triglycerides, including borderline	>150	Yes	No
High triglycerides	>200	Yes	No
High glycohemoglobin A1C	> 6.4 percent	Yes	Yes
High total cholesterol, including borderline	>200 mg/dL	Yes	Yes
High total cholesterol	>240 mg/dL	Yes	Yes
Low HDL cholesterol	<59 mg/dL	Yes	Yes
High blood pressure	>140/90 mmHg	Yes	Yes

Notes: The criteria for diabetes and high glycohemoglobin A1C come from the National Institute of Diabetes, Digestive, and Kidney Diseases. The criteria for cholesterol come from the National Heart, Blood, and Lung Institute. In regards to the criteria for blood pressure, the numerator refers to systolic, and the denominator refers to diastolic.

Appendix Table 2: Sample Restrictions

	Morning	Afternoon	Difference
NHANES Sample	[6943]	[7270]	
SSA match	84.70	85.67	-0.96
	(0.43)	(0.41)	(0.60)
	[5881]	[6228]	
No previous SSA benefits	68.36	68.03	-0.32
	(0.61)	(0.59)	(0.85)
	[4020]	[4237]	
Ages 40 to 61	44.23	43.52	0.71
	(0.78)	(0.76)	(1.09)
	[1778]	[1844]	
Not deceased by prior year four	98.76	98.70	0.06
	(0.26)	(0.26)	(0.37)
	[1756]	[1820]	
No missing values for select variables	[1751]	[1818]	

Notes: The sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. The sample restrictions are applied to the full sample, which is restricted to respondents who are ages 20 and older. SSA benefits refer to DI, OA, spousal, or survivor benefits. Estimates are in percentage points. Standard errors are in parentheses, and observations are in brackets. In the difference column, * indicates significance at the 5 percent level.

Appendix Table 3: Missing Values of Control Variables - Analysis Sample

	Ages 40 to 61			Ages 40 to 58			Ages 59 to 61		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Marital status	3.31	3.52	-0.21	3.49	3.48	0.00	2.16	3.79	-1.64
	(0.43)	(0.43)	(0.61)	(0.47)	(0.46)	(0.66)	(0.96)	(1.32)	(1.63)
Family poverty income	5.77	6.16	-0.39	5.73	6.10	-0.37	6.03	6.64	-0.60
ratio	(0.56)	(0.56)	(0.79)	(0.60)	(0.60)	(0.84)	(1.57)	(1.72)	(2.32)
Employment	0.06	0.06	0.00	0.07	0.06	0.00	0.00	0.00	0.00
	(0.06)	(0.06)	(0.08)	(0.07)	(0.06)	(0.09)			
Any health insurance	0.97	0.99	-0.02	1.12	1.12	0.00	0.00	0.00	0.00
	(0.23)	(0.23)	(0.33)	(0.27)	(0.26)	(0.38)			
High blood	0.57	0.50	0.08	0.59	0.50	0.09	0.43	0.47	-0.04
pressure (Q)	(0.18)	(0.16)	(0.24)	(0.20)	(0.18)	(0.26)	(0.43)	(0.47)	(0.64)
Self-reported	0.80	1.05	-0.25	0.72	0.87	-0.15	1.29	2.37	-1.08
diagnosis (Q)	(0.21)	(0.24)	(0.32)	(0.22)	(0.23)	(0.32)	(0.74)	(1.05)	(1.29)
Glycohemoglobin (Q)	3.60	3.41	0.19	3.62	3.17	0.45	3.45	5.21	-1.76
	(0.45)	(0.43)	(0.62)	(0.48)	(0.44)	(0.65)	(1.20)	(1.53)	(1.95)
Total cholesterol (L)	5.14	4.79	0.35	5.00	4.36	0.65	6.03	8.06	-2.02
	(0.53)	(0.50)	(0.73)	(0.56)	(0.51)	(0.76)	(1.57)	(1.88)	(2.45)
HDL cholesterol (L)	34.89	36.91	-2.01	34.63	36.15	-1.53	36.64	42.65	-6.02
	(1.14)	(1.13)	(1.61)	(1.22)	(1.20)	(1.71)	(3.17)	(3.41)	(4.66)
High blood pressure (L)	5.14	4.40	0.74	5.46	4.54	0.92	3.02	3.32	-0.30
	(0.53)	(0.48)	(0.71)	(0.58)	(0.52)	(0.78)	(1.13)	(1.24)	(1.67)
Body mass index (L)	1.94	2.20	-0.26	2.04	2.24	-0.20	1.29	1.90	-0.60
	(0.33)	(0.34)	(0.48)	(0.36)	(0.37)	(0.52)	(0.74)	(0.94)	(1.20)
Observations	1751	1818		1519	1607		232	211	

Notes: The analysis sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. (Q) indicates information derived from the at-home questionnaire, and (L) indicates information derived from laboratory tests. Standard errors are in parentheses. In the difference column, * indicates significance at the 5 percent level.

Appendix Table 4: Demographics

	Ages 40 to 58			Ages 59 to 61		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Age (years)	48.07	47.90	0.16	60.12	60.13	-0.02
	(0.14)	(0.13)	(0.19)	(0.05)	(0.05)	(0.07)
Male	50.30	50.53	-0.23	49.14	52.61	-3.47
	(1.28)	(1.25)	(1.79)	(3.29)	(3.45)	(4.76)
White	50.56	49.60	0.96	55.60	48.82	6.79
	(1.28)	(1.25)	(1.79)	(3.27)	(3.45)	(4.75)
Black	20.54	21.53	-0.99	15.95	18.96	-3.01
	(1.04)	(1.03)	(1.46)	(2.41)	(2.70)	(3.62)
Other race	28.90	28.87	0.03	28.45	32.23	-3.78
	(1.16)	(1.13)	(1.62)	(2.97)	(3.23)	(4.38)
Less than high school	26.53	24.83	1.70	31.03	34.12	-3.09
	(1.13)	(1.08)	(1.56)	(3.04)	(3.27)	(4.47)
High school	22.45	23.21	-0.76	21.98	21.33	0.66
	(1.07)	(1.05)	(1.50)	(2.72)	(2.83)	(3.93)
Some college or more	51.02	51.96	-0.94	46.98	44.55	2.43
	(1.28)	(1.25)	(1.79)	(3.28)	(3.43)	(4.75)
Married	66.58	65.44	1.13	70.48	71.43	-0.94
	(1.23)	(1.21)	(1.73)	(3.03)	(3.18)	(4.39)
Single	13.17	14.57	-1.41	7.05	10.34	-3.30
	(0.88)	(0.90)	(1.26)	(1.70)	(2.14)	(2.74)
Other marital status	20.26	19.99	0.27	22.47	18.23	4.24
	(1.05)	(1.02)	(1.46)	(2.78)	(2.72)	(3.88)
Married & three or	44.88	46.94	-2.05	22.03	29.06	-7.04
more family members	(1.30)	(1.27)	(1.82)	(2.76)	(3.19)	(4.22)
Observations	1519	1607		232	211	

Notes: The analysis sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. Estimates are conditional on non-missing values and are in percentage points, unless otherwise noted. Standard errors are in parentheses. In the difference column, * indicates significance at the 5 percent level.

Appendix Table 5: Labor Supply and Health Insurance

	Ages 40 to 58			Ages 59 to 61		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Labor force	80.78	78.72	2.06	65.95	65.88	0.07
participation	(1.01)	(1.02)	(1.44)	(3.12)	(3.27)	(4.520
Employed	75.71	72.99	2.71	60.78	60.19	0.59
	(1.10)	(1.11)	(1.56)	(3.21)	(3.38)	(4.66)
Employed full time	58.30	56.97	1.33	41.81	44.55	-2.74
	(1.27)	(1.24)	(1.77)	(3.25)	(3.43)	(4.72)
Family poverty income	13.13	15.77	-2.64	12.84	11.17	1.68
ratio <1	(0.89)	(0.94)	(1.30)*	(2.27)	(2.25)	(3.20)
Family poverty income	19.62	17.03	2.59	15.60	21.83	-6.23
ratio 1-2.99	(1.05)	(0.97)	(1.43)	(2.46)	(2.95)	(3.84)
Family poverty income	38.06	41.29	-3.23	44.04	40.10	3.94
ratio 3-4.99	(1.28)	(1.27)	(1.80)	(3.37)	(3.50)	(4.86)
Family poverty income	29.19	25.91	3.28	27.52	26.90	0.62
ratio 5+	(1.20)	(1.13)	(1.65)*	(3.03)	(3.17)	(4.38)
Quarters of coverage -	77.68	75.30	2.39	63.79	64.45	-0.66
any	(1.07)	(1.08)	(1.52)	(3.16)	(3.30)	(4.57)
DI insured	74.33	74.98	-0.66	69.83	72.51	-2.68
	(1.12)	(1.08)	(1.56)	(3.02)	(3.08)	(4.31)
Health insurance -	80.16	79.17	0.99	81.47	80.57	0.90
any	(1.03)	(1.02)	(1.45)	(2.56)	(2.73)	(3.74)
Health insurance -	71.72	71.01	0.70	69.26	69.67	-0.40
private	(1.17)	(1.14)	(1.63)	(3.04)	(3.17)	(4.40)
Health insurance -	70.51	69.89	0.62	57.45	59.52	-2.08
employer	(2.42)	(2.41)	(3.42)	(7.29)	(7.67)	(10.58)
Observations	1519	1607		232	211	

Notes: The analysis sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. Estimates are conditional on non-missing values and are in percentage points, unless otherwise noted. Data on employer-provided health insurance is available only for the 2003/2004 sample. Standard errors are in parentheses. In the difference column, * indicates significance at the 5 percent level.

Appendix Table 6: Self-Reported Health

	Ages 40 to 58			Ages 59 to 61		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Diabetes, including	9.28	9.71	-0.43	16.38	22.27	-5.90
borderline	(0.74)	(0.74)	(1.05)	(2.44)	(2.87)	(2.87)*
Diabetes	8.36	8.53	-0.16	12.93	20.38	-7.45
	(0.71)	(0.70)	(1.00)	(2.21)	(2.78)	(2.78)*
High cholesterol	30.55	28.38	2.17	46.55	41.23	5.32
	(1.18)	(1.12)	(1.63)	(3.28)	(3.40)	(3.40)
High blood pressure	29.21	29.27	-0.06	44.16	46.67	-2.51
	(1.17)	(1.14)	(1.63)	(3.27)	(3.45)	(3.45)
Arthritis	22.27	19.56	2.70	35.93	31.75	4.18
	(1.07)	(0.99)	(1.46)	(3.16)	(3.21)	(3.21)
Heart failure	1.65	1.12	0.53	1.29	2.84	-1.55
	(0.33)	(0.26)	(0.42)	(0.74)	(1.15)	(1.15)
Heart disease	2.11	1.81	0.30	5.60	6.22	-0.62
	(0.37)	(0.33)	(0.50)	(1.51)	(1.67)	(1.67)
Angina	1.52	2.43	-0.91	2.60	1.90	0.69
	(0.31)	(0.38)	(0.50)	(1.05)	(0.95)	(0.95)
Heart attack	2.44	2.37	0.07	5.60	3.32	2.29
	(0.40)	(0.38)	(0.55)	(1.51)	(1.24)	(1.24)
Stroke	1.52	1.31	0.21	1.29	1.42	-0.13
	(0.31)	(0.28)	(0.42)	(0.74)	(0.82)	(0.82)
Emphysema	1.25	0.68	0.57	3.02	0.95	2.07
	(0.29)	(0.21)	(0.35)	(1.13)	(0.67)	(0.67)*
Overweight	33.64	34.00	-0.36	39.22	39.05	0.18
	(1.21)	(1.18)	(1.69)	(3.21)	(3.37)	(3.37)
Chronic bronchitis	6.20	6.05	0.15	4.74	7.58	-2.84
	(0.62)	(0.60)	(0.86)	(1.40)	(1.83)	(1.83)
Liver condition	4.48	4.30	0.18	3.46	3.33	0.13
	(0.53)	(0.51)	(0.73)	(1.21)	(1.24)	(1.24)
Any condition, including	67.65	65.62	2.03	85.53	82.44	3.09
borderline diabetes	(1.21)	(1.19)	(1.70)	(2.34)	(2.66)	(2.66)
Total conditions (number)	1.46	1.41	0.05	2.10	2.08	0.01
	(0.04)	(0.04)	(0.05)	(0.10)	(0.11)	(0.11)
Observations	1519	1607		232	211	

Notes: The analysis sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. Estimates are conditional on non-missing values and are in percentage points, unless otherwise noted. Standard errors are in parentheses. In the difference column, * indicates significance at the 5 percent level.

Appendix Table 7: Laboratory and Examination Results

	Ages 40 to 58			Ages 59 to 61		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Diabetes, including	41.28	-	-	53.81	-	-
borderline	(1.29)			(3.35)		
Diabetes	9.58	-	-	15.70	-	-
	(0.77)			(2.44)		
High LDL cholesterol,	42.12	-	-	44.88	-	-
including borderline	(1.36)			(3.48)		
High LDL cholesterol	15.45	-	-	16.59	-	-
	(1.00)			(2.60)		
High triglycerides,	35.86	-	-	49.54	-	-
including borderline	(1.26)			(3.39)		
High triglycerides	20.71	-	-	26.15	-	-
	(1.07)			(2.98)		
Any condition, including	71.68	-	-	85.37	-	-
borderline	(1.24)			(2.47)		
Any condition	34.40	-	-	43.90	-	-
	(1.31)			(3.47)		
Total conditions, including	1.15	-	-	1.45	-	-
borderline (number)	(0.03)			(0.07)		
Total conditions (number)	0.41	-	-	0.56	-	-
	(0.02)			(0.05)		
High glycohemoglobin	7.86	8.55	-0.69	13.84	21.50	-7.66
	(0.70)	(0.71)	(1.00)	(2.31)	(2.91)	(3.72)*
High total cholesterol,	53.85	59.08	-5.23	60.09	67.53	-7.43
including borderline	(1.31)	(1.25)	(1.82)*	(3.32)	(3.37)	(4.73)
High total cholesterol	19.20	20.95	-1.75	21.10	25.77	-4.67
	(1.04)	(1.04)	(1.47)	(2.77)	(3.15)	(4.19)
Low HDL cholesterol	76.64	73.29	3.34	70.75	74.38	-3.63
	(1.34)	(1.38)	(1.93)	(3.76)	(3.98)	(5.48)
High blood pressure	16.85	18.25	-1.40	31.56	32.35	-0.80
	(0.99)	(0.99)	(1.40)	(3.11)	(3.28)	(4.52)
BMI (index)	28.98	29.05	-0.08	29.17	29.99	-0.82
	(0.17)	(0.16)	(0.23)	(0.39)	(0.40)	(0.56)
Observations	1519	1607		232	211	

Notes: The analysis sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. Estimates are conditional on non-missing values and are in percentage points, unless otherwise noted. Standard errors are in parentheses. In the difference column, * indicates significance at the 5 percent level.

Appendix Table 8: New Diagnoses

	Ages 40 to 58			Ages 59 to 61		
	Morning	Afternoon	Difference	Morning	Afternoon	Difference
Diabetes, including	32.80	-	-	39.46	-	-
borderline	(1.23)			(3.28)		
Diabetes	2.76	-	-	5.83	-	-
	(0.43)			(1.57)		
High LDL cholesterol,	25.00	-	-	24.88	-	-
including borderline	(1.19)			(3.03)		
High LDL cholesterol	7.58	-	-	9.27	-	-
	(0.73)			(2.03)		
High triglycerides,	19.74	-	-	23.39	-	-
including borderline	(1.05)			(2.87)		
High triglycerides	10.63	-	-	11.47	-	-
	(0.81)			(2.16)		
Any condition, including	53.99	-	-	59.51	-	-
borderline	(1.37)			(3.44)		
Any condition	17.62	-	-	23.41	-	-
	(1.05)			(2.96)		
Total conditions, including	0.76	-	-	0.87	-	-
borderline (number)	(0.02)			(0.06)		
Total conditions (number)	0.08	-	-	0.12	-	-
	(0.01)			(0.02)		
High total cholesterol,	31.95	36.82	-4.88	30.73	36.60	-5.86
including borderline	(1.23)	(1.23)	(1.74)*	(3.13)	(3.47)	(4.67)
High total cholesterol	10.33	11.13	-0.80	11.47	11.34	0.13
	(0.80)	(0.80)	(1.13)	(2.16)	(2.28)	(3.14)
Observations	1519	1607		232	211	

Notes: The analysis sample is derived from the Continuous National Health and Nutrition Examination Survey, years 1999/2000, 2001/2002, and 2003/2004. Estimates are conditional on non-missing values and are in percentage points, unless otherwise noted. Standard errors are in parentheses. In the difference column, * indicates significance at the 5 percent level.