The Effect of Disability Insurance on Health Investment

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ABSTRACT

This paper examines whether individuals are more likely to know their health status after the advent of disability insurance. A potential disability payment increases the internal return of knowing one's health status by increasing expected benefits. The prevalence of diagnosed diabetes and diabetes (diagnosed and undiagnosed) among veteran males are examined before and after diabetes mellitus became a compensable disability under the Department of Veterans Affairs disability compensation program. The diagnostic rate of diabetes increased considerably immediately after policy implementation, and the onset of new diabetes cases can explain only a fraction of this growth.

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1 Introduction

The early detection of certain medical diseases and conditions has been an integral component of public health policy in the United States. For diseases and conditions such as diabetes, HIV, and certain cancers, early detection affords early treatment which substantially reduces the risk of severe morbidity and mortality.[1] Despite the potential health benefits of early detection, the direct and indirect costs of medical screening may discourage many individuals from seeking medical consultation and consequently knowing their health status.[2] In fact, health policies designed to increase medical screening rates generally involve reducing the direct costs born by the individual. But even when the cost of medical consultation is negligible, many health diseases and conditions remain undiagnosed. For example, despite the near zero costs of determining one's HIV status - testing is generally free, timely, and anonymous - the CDC reports that in 2003 approximately 24%-27% of individuals infected with HIV are undiagnosed (Glynn and Rhodes, 2005).

Considerably high undiagnosed rates when the cost of medical consultation is negligible may reflect that, among those undiagnosed, the benefit of knowing may be particularly low. For example, if the cost of medical treatment is high, then the potential benefits of early detection may not be realized. In this regard, the internal return of knowing one's health status should reflect both the costs of a medical consultation as well as the expected benefit derived from any new information that results. This study considers whether individuals are more likely to seek medical consultation in response to an increase in the benefit of knowing.

Instead of the health benefits of early detection, this paper identifies the benefit of knowing one's health status by the advent of disability insurance. Economic theory predicts that the availability of disability insurance may encourage health disinvestment by inducing moral hazard behavior[3]. But since the identification of specific conditions is a requisite for disability benefit eligibility, a potential disability payment may simultaneously increase the internal return of knowing one's health status. The empirical relationship between the availability of disability insurance benefits and health investment has been previously considered by Kubik

(1999), who concludes that cash assistance targeted to children with disabilities (namely Supplemental Security Income) encourages the detection and treatment of medical conditions in low-income children.

This study examines the rate of diagnosed diabetes and diabetes (diagnosed and undiagnosed) among the male Viet Nam Era veteran population before and after the implementation of an amendment to Title 38 (AT38) which 'presumptively' linked the onset of diabetes to Agent Orange exposure. While the relationship had been anecdotally causal, no consensus had been reached among the scientific research community. This changed in October, 2000, when the Institute of Medicine concluded that there was 'limited/suggestive' evidence that linked exposure to Agent Orange to the onset of diabetes. Based on this conclusion, the VA announced in November, 2000, that diabetes would become a compensable disability via AT38; and in July, 2001, AT38 was implemented.

In 2001, the VA estimated that 9% of the 2.3 million veterans had type II diabetes, and the implementation of AT38 would increase disability compensation expenditures by $3.3 billion over the first five years of its enactment (DVA, 2001). By December 2004, just over three years after the enactment of AT38, 167,000 Viet Nam Era veterans had a rated diabetes case, becoming most prevalent disability compensated by the VA disability compensation program among Viet Nam Era veterans (VBA, FY2004).

This study examines whether the rise in diabetes cases on the disability rolls can be partially explained by diabetics who determined their diabetes status only after diabetes became compensated. According to a study by the Center for Disease Control, nearly one-third of the 16.7 million (8.7%) diabetics in the US aged 20 and older remain undiagnosed (CDC, 2003). Therefore, it is plausible that at least some veterans had determined their diabetes status only after AT38 was implemented. Initial self-reported diabetes diagnostic rates among Viet Nam Era veterans were estimated from the National Health Interview Survey (NHIS) for survey years 1998 to 2003.[4] Figure 1 plots these estimated diagnostic rates along with the number of Viet Nam Era veteran beneficiaries, which illustrates a simultaneous increase in the prevalence of self-reported diabetes and disability compensation receipt among

Viet Nam Era veterans that was correlated with the implementation of AT38.

The National Health and Nutrition Examination Survey (NHANES) are used to obtain a triple-difference estimate of the prevalence of self-reported diagnosed diabetes between 1999/2000 and 2001/2002.[5] The non-linear probability model discriminates between non-veterans, veterans, and Viet Nam Era veterans. A limitation of the NHANES data is that period of service was not ascertained among veteran respondents. Thus, the empirical analyses, discussed in further detail below, refer to the probability of Viet Nam Era service conditional on age and veteran status.

Basic tabulations of self-reported diabetes in 1999/2000 and 2001/2002, similar to those presented in Figure 1, confirm a rise in self-reported diabetes among veterans most likely to have served during the Viet Nam Era, increasing by nearly 4 percentage points more compared to similarly aged non-veterans. The triple difference estimation yields an 8 percentage point increase. Using a subset of NHANES respondents who had taken a glucose test after reporting their diagnosed diabetes status, the increase in diabetes prevalence (diagnosed and undiagnosed) and false-positive responses can plausibly account for 25% and 50% of the observed rise in the percentage point rise in self-reported diabetes among Viet Nam Era veterans. Thus, approximately 25% of the rise in self-reported diabetes reflects the increased prevalence of diagnosed diabetes among the previously undiagnosed veteran population.

Section II outlines VA disability compensation program rules, documents the recent increase in DC beneficiary rolls and expenditures, and provides background information regarding the implementation of AT38. Section III contains the empirical analyses and results on the prevalence of diagnosed and undiagnosed diabetes, and Section IV provides concluding remarks.

2 VA Disability Compensation

2.1 Program Rules

Disability compensation payments are awarded to veterans with disabilities deemed to be service-connected, defined as a disease or injury either aggravated or acquired during active military service.[6] Compensation for multiple and/or partial disabilities is a defining feature of the VA disability compensation program - SSDI and SSI do not provide benefits for partial disabilities - and is quite common among disability compensation beneficiaries.[7] Disabilities and their severity are identified by the use of Veterans Benefits Administration's Schedule for Rating Disabilities. The Schedule defines and quantifies each disability using a disability percentage scale ranging from 0% (generally a non-compensable rate) to 100% (totally disabled) by increments of 10%. If a veteran exhibits multiple service-connected disabilities, a combined ratings table (based on residual capacity) is used to aggregate the severity ratings, and the final level of disability is rounded to the nearest multiple of 10%. The disability compensation benefit is determined by this combined degree of disability.

The VA considers the average reduction in earnings capacity associated with the combined degree of disability to determine the benefit amount.[8] The benefit amount increases nonlinearly with the combined degree of disability, i.e. higher combined disability rating results in greater relative benefit generosity, defined as the payment amount divided by the degree of disability. In 2001, payment amounts to a single veteran with no dependents whose combined disability rating was 10%, 50%, and 100%, were \$103, \$625, and \$2,163, respectively.[9]

Because the combined disability is based on residual capacity, the loss in earnings resulting from each individual disability are not considered additive for beneficiaries with multiple service-connected disabilities. For example, if a veteran has two separate disabilities both rated at 50%, only 50% of his or her ability is subject to the second 50% disability. The overall disability would therefore be 75%, which is subsequently rounded to 80%.[10] The effect of this inequitable calculation of the combined disability rating is somewhat attenuated by the fact that the total benefit amount increases nonlinearly with the combined degree of disability.

At the end of fiscal year 2001, just prior to the implementation of AT38, 749,554 million Viet Nam Era veterans (32.3% of all DC beneficiaries) were on the disability compensation rolls with a total of 2.01 million individual service-connected disabilities cases, averaging 2.77 disabilities per Viet Nam Era beneficiary. [11] Because the benefit amount is determined by residual functional capacity, the potential impact of AT38 on a beneficiary's disability payment depends on his or her initial disability ratings (unrounded combined disability rating). Table 1 illustrates the baseline benefit amount and the change in benefits resulting from an appended diabetes case, illustrating the varied incentives among Viet Nam Era veterans to seek compensation for diabetes after AT38's implementation. Thus, a veteran whose diabetes was rate at 10% (requiring a restricted diet only) and was not previously receiving disability compensation benefits (an initial rating of 0%) would receive $1,236 in benefits annually after AT38. The change in annual benefits may increase as the diabetes rating increases, but may increase or decrease as the initial rating increases. The change in benefits could be as large as $27,444 annually, resulting from a 100% diabetes rating and a 0% initial disability rating.

2.2 Amending Title 38

Agent Orange was an herbicide sprayed in all four military zones of Viet Nam to destroy foliage that would otherwise serve as cover for opposing forces. Soon after the Viet Nam War ended, Viet Nam Era veterans became increasingly concerned about the long term health effects that exposure to dioxin, a compound contained in Agent Orange, may have. In 1978, the VA established the Agent Orange Registry to monitor the long-term health consequences of Agent Orange; however, no conclusive evidence existed at that time which linked Agent Orange exposure to the onset of any determinable medical condition. Therefore, most veterans who sought disability compensation benefits for conditions perceived to have resulted from Agent Orange exposure were presumably denied.

Diabetes mellitus, commonly known as Type II diabetes, was perhaps the most common medical condition anecdotally associated with dioxin exposure. However, in 1994, a scientific review committee comprised of Institute of Medicine (IOM, 1994) researchers concluded that

there was inadequate or insufficient evidence to establish a causal association between dioxin exposure and the onset of diabetes.[12] This decision was reversed by the IOM in 1999, based on new research conducted by the National Institute for Occupational Safety and Health and the U.S. Air Force, concluding that there was limited or suggestive evidence of an association between dioxin exposure and diabetes. Its conclusion, which reversed the conclusion of three preceding committee publications, was published in a report, "Veterans and Agent Orange: Herbicide/Dioxin Exposure and Type 2 Diabetes," released in October, 2000 (IOM, 2000).

One month after this publication's release, the Acting Secretary announced that diabetes associated with Agent Orange exposure would be deemed a presumptively service-connected disability among Viet Nam Era veterans and henceforth compensable under the VA disability compensation program (DVA, 2000).[13] Presumption meant that Viet Nam Era veterans did not have to prove direct exposure to Agent Orange during their military service caused their medical problems. Veterans from other eras (e.g. Korean War) who were purportedly exposed to Agent Orange would also become eligible for benefits, but their exposure and consequent service-connectedness would not be presumed.

2.3 Recent Growth of VA Disability Compensation Rolls and Expenditures

Despite the specificity of the VA disability compensation eligibility criteria as well as the select population it serves, the size of VA disability compensation's payment expenditures and rolls are considerable compared to those of the SSDI and SSI programs. At the beginning of fiscal year 2002, 2.32 million living veterans (8.91% of the total US veteran population) received either disability compensation - approximately one-third and two-fifths the size of the SSDI and SSI rolls, respectively, in the same year. Additionally, VA disability compensation payment expenditures totaling $15.8 billion were approximately one-fourth and two-thirds the size of SSDI and SSI expenditures, respectively.[14]

The VA disability compensation rolls exhibited considerable growth in the past decade reflecting increases in the number of new Gulf War, Viet Nam Era, and 'All Other' veteran beneficiaries. From 1993 to 2003, the VA disability compensation rolls increased by 13.1%

(to 2.49 million beneficiaries in 2003) despite a decline in the overall veteran population of 10.9% (to 25.2 million veterans in 2005). Corresponding total real (CPI-adjusted) disability compensation expenditures increased roughly 55.3% between 1993 and 2003 (from $13.4 to $20.8 billion in 2003 dollars).

While the disability roll growth in earlier part of this period was predominately driven by new Gulf War veterans entering the disability compensation rolls, Viet Nam Era veterans represented a significant proportion of this growth in 2001, nearly 30 years after the Viet Nam Era ended. From the end of fiscal year 2001 to 2004, the number of Viet Nam Era veterans on the disability compensation rolls increased by nearly 20% (to 8.83 million in 2004, see Figure **??**), a particularly striking increase in growth above pre-trend levels.[15].

The impact of AT38 may have contributed significantly to the recent growth in disability rolls and expenditures. Prior to congressional review, it was estimated that approximately 220,000 Viet Nam Era veterans would be awarded benefits as a results of AT38 during the first five years of after its enactment (DVA News Release, May 2001). By December 2004, just over three years after the enactment of AT38, 167,000 Viet Nam Era veterans had a rated diabetes case (about 75% of its projected number of beneficiaries among the entire veteran population over five years).[16] Also, by the end of fiscal year 2004, diabetes became the most prevalent disability compensated by the VA disability compensation program among Viet Nam Era veterans (VBA, 2005). The rise in the number of compensated diabetes cases among Viet Nam Era veterans occurred simultaneously with an increase in DC expenditures among Viet Nam Era veterans. From 2000 to 2003, real (CPI-adjusted) disability compensation expenditures among Viet Nam Era veterans increased by 37.9% to $9.4 billion (real DC expenditures for Viet Nam Era veterans increased just 15% between 1997 and 2000).

The increase in the Viet Nam Era beneficiary roll growth and expenditures in the early 2000's also occurred simultaneously with the Veterans Claims Assistance Act (Public Law 106-475). The Veterans Claims Assistance Act of 2000, enacted in January, 2002, overturned the Morton vs. West decision (U.S. Court of Appeals, 1999) by reinstating the VA's responsibility to help veterans develop their disability claims. Consequently, the VA reworked 98,000 claims

that were denied under the Morton decision and allocated more time to process the 244,000 pending disability compensation and pension claims (GAO, 2002). The additional goal to cut the time to process claims in half may have contributed significantly to the rate in which disability claims are reviewed, and, as a result, an increase in the rate of disability roll growth above pre-trend levels.

While the reversal of the Morton versus West decision affected the disability rolls systemically (indeed, the rate of beneficiary roll growth increased among Gulf War veterans in FY2002 as well), AT38 affected both the number and composition of disability compensation beneficiaries. Because eligibility criteria of disability insurance programs are generally applied universally, the enactment of AT38, which mainly affected Viet Nam Era veterans, provides a unique opportunity to examine the impact of disability insurance on health investment. The next section considers whether the rise in compensated diabetes cases can be partially explained by veterans who had determined their diabetes status only after AT38 was implemented.

3 Prevalence of Diagnosed and Undiagnosed Diabetes

The Agent Orange Registry, established in 1978, provides comprehensive medical examinations for veterans concerned about their Agent Orange exposure. The examination, which is offered at all VA medical centers, pays particular attention to the detection of diabetes (DVA, 2004). Participation in the Agent Orange Registry is voluntary and available to all veterans who served in Viet Nam[17]. In 1999 and 2000, just prior to AT38, there were 5,377 and 7,957 examinations conducted through the registry. In 2001, the year AT38 was implemented, the number of examinations increased to 23,406 in 2001 (DVA, 2004).[18] The identification of medical conditions through the Registry is not a requisite for disability receipt, but the recent spike in the number of medical evaluations through the Registry suggests that individuals respond to the increased incentive to know their health status from the advent of disability insurance. The next subsection estimates whether the increased screening rates translated

into an increase in prevalence of self-reported diabetes among Viet Nam Era veterans.

3.1 Data Description

The 1999/2000 and 2001/2002 National Health and Nutrition Examination Survey (NHANES) were used to estimate the prevalence of self-reported diagnosed diabetes.[19] The advantage of the NHANES data is that, in addition to the prevalence of self-reported diagnosed diabetes, the prevalence of diabetes (diagnosed and undiagnosed) and false-positive responses can be estimated to yield a lower bound impact of AT38 on the prevalence of diagnosed diabetes. A limitation of NHANES data is that the period of military service was not ascertained among veteran respondents.

To plausibly identify veterans affected by AT38, the analyses refer to the probability of being a Viet Nam Era veteran conditional on veteran status and age. Figure 2 plots these conditional probability estimates, derived non-parametrically from 1% Census 2000 data, and clearly identifies the Viet Nam Era veteran population by the prominent spike in probability between ages 40 and 60. Veteran and non-veteran population estimates are also plotted in Figure 2, revealing the underlying age distribution of veterans and non-veterans. Clearly, the age composition of these two populations must be taken into account in the analyses.

The NHANES data are subset to include all males aged 21 to 70, yielding 3,769 observations. According to Figure 2, the proportion of veteran males increases nearly monotonically across these ages, increasing from 3.7% at age 21 to 68.5% at age 70.[20] Descriptive statistics by veteran status in 1999/2000 and 2001/2002 are contained in Tables 2 and 3. In Table 2, all observations are weighted by two-year sampling weights. In Table 3, veteran observations are weighted by the product of the survey weights and the probability of being a Viet Nam Era veteran, providing statistics among veterans most likely to have served during the Viet Nam Era. To derive comparably aged non-veteran statistics (Table 3), non-veterans were assigned probabilities of Viet Nam Era service had they served in the military and weighted accordingly.

The prevalence estimates of self-reported diabetes among veterans and non-veterans are

given by Table 2 and Table 3. From 1999/2000 to 2001/2002, the prevalence of diabetes among veterans increased by 3% points whereas the prevalence increased by just .5% points among non-veterans. The differential increase in self-reported diabetes among veterans and non-veterans is more pronounced at ages were veterans were most likely to have served during the Viet Nam Era - the rate of self-reported diabetes increased by nearly 4% points more among veterans most likely to have served during the Viet Nam Era relative to comparably aged non-veterans (Table 3). The observable risk factors associated with diabetes (e.g. body mass index, exercise, diet, and dioxin levels) do not seem to vary considerably between veterans and non-veterans (Table 3).

The prominent change in the prevalence of diabetes among veterans provides suggestive evidence that AT38 had an impact on the rate of self-reported diabetes. These analyses are merely preliminary since the incidence of diabetes and diabetes diagnoses may differ systematically among veterans compared to non-veterans. Additionally, the differential composition of Viet Nam Era veterans relative to comparably aged non-veterans may also affect the prevalence of self-reported diabetes. For example, in Tables 2 and 3, the proportion of whites among veterans is considerably greater than non-veterans. Veterans also have higher levels of educational attainment, are less likely to earn less than $35,000/year, and less likely to be uninsured. The next section estimates the prevalence of self-reported diabetes controlling for these systematic and observed compositional differences between non-veterans, veterans, and Viet Nam Era veterans.

3.2 Empirical Model

Systematic differences between veterans and non-veterans and compositional differences between Viet Nam Era veterans and both comparably aged non-veterans or non-Viet Nam Era veterans preclude a direct comparison of the prevalence of self-reported diabetes. To identify the impact of AT38 on the self-reported rate of diabetes, the analyses employs a multivariate, triple difference specification that discriminates between non-veterans, veterans, and Viet Nam Era veterans.

The probability of self-reported diabetes diagnosis is modeled using a non-linear probit model,

$$Prob[Dib_i = 1|.] = \Phi(D(.)), \tag{1}$$

where the index function is defined as,

$$\begin{aligned} D(.) = \alpha_0 + \alpha_1 I(after_i = 1) + \alpha_2 I(vet_i = 1) + \alpha_3 I(after_i = 1, vet_i = 1) + \\ \alpha_4 \hat{viet_i} + \alpha_5 \hat{viet_i}^2 + \alpha_6 I(after_i = 1)\hat{viet_i} + \beta X_i + \epsilon_i. \end{aligned} \tag{2}$$

As mentioned above, $\hat{viet_i} = \widehat{P[viet_i = 1|age_i, vet_i]}$, which is estimated non-parametrically from Census 2002 data. The $I(.)'s$ represent indicator functions and X_i is a set of control variables.

The parameter of interest is α_6 which reflects the triple difference effect (on the index function) of plausible Viet Nam Era service after AT38's implementation. Variables $I(vet_i = 1)$ and $I(vet_i = 1, after_i = 1)$ control for systematic differences in the prevalence and incidence of diabetes diagnosis among veterans and non-veterans. The additional, systematic difference between veterans and veterans most likely to have served during the Viet Nam Era are controlled captured by α_4 and α_5, which are identified by the implicit interaction of $\hat{viet_i}$ and $I(vet_i = 1)$, i.e. $\hat{viet_i} = I(vet_i = 1)\hat{viet_i}$. Since $\hat{viet_i}$, is a continuous continuous variable which imperfectly identifies the 'treated' group, the additional squared term, $\hat{viet_i}^2$, is included to further identify the fixed effect of Viet Nam Era veteran service on prevalence of self-reported diagnosed diabetes.

The set of control variables contain demographic factors of the individual that may affect the probability of diagnosed diabetes, including age_i (and age_i^2), race indicator ($I(white_i = 1)$), income, education, and body mass index (BMI_i). Interaction terms of age and veteran status are included to account for a veteran specific profile of diabetes diagnoses by age. Additional interaction terms of $I(white_i = 1)$ with $\hat{viet_i}$, $\hat{viet_i}^2$, and BMI_i are also included to control for the differential race composition of veterans.

3.3 Results

Point estimation results are presented in Table 4, Panel A. The degree of variable interaction and the nature of nonlinear probability models precludes a direct interpretation of these point estimates. All else equal, the results suggest that veterans are considerably less likely to report having been diagnosed with diabetes, although the implied fixed effect is not statistically significant. However, the veteran-specific profile of diabetes across age is more 'steep' compared to non-veterans, which was confirmed separately by estimating prevalence estimates by age for veterans and non-veterans. Most of the control variables have the expected effect; the probability increases with age and BMI and decreases with education and income. Additionally, the white fixed effect is negative and statistically significant (consistent with previous studies of diabetes prevalence across races, see CDC 2003), but the index function increases disproportionally more among whites as BMI increases.

The estimated magnitude of the interaction term of interest, α_6, is considerably larger than the after and vet/after interaction terms, although none of them are statistically significant. However, as mentioned above, interaction terms in non-linear models preclude a direct interpretation. To derive an estimated impact of α_6, the change in probability is calculated numerically among all veterans in 2001/2002. Post-estimation, *viet* variables were set to 1 (including interaction terms), so that all veterans are considered to have served during the Viet Nam Era. The estimated impact of α_6 is then calculated as,

$$\widehat{\theta(.)_i} = \Phi(I(after_i \widehat{=1)} viet_i = 1, .) - \Phi(I(after_i \widehat{=1)} viet_i = 0, .), \tag{3}$$

which, as mentioned above, assumes all veterans served during the Viet Nam Era.[21]
The estimated impact of α_6 among Viet Nam Era veterans is simply the average of $\widehat{\theta(.)_i}$ weighted by the product of $\hat{viet}_i$ and the probability sampling weights.

The result, given in Panel A, suggests a 7.6% point increase in the prevalence of Viet Nam Era veterans, although it is not statistically significant (t-statistic of 1.19). The model was estimated using $viet_i$ calculated using veterans status, age and race (Table 4, Panel B); and

veterans status, age, race and education (Table 4, Panel C). On the one hand, these estimates may be more precise in identifying veterans because utilizes more observable characteristics. But on the other hand, the number of individuals in each cell (particularly non-white cells) become smaller, yielding more variance in the predicted probabilities (which is not incorporated in the estimation as these probabilities are assumed fixed). The final specification, Panel C, indicates a 6.3% point increase in the prevalence of self-reported diabetes among Viet Nam Era veterans, but the standard error becomes smaller compared to Panel A.

In addition to the questionnaire component, a sample of NHANES respondents take a glucose test after a period of fasting which are used to estimate the prevalence of undiagnosed diabetes. Figure 3 plots individual t-statistics of $\widehat{\theta(.)_i}$ along the the distribution of fasting glucose levels among these respondents. The criteria for diabetes maintained by the American Diabetes association is a fasting glucose level $\geq$126 mg/dL, which may be considered marginally diagnosed diabetics. The figure suggests that the 'more significant' estimated effects of AT38 on the probability of diabetes diagnosis occurs at this margin among Viet Nam Era veterans.

3.4 Undiagnosed Diabetes

Mentioned above, the advantage of the NHANES data is that the prevalence of undiagnosed diabetes and false-positive responses can be estimated from a subsample of survey respondents who take a glucose test. The number of males who took a glucose test in 1999/2000 and 2001/2002 was 675 and 862, respectively. Based on this sample, four estimates can be calculated; diabetics who report having been diagnosed (true positives), diabetics who report not having been diagnosed (false negatives), non-diabetics who report having been diagnosed (false positives), and non-diabetics who report not having been diagnosed (true negatives). Diagnosis status was identified by the self-reported diagnosis variable, and diabetes status was estimated using the glucose test results (again, the criteria for diabetes maintained by the American Diabetes association is a fasting glucose level $\geq$126 mg/dL). A four-way table was constructed for veterans using Viet Nam Era and sampling weights (Table 5).

Based on this sample, the prevalence estimates of self-report diabetes in 1999/2000 (6.02%) and 2001/2002 (10.2%) are fairly consistent with the Table 3 (increasing from 6.13% to 11.5%). From this table, the observed 4% point rise in self reported diabetes can be decomposed into an increase in the prevalence of diabetes (diagnosed and undiagnosed) and false-positive responses. According to Table 4, the overall prevalence of diabetes increased just 1.07% points, and the prevalence of false-positives increased 1.72% points. Thus, approximately 25% of the 4% point rise in self-reported diabetes cannot be accounted by the combined effects of false-positives and the incidence of diabetes among Viet Nam Era veterans.

4 Concluding Remarks

This paper considers whether individuals respond to the increased incentive to know their health status due to the advent of disability insurance. First, the results show that the number of examinations through the Agent Orange Registry increased considerably immediately after AT38's implementation. Second, the results demonstrate a considerable rise in self-reported diabetes among Viet Nam Era veterans which coincides with the implementation of AT38. And finally, an estimated 25% of the rise in self-reported diabetes cannot be accounted for by an increase in diabetes prevalence or false-positive responses.

More generally, the results suggest that individuals respond to the increased incentive to know their health status through an increase in the benefit of knowing, which should be considered when designing health policies to encourage early medical screening. Additionally, the long run benefits of detecting emerging medical conditions early may outweigh the costs of offering these benefits. According to the American Diabetes Association, the direct and indirect expenditures attributable to diabetes in 2002 were estimated at $132 billion, with $39.8 billion attributable to lost workdays, restrictive activity days, mortality, and permanent disability alone (ADA, 2003).

In this study, however, the increase in the benefit of knowing was identified by the availability of disability insurance. While this may have increased the rate at which Viet Nam Era

veterans had been diagnosed for diabetes, a potential benefit may discourage an individual on the margin from abstaining from risky behaviors associated with the onset of diabetes. This is of particular concern with VA disability compensation payments where benefits increase as the severity of disability graduates.

Notes

[1]For example, the Center for Disease Control attributes some of the recent decline in cancer related deaths to increased cancer screening rates and advocates further increasing cancer screening rates to reduce the incidence of cancer related deaths (see USPTSF, 2002a; USPTSF, 2002b; and USPTSF, 2003).

[2]Recent evidence suggests that when individuals are enrolled in health insurance programs, which reduce the marginal cost of medical treatment, the diagnostic hazard of medical diseases and conditions increases (Schimmel, 2006).

[3]see Marshall (1976).

[4]Like the NHANES data, discussed below, the NHIS data reports whether a respondent had previously served in the military but does not ascertain period of service. The figure reflects annual prevalence estimates among veterans using weights equaling the product of the sampling weights contained in the NHIS data and the probability, conditional on age and veteran status, of having served during the Viet Nam Era.

[5]These are the same data used in CDC, 2003.

[6]The definition of active military service includes both war and peace time service.

[7]While SSDI does not explicitly compensate for partial disabilities, an SSDI applicant can satisfy the severity requirement of the general disability standard maintained by SSA - 'inability to engage in any substantial gainful activity' - with either a single impairment or a combination of impairments.

[8]"The Secretary shall adopt and apply a schedule of ratings of reductions in earning capacity resulting from specific injuries or combination of injuries based, as far as practicable, upon the average impairments of earning capacity resulting from such injuries in civil occupations (USC Title 38, Part II, Chapter 11, Subchapter VI, Section 1155)."

[9]Dependency benefits are payable to beneficiaries who have a combined disability rating that is at least 30%.

[10]In this manner, the combined ratings table precludes a beneficiary from receiving a combined disability rating greater than 100%.

[11]Among all compensated disabilities (5.97 million individual disabilities), approximately 90% of the were rated 30% or less, and nearly 75% of all beneficiaries (2.32 million in total) had a combined disability rating less than 50%.

[12]Subsequent IOM reports, Update 1996 and Update 1998, upheld this initial position.

[13]Currently, eleven diseases are presumptively service-connected due to Agent Orange exposure, including Hodgkin's disease, chronic lymphocytic leukemia, prostate cancer, and respiratory cancers.

[14]Veterans Benefits Administration Annual Benefits Reports, FY2001 (VA disability compensation figures), SSA Actuarial Publications, Statistical Tables - primary beneficiary and dependents (Social Security Disability Insurance figures), and 2004 Annual Report of the SSI Program - federal payments to all beneficiaries (SSI

figures).

[15]Interestingly, disability compensation participation rates became more associated with local economic conditions post-program expansion compared to years prior (Duggan, Rosenheck, Singleton, 2006)

[16]It should be noted that even if all 167,000 diabetes cases reflect newly enrolled beneficiaries, it accounts for just 12.6% of the beneficiary roll growth between 2002 and 2005.

[17]A veteran is not eligible for the Agent Orange Registry unless he or she served in Korea in 1968 or 1969 or was exposed to Agent Orange during military service

[18]The increase in examinations persisted in 2002 and 2003, with 23,548 and 30,836 examinations conducted, respectively.

[19]The survey data provide separate two year and four year sampling weights as well as strata and cluster variables that allow for pooling across all four years.

[20]Using sampling weights, the representation of veterans in both survey years remained constant at 1/3 (Table 2), but the share of Viet Nam Era veterans, determined solely by the age composition of veterans, increased somewhat from the 1999/2000 to 2001/2002 survey.

[21]The estimated variance of $\widehat{\theta(.)_i}$, using the delta method, is given by,
$\widehat{v(.)_i} = \frac{\partial \widehat{v(.)_i}}{\partial \widehat{\alpha}} \widehat{\Sigma} \frac{\partial \widehat{v(.)_i}}{\partial \widehat{\alpha}}'$, where $\widehat{\Sigma}$ is the robust covariance matrix of $\widehat{\alpha}$.

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Table 1: Initial Monthly Benefit and Change after AT38 by Diabetes Mellitus Rating
VA Disability Compensation Rate Tables: 12/01/01

A. Change in Monthly Benefit by Diabetes Mellitus Rating

Initial Rating	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Initial Benefit ($)	0	103	199	343	488	687	864	1081	1254	1410	2287
Diabetes Rating											
10%	103	96	144	145	199	177	0	0	0	0	0
20%	199	240	289	145	199	177	217	173	0	0	0
30%	343	385	289	344	376	394	217	173	156	0	0
60%	864	761	882	738	766	567	390	329	156	877	0
100%	2,287	2,184	2,088	1,944	1,799	1,600	1,423	1,206	1,033	877	0

B. Description of Diabetes Mellitus Severity: VBA Schedule for Rating Disabilities

10%: Manageable by restricted diet only
20%: Rating of 10% and requiring either insulin or hypoglycemic agent
40%: Requiring restricted diet, insulin, and regulation of activities
60%: Activities with episodes of ketoacidosis or hypoglycemic reactions requiring one or two hospitalizations per year or twice a month visits to a diabetic care provider, plus complications that would not be compensable if separately evaluated
100%: Requiring more than one daily injection of insulin, diet, and regulation of activities (avoidance of strenuous occupational and recreational activities)with episodes of ketoacidosis or hypoglycemic reactions requiring at least three hospitalizations per year or weekly visits to a diabetic care provider, plus either progressive loss of weight and strength or complications that would be compensable if separately evaluated

Table 2: Sample Characteristics of Veterans and Non-Veterans: Sample Weights
NHANES 1999/2000 and 2001/2002: Males Ages 21 to 70

	Veterans		**Non-Veterans**	
Survey Year	**1999/2000**	**2001/2002**	**1999/2000**	**2001/2002**
Observations	404	498	1,332	1,535
Est. Population in Millions	20.78	21.20	59.86	65.04
% Viet Nam Era	32.03	41.45	-	-
	(0.0175)	(0.0182)		
Age	49.95	50.44	40.09	38.39
	(0.621)	(0.675)	(0.344)	(0.484)
% White	86.24	82.06	65.11	69.43
	(0.0184)	(0.0212)	(0.0320)	(0.0238)
% Less than High School	13.60	9.47	27.11	20.16
	(0.0168)	(0.0185)	(0.0223)	(0.0134)
% More than High School	57.56	61.38	50.16	55.31
	(0.0359)	(0.0342)	(0.0323)	(0.0205)
% Household Income	24.27	22.75	32.40	29.27
$\leq$\$35,000	(0.0506)	(0.0211)	(0.0240)	(0.0182)
% No Insurance	11.52	10.37	26.27	23.31
	(0.0268)	(0.0150)	(0.0183)	(0.0128)
% Self-Reported Diabetes	7.62	10.63	4.52	5.16
	(0.0115)	(0.0183)	(0.00725)	(0.00490)
Body Mass Index	28.47	28.50	27.54	27.89
	(0.353)	(0.224)	(0.295)	(0.201)
Dioxin Level (fg/g) (b)	25.5	17.1	19.2	15.8
	(6.73)	(1.17)	(.471)	(.689)
% Vigorous Activity	66.65	69.36	62.91	69.85
in Past Month	(0.0197)	(0.0292)	(0.0260)	(0.0149)
% Eat Out Once or	27.85	30.96	26.69	26.62
in Twice Past Week	(0.0224)	(0.0243)	(0.0195)	(0.0137)

Statistics were calculated using the product of the two year sampling weights. The standard errors (in parentheses) reflect the NHANES survey design, including stratum and primary sampling units.
(b) Estimated on a subset of 2,260 observations.

Table 3: Sample Characteristics of Veterans and Non-Veterans: Viet Nam Era Weights
NHANES 1999/2000 and 2001/2002: Males Ages 21 to 70

	Veterans		Non-Veterans	
Survey Year	**1999/2000**	**2001/2002**	**1999/2000**	**2001/2002**
Observations	-	-	-	-
Est. Population in Millions	6.66	8.77	12.78	13.59
% Viet Nam Era	68.07	72.01	-	-
	(0.0151)	(0.0135)		
Age	53.20	51.87	50.31	49.97
	(0.294)	(0.265)	(0.226)	(0.268)
% White	88.57	81.06	67.12	75.30
	(0.0240)	(0.0306)	(0.0292)	(0.0357)
% Less than High School	12.93	7.61	25.68	19.17
	(0.0213)	(0.0220)	(0.0247)	(0.0205)
% More than High School	55.54	67.17	55.67	59.31
	(0.0421)	(0.0410)	(0.0378)	(0.0311)
% Household Income	17.75	22.09	30.63	24.11
$\leq$\$35,000	(0.0375)	(0.0241)	(0.0313)	(0.0277)
% No Insurance	7.87	9.96	17.64	11.67
	(0.0299)	(0.0151)	(0.0180)	(0.0182)
% Self-Reported Diabetes	6.13	11.48	7.32	8.90
	(0.0223)	(0.0220)	(0.0124)	(0.0122)
Body Mass Index	29.37	28.50	27.97	28.91
	(0.452)	(0.339)	(0.413)	(0.396)
Dioxin Level (fg/g) (b)	19.0	17.6	18.7	17.8
	(.918)	(1.76)	(.692)	(1.64)
% Vigorous Activity	66.04	68.42	61.63	64.92
in Past Month	(0.0368)	(0.0481)	(0.0361)	(0.0338)
% Eat Out Once or	30.13	30.23	30.27	29.82
in Twice Past Week	(0.0371)	(0.0284)	(0.0402)	(0.0266)

Statistics were calculated using the product of the two year sampling weights and the conditional probability of Viet Nam Era service. Non-veterans were assigned conditional probability weights as if they were veterans to provide a comparably aged non-veteran population. The standard errors (in parentheses) reflect the NHANES survey design, including stratum and primary sampling units.
(b) Estimated on a subset of 2,260 observations.

Table 4: Probit Model Results of Self-Reported Diagnosed Diabetes
NHANES 1999/2000 and 2001/2002: Males Ages 25 to 70

	A. Age		**B. Age/Race**		**C. Age/Race/Education**	
Variable	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
After	0.034	[0.100]	0.034	[0.099]	0.032	[0.100]
Vet	-3.925	[2.877]	-3.627	[2.755]	-2.467	[1.954]
Vet*After	-0.038	[0.242]	-0.044	[0.242]	-0.032	[0.244]
Viet	0.142	[1.687]	2.037	[1.860]	2.755	[1.681]
$Viet^2$	-0.215	[1.573]	-2.136	[1.755]	-2.744	[1.625]
Viet*After	0.673	[0.598]	0.67	[0.613]	0.653	[0.604]
Age	0.107	[0.033]**	0.107	[0.033]**	0.106	[0.032]**
Age^2	-0.001	[0.000]*	-0.001	[0.000]*	-0.001	[0.000]*
Vet*Age	0.143	[0.118]	0.121	[0.113]	0.071	[0.081]
Vet*Age^2	-0.001	[0.001]	-0.001	[0.001]	-0.001	[0.001]
White	-1.24	[0.358]**	-1.236	[0.358]**	-1.241	[0.359]**
White*Vet	0.701	[0.252]**	0.95	[0.289]**	0.973	[0.270]**
White*Viet	-3.982	[1.973]	-5.909	[2.153]*	-5.702	[2.076]*
White*$Viet^2$	2.927	[2.143]	4.964	[2.261]*	4.675	[2.205]*
<High School	0.06	[0.135]	0.06	[0.136]	0.048	[0.135]
> High School	-0.066	[0.103]	-0.068	[0.103]	-0.051	[0.102]
HH Income <$35k	0.18	[0.099]	0.18	[0.099]	0.177	[0.099]
No Insurance	-0.079	[0.142]	-0.082	[0.141]	-0.078	[0.141]
BMI	0.032	[0.012]*	0.031	[0.012]*	0.031	[0.012]*
BMI*White	0.029	[0.009]**	0.029	[0.009]**	0.029	[0.009]**
Constant	-5.478	[0.786]**	-5.48	[0.787]**	-5.457	[0.783]**
$after * viet_i = 0/1$	**Estimate**	**Std. Error.**	**Estimate**	**Std. Error.**	**Estimate**	**Std. Error.**
Viet*After Effect	0.076	[.0625]	0.078	[.0655]	0.063	[.0544]
Model Fit (Weighted)						
$\widehat{\Phi(D(.))}$	0.06		0.06		0.06	
Positives False	0.21		0.21		0.21	
Negatives False	0.29		0.29		0.30	
Observations	3339		3339		3339	

Viet is identified by $viet_i = P[viet_i = \widehat{1|age_i, vet_i}]$, which is estimated non-parametrically from Census 2002 data and assumed fixed. Observations are weighted using four year sampling weights. The standard errors (in parentheses) reflect the NHANES survey design, including stratum and primary sampling units.

Table: Diabetes and Diagnosed Diabetes Rates Among Veterans: Viet Nam Era Weights
NHANES 1999/2000 and 2001/2002: Males Ages 21 to 70

Year		**1999/2000**				**2001/2002**		
% Diabetic		Yes	No	Sum		Yes	No	Sum
% Diagnosed	Yes	5.81 (0.0475)	0.21 (0.00195)	6.02 (0.0495)	Yes	8.05 (0.0254)	2.13 (0.0134)	10.18 (0.0121)
	No	3.74 (0.0163)	90.24 (0.0656)	93.98 (0.0495)	No	2.58 (0.0151)	87.25 (0.00299)	89.82 (0.0121)
	Sum	9.55 (0.0636)	90.45 (0.0636)	100	Sum	10.62 (0.0104)	89.38 (0.0104)	100

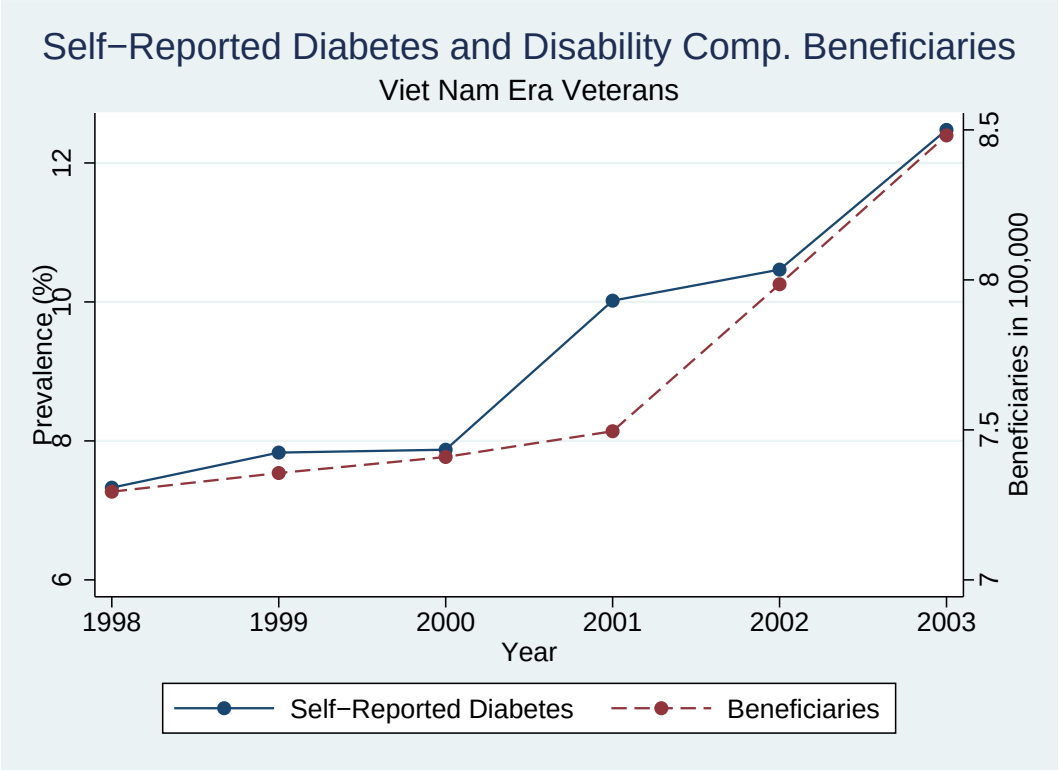

Figure 1: The annual prevalence of self-reported diagnosed diabetes among Viet Nam Era veterans was estimated using the National Health Interview Survey 1997 to 2003. Beneficiary roll data are from the Department of Veterans Affairs, Office of Policy, Planning and Preparedness, and reflect the number of beneficiaries at the end of fiscal years. Thus, 2001 represent the number of beneficiaries one month before AT38's implementation

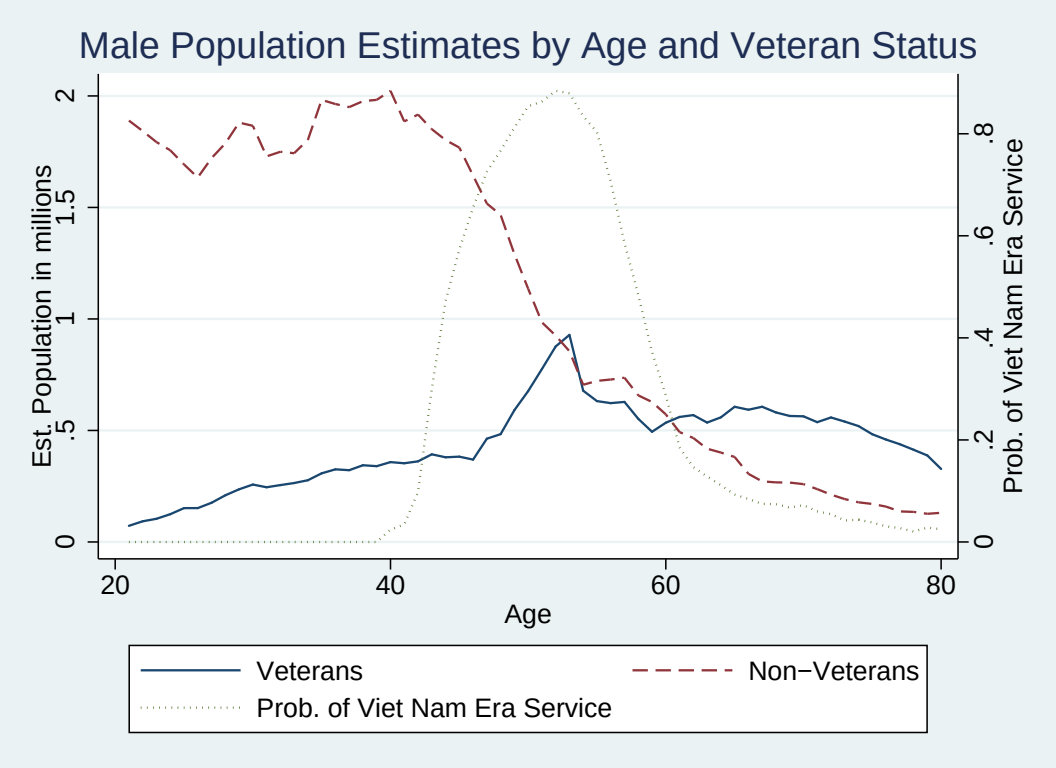

Figure 2: Estimated veteran population, non-veteran population, and probability of Viet Nam Era service conditional on age and veteran status (Census 2002)

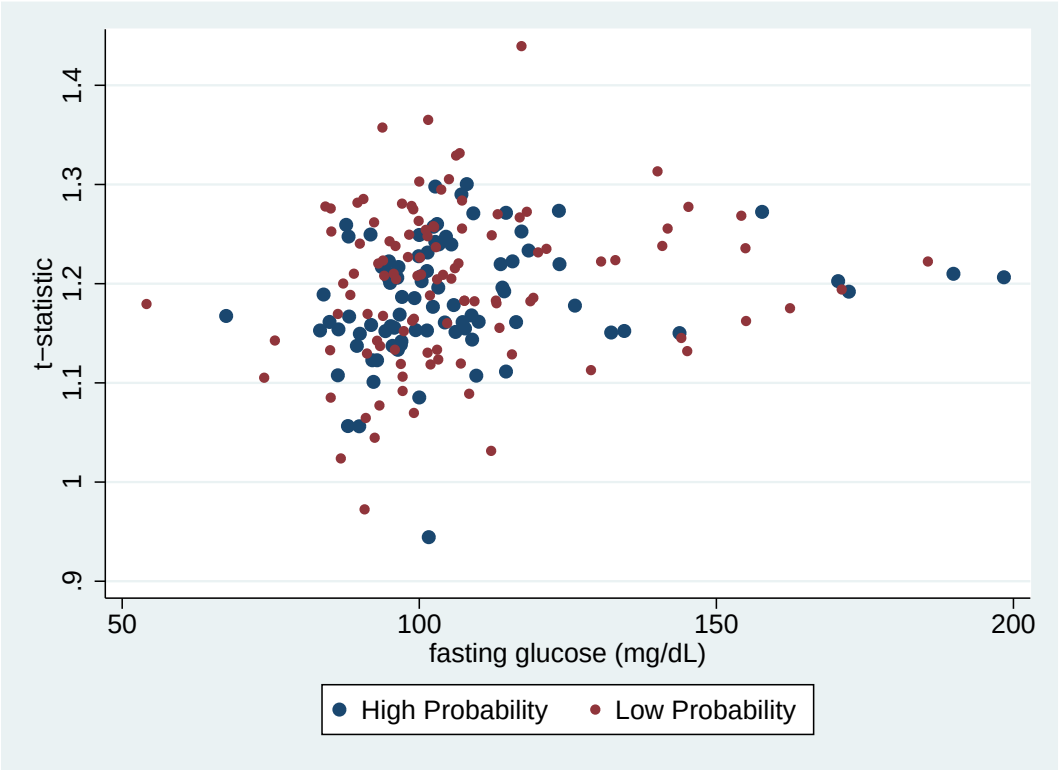

Figure 3: T-statistics of $\hat{\theta_i}(.)$ by fasting glucose level for veterans. High probability means the probability of Viet Nam Era service conditional on age is greater than or equal to 50% Six observations with glucose levels above 200 mg/Dl were deleted from the figure.