Job Market Paper

MINIMUM STANDARDS AND INSURANCE REGULATION: EVIDENCE FROM THE MEDIGAP MARKET

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This paper examines the consequences of imposing binding minimum standards on the market for voluntary private health insurance for the elderly. Theoretically, the effect of these standards on insurance coverage and on welfare is ambiguous. I find robust evidence of a substantial decline in insurance associated with the minimum standards. The central estimates suggest that the standards are associated with an 8 percentage point (25 percent) decrease in the proportion of the population with coverage in the affected market; I find no evidence of substitution to other, unregulated sources of insurance coverage. I also find evidence that the minimum standards may have reduced the coverage of non-mandated benefits among the insured. I consider several models of how minimum standards might interact with the private market equilibrium. The results are most consistent with certain models of insurance markets with adverse selection. The final section of the paper considers the welfare implications of the changes in risk bearing associated with the imposition of the minimum standards. The results suggest that the imposition of these standards was, even under relatively conservative assumptions, welfare reducing on net.

Key Words: Minimum Standards; Insurance regulation; Health insurance

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"We may tell the society to jump out of the market frying pan, but we have no basis for predicting whether it will land in the fire or a luxurious bed"

– George Stigler, The Citizen and the State: Essays on Regulation, 1975.

1. Introduction

Government intervention in insurance markets is both pervasive and varied. It runs the gamut from direct government provision of insurance through such programs as Social Security and Medicare to government regulation of private insurance markets such as health and automobile insurance markets. An increasingly common form of private insurance market regulation is the imposition of minimum standards. These standards have been introduced in a range of insurance markets, including the homeowner's and automobile liability insurance markets. Minimum standards have also been applied or proposed in several different health insurance markets, from state requirements that mental health benefits be included in employer-provided health insurance packages to Federal proposals for a "Patients' Bill of Rights" that would impose minimum standards on HMOs.

In a perfect information, perfect competition model of insurance markets, there is no economic rationale for minimum standards, or indeed any government intervention. However, if these assumptions do not hold, private markets may produce inefficient outcomes and government intervention may therefore be efficiency-enhancing. For example, if consumers underestimate the probability of various risks, their voluntary insurance purchases will be sub-optimally low. Similarly, adverse selection can destroy the market for insurance completely or, short of that, result in sub-optimal amounts of insurance for certain risk classes. Minimum standards potentially counteract such tendencies for insufficient insurance coverage by setting a floor on the amount of insurance purchased by the insured.

As the Stigler quotation above suggests, however, the desire to solve potential private market failures must be balanced against the potential for unintended, negative consequences of minimum standards. A primary concern is that minimum standards will cause people to exit the

market for the regulated insurance product. These people may either substitute toward unregulated forms of insurance or drop coverage altogether. An additional concern is that minimum standards may affect the equilibrium provision of non-mandated insurance benefits in the regulated insurance market.

The effect of the minimum standards on both the proportion of the population with insurance coverage and the coverage of non-mandated benefit among the insured is theoretically ambiguous. Knowledge of the sign and magnitude of the response to minimum standards along both these margins is therefore critical to evaluating the merits of this form of regulation. Knowledge of the effects of imposing a minimum standard can also shed light on the nature of the equilibrium – and particularly on the existence of potential market failures – in the unregulated market. Despite this, there is virtually no empirical evidence on the effect of minimum standards in insurance markets.[1]

In this paper, I examine the consequences of imposing large, binding minimum standards in the voluntary, private supplementary health insurance market for the elderly. Such insurance is commonly known as "Medigap" or "Medicare supplement insurance". These insurance policies cover some portion of the considerable medical costs not covered by Medicare, the public health insurance program for the elderly in the United States. In the late 1970s and early 1980s, almost all states followed a federal "recommendation" to impose minimum standards on the non-group Medigap market. The regulations specified certain gaps in Medicare coverage that any non-group Medigap policy must cover. They did not require that individuals purchase these policies, nor did they regulate their price. The coverage of other gaps was left to the market.

The market failures that provide potential economic rationales for minimum standards may well be present in the Medigap market. Consumer misinformation, not only about medical risks but also about insurance needs, may be a problem for many Medigap consumers who must

decide whether and how to supplement a public health insurance plan that they may not fully understand. Indeed, this was a major motivation for the minimum standards (see e.g. Merritt and Potemken 1982). Adverse selection – another potential rationale for minimum standards – is also present in the Medigap market (Ettner 1997).

The rest of the paper is organized as follows. In section two, I provide background on the Medigap market and the specific nature of the minimum standards imposed. Section three discusses a variety of theoretical mechanisms by which minimum standards may affect the proportion of the population with private insurance coverage and the amount of coverage for non-mandated benefits among those who retain insurance. The direction and magnitude of each of these effects is theoretically ambiguous.

The next two sections examine each effect empirically. In section four, I find robust evidence of a large "quality-quantity" tradeoff. The imposition of minimum standards is associated with a long-run decline in coverage in the regulated market (non-group Medigap policies) of 8 percentage points (25 percent). I find no evidence of substitution to the other potential sources of supplementary insurance coverage. The evidence presented in section five suggests that the imposition of minimum standards is also associated with a reduction in most non-mandated benefits among the insured in the regulated market.

Section six explores which models of the unregulated insurance market are consistent with the estimated effects of the minimum standards. Although I cannot definitively test the alternative theories with the available data, I can shed some light on their relative merits. The evidence appears inconsistent with a model of perfect markets and full rationality. There is also little direct support of a large role for consumer misinformation. I find the most support for certain models of adverse selection. These models suggest that adverse selection – which may

[1] An exception is Gruber (1994) who finds no evidence of an effect of state-mandated benefits for employer-provided health insurance on insurance coverage. He notes, however, that the mandates were not binding, and that this may explain the absence of an effect.

provide an economic rationale for government intervention – may also exacerbate the potential for unintended, adverse effects of the minimum standards.

The empirical results point to substantial declines in insurance coverage – on both the extensive and the intensive margin – associated with the imposition of binding minimum standards. Yet the mandated minimum benefits themselves provide considerable additional insurance for most individuals with non-group coverage. In section seven, I present estimates of the changes in risk bearing due to changes in insurance associated with the minimum standards. I find that, even under relatively conservative assumptions, the minimum standards appear to be, on net, welfare reducing.

The last section concludes.

2. Minimum standards in the Medigap market.

2.1. *The Medigap market*

Virtually universal among the elderly in the United States, Medicare provides only partial health insurance coverage. In 1977, just before the minimum standards regulation, Medicare paid just under half of all health care expenses of the elderly. It is not surprising, therefore, that about two-thirds of Medicare beneficiaries had private insurance to supplement Medicare (Cafferata 1984). This Medigap insurance was obtained, in roughly equal proportions, from group and non-group sources.[2] The average annual premium for a non-group policy in 1977 was $557 in 1999 dollars.[3] Spending on Medigap premiums was approximately one-tenth of the total direct medical expenditures (not including insurance premiums) for the elderly (Cafferata 1984).

The non-group market, to which the minimum standards applied, was highly concentrated. In 1984, Blue Cross and Blue Shield plans accounted for three-quarters of non-group Medigap

[2] Author's calculation based on data from the National Health Interview Surveys (NHIS) described in section four. Throughout this paper, I refer to health insurance purchased through a current or former employer or union as "group" insurance. I use the term "non-group" insurance to refer to non-employment related health insurance. This is purchased either directly through a private company or through a non-employment related association such as the AARP. Non-group policies are sold on an individual basis. Group policies may include spousal dependents.

premiums. Three companies accounted for over 50 percent of the remaining non-group premiums. (U.S. General Accounting Office, 1986).

Medigap covers some of the "gaps" in Medicare. Medicare consists of two different programs. Medicare Part A (Hospital Insurance Program) is mandatory and covers some non-physician inpatient hospital care expenses, and some care in skilled nursing facilities or home health care. Medicare Part B (Supplementary Medical Insurance Program) pays for physician fees for covered services and other medical and health services.

Gaps in Medicare coverage fall into three main categories. First, there are cost-sharing provisions for the health services that Medicare covers. These include separate annual deductibles and copayments for expenses covered by Part A and by Part B. These copayments are uncapped. In addition, the Part A copayments increase as a percent of total expenses with the length of the hospital stay. As a result, the cost sharing provisions leave the elderly with substantial exposure to medical expenditure risk for services covered by Medicare. Second, there are certain health services that Medicare covers only partially and/or with severe restrictions, such as care in a skilled nursing facility or home health care. Third, there are health services that Medicare does not cover at all, such as outpatient prescription drugs and hospital stays beyond 150 days.

2.2. Minimum Standards: The Baucus Amendments

Before the states adopted minimum standards, the non-group Medigap market was essentially unregulated (Van Ellet (1979), McCall, Rice and Hall (1983)). This makes this market a particularly useful setting for studying the consequences of minimum standards in insurance markets. Most insurance markets have been heavily regulated for a long time, making it very difficult to isolate the consequences of one particular type of regulation.

Starting in the late 1970s, a small number of states introduced minimum standards for non-group Medigap policies. In 1978, the National Association of Insurance Commissioners (NAIC)

[3] Author's calculation based on data described in section five. Throughout this paper, dollar figures are reported in 1999 dollars – adjusted using the CPI-U – unless otherwise noted.

issued a set of model regulations for such minimum standards. The 1980 Federal Baucus amendments provided "encouragement" to the states to adopt these model regulations.[4] Shortly thereafter, the remaining 42 states and the District of Columbia enacted minimum standards for non-group Medigap policies. Table 1 reports the first full year that the regulations were in effect in each state.[5]

The minimum standards applied only to non-group policies. They did not apply to policies purchased from a current or former employer or union ("group policies"). Policies that were converted from group policies to non-group policies, and renewals of existing non-group policies, were also not covered by the minimum standards.[6]

The minimum standards limited exclusions for pre-existing conditions to 6 months and specified a minimum set of benefits that policies must cover. Specifically, they required full coverage of the Part A copayments for hospital days covered by Medicare, and coverage of 90 percent of the cost of hospital stays above 150 days, at which point Medicare coverage ceases, for at least an additional 365 days.[7] They also mandated full coverage of the Part B copayment, subject to a maximum deductible of $200 and a maximum benefit of no less than $5,000. Finally, the policy had to cover the annual deductibles in both Part A and Part B for the first three pints of blood used, but not the general Part A and Part B deductibles. Appendix A provides more detail on the gaps in Medicare coverage and on the specific requirements of the minimum standards.

Two concerns motivated the passage of the Baucus amendments. First, policy-makers were worried that the elderly were unable to make informed choices about their insurance coverage; in particular, it was feared that they overestimated the amount of coverage provided through

[4] Since insurance regulation is the prerogative of the states, the federal regulations were technically voluntary. Merritt and Potemken (1982) and McCall et al. (1983) describe the institutional structure established by the Baucus amendments to encourage states to adopt these regulations.
[5] Most states simply adopted the minimum standards in the model regulations. However, eight states adopted regulations that restricted the allowable policy space even further. I find no evidence of a differential effect of the more stringent regulations.
[6] All non-group Medigap policies are sold on an annual basis.

Medicare (see e.g. Merritt and Potemken 1982, DeNovo and Shearer, 1978, U.S. Senate, 1978).[8] The minimum benefit standards described above were designed to address these concerns. In addition, concern about fraud and abuse practiced by a very small segment of the industry motivated several other provisions of the Baucus amendments, such as allowing the purchaser a 30 day "free look" period during which the policy could be returned, and requiring the prominent display of cancellation and termination clauses. In contrast to the minimum benefit standards, these policies did not affect the vast majority of buyers. (McCall et al., 1983, Merritt and Potemken 1982, U.S. House of Representatives 1978). In the empirical analysis, I therefore attribute estimated effects of the reforms to the minimum benefit standards.

2.3 The "bite" of the minimum standards

Data from the 1977 National Medical Care Expenditure Survey (NMCES) indicate that, prior to the enactment of the regulations, less than 7 percent of non-group policies in effect would have met the minimum standards that are measurable in these data. Ten years later, the 1987 National Medical Expenditure Survey (NMES) indicates the requirements were strongly enforced: 94 percent of individuals who had policies that were subject to the minimum standards met the measurable requirements.[9] The most binding requirement was for coverage for 365 days beyond the first 150 hospital days – only 11 percent of non-group policies in 1977 would have met this requirement – followed by the requirement for full coverage of the Part B copayment, which only 52 percent of policies satisfied. In contrast, 70 percent covered the Part A copayments for hospital days 91-150, and 87 percent covered the Part A copayments for hospital days 61-90.

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[7] After the annual deductible, Medicare Part A fully covers all hospital inpatient expenses for 60 days, after which there is a copayment for hospital days 61-90, and another, higher copayment for hospital days 91-150.

[8] For example, a widely-cited report by the Federal Trade Commission during the height of congressional interest in Medigap regulation noted "the lack of consumer information in the Medicare supplement market is so great that is it almost impossible to make rational purchase decisions. Very few people understand the complexities of Medicare and its gaps" (DeNovo and Shearer, 1978, p. i).

[9] These estimates are based on information on compliance with all of the minimum standards except those regarding pre-existing conditions or coverage of the Part A and Part B blood deductibles. The data are described in more detail in section five.

The potential out-of-pocket liability insured by the mandated benefits was substantial. The mandated Part A benefits provided insurance against rare but potentially catastrophic financial risks associated with long hospital stays.[10] Moreover, mandated coverage of the 20 percent Part B copayment for physician charges insured an uncapped and potentially large exposed risk. I calculate that, on average, the amount of additional insurance required to upgrade a pre-reform plan to comply with the minimum standards was about one-fifth of the total amount of insurance in the pre-reform plan.[11]

3. Minimum standards in a voluntary private insurance market

This section considers the theoretical effects of these minimum standards. It describes their likely effects under alternative models of the Medigap market, and discusses ways to distinguish empirically among the models. To begin, consider a 65-year-old, newly eligible for Medicare, who is deciding whether and how much supplementary health insurance to purchase, as shown in Figure 1. The budget constraint is given by the line AB. Individuals who place a high value on insurance will purchase more comprehensive policies such as E, while those who value insurance less will choose a point such as D. Now suppose that the government imposes a minimum standard on the supplementary market. It does not require purchase of the supplementary insurance, but it mandates that any purchase must be of at least the amount *m*. The individuals' budget set is now restricted to the point A and the solid line CB.

Consider first the baseline case of perfect competition, constant returns to scale, and perfect information. Under these assumptions, the regulation does not affect the relative price of health insurance. As a result, individuals whose insurance purchases already satisfy the minimum standards (i.e. they either purchase no insurance at point A or they purchase more than *m*, such as

[10] Data from a 20% sample of Medicare beneficiaries in 1984 indicate that only 0.1% of the elderly had hospital stays beyond 150 days. A stay of 365 days beyond the 150 days partially covered by Medicare would have cost an individual without private insurance $170,638 (assuming a hospital charge of $467.5 per day (American Hospital Association, 1978)).

[11] I compare risk premiums across insurance arrangements to quantify the difference in the amount of insurance. The data and method behind this type of calculation are described in more detail in section

at point E) will experience no change in their consumption decisions. An individual who purchases less than *m* (for example, at point D), however, must now compare his utility from getting no insurance to his maximal utility from purchasing a policy that complies with the minimum standards. Assuming strictly convex preferences, if the individual chooses to purchase insurance, the optimal compliant policy is exactly the minimum required amount of insurance. As drawn, the individual now prefers purchasing no insurance (point A) to the optimal compliant policy (point C). Figure 1 thus illustrates how minimum standards can produce declines in the proportion of individuals with private insurance coverage and declines in welfare.

If we relax the baseline assumptions to allow for consumer misinformation or irrationality – one of the major political motivations for the legislation – we might expect to see larger declines in Medigap coverage associated with the minimum standards. For if consumers mistakenly believe that Medicare covers some or all of the mandated benefits, they will perceive the increase in costs associated with the minimum standards but underestimate the associated increase in insurance coverage. The presence of consumer misinformation suggests that the decline in Medigap coverage should be particularly acute among the less-educated, since they are likely to be the most misinformed about the gaps in Medicare coverage.

One important abstraction in Figure 1 is that it assumes that supplementary health insurance varies on only one dimension: quantity. In practice, Medigap policies are multi-dimensional. Policies that would not have met the minimum standards tended to cover a variety of non-mandated benefits. For example, in 1977, 98 percent of policies that would not have met the minimum standards covered the (non-mandated) Part A deductible, and over one-fifth covered outpatient prescription drugs (also not mandated).[12]

We can therefore enrich the analysis to think of a three-good world: mandated insurance benefits, non-mandated insurance benefits, and all other goods. Under the same assumptions as

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seven. The estimate reported here assumes a constant relative risk aversion utility function and a coefficient of relative risk aversion of 3.

above (perfect competition, constant returns to scale, and perfect information), individuals whose insurance policies already satisfy the minimum standards will not change their purchase of the non-mandated benefits. However, the model generates ambiguous changes in non-mandated benefits for individuals whose policies did not satisfy the minimum standards and who upgrade their policies to comply. The sign and magnitude of any changes in non-mandated benefits depends on both the income effects of the price increase associated with complying with the minimum standards and on whether the mandated and non-mandated benefits are complements or substitutes.

If we relax the assumptions of perfect competition, constant returns to scale and symmetric information, a variety of supply side mechanisms can produce additional effects of the minimum standards on insurance coverage; these effects operate through insurance prices. For example, if there are joint costs incurred by insurance companies in producing different insurance products, minimum standards, by requiring a company to drop its non-compliant policies, can increase the share of costs borne by the remaining policies and hence their prices, producing additional declines in insurance coverage. Since the minimum standards only applied to new purchases and not to renewals of existing policies, we can investigate this possibility by looking at the effect of the reforms on existing policyholders. On the other hand, relaxing the assumption of perfect competition can produce mechanisms through which the introduction of minimum standards results in an *increase* in both the proportion of the population purchasing the regulated product and the provision of non-mandated benefits among the insured. For example, the Ronnen (1991) oligopoly model with differentiated products produces such results because the minimum standards enhance price competition by reducing the space over which firms can try to differentiate their products; in this model, the minimum standards are welfare enhancing.

Finally, in an insurance market context, the minimum standards might interact with adverse selection. Adverse selection is a primary economic motivation for government

[12] Author's calculations based on 1977 NMCES.

intervention in these markets. It is well-known that mandatory coverage can be welfare-enhancing if, because of adverse selection, individuals who would be willing to pay the market pooling price for insurance coverage are unable to obtain such coverage in the unregulated private market (Akerlof 1970). Minimum standards in a voluntary private insurance market can potentially achieve a comparable effect. The minimum standards bundle the purchase of any non-mandated benefits with the mandated benefits. If in the unregulated private market equilibrium consumer surplus from the non-mandated benefits is sufficiently high, individuals may respond to the minimum standards by purchasing the bundled product. Of course, to the extent that some people, particularly lower risk individuals, have sufficiently low consumer surplus from the non-mandated benefits that they prefer to drop the non-mandated benefits rather than upgrade their policy to comply with the minimum standards, welfare gains will diminish. Moreover, these declines in insurance coverage of low risk individuals could increase adverse selection – and hence premiums – in the remaining market, causing it to unravel further, perhaps completely. The result could be substantial declines in non-mandated benefit coverage among those who maintain insurance coverage and further welfare declines.[13] The extent of such potential adverse effects – and hence the potential for minimum standards to address the problems produced by adverse selection in the private market – is an empirical question.

The next two sections investigate empirically the effect of minimum standards on the proportion of the population with insurance coverage and coverage of non-mandated benefits among the insured. I then explore which of the theoretical models are consistent with the empirical evidence.

4. Effect of Minimum Standards on Proportion with Private Insurance Coverage

4.1 Data and Empirical Strategy

[13] Mandatory coverage does not suffer from these potential problems. However, mandatory insurance leaves no room for consumer sovereignty on the participation margin. Minimum standards in a voluntary private market may provide a desirable compromise between respecting some consumer sovereignty on this margin while trying to counteract adverse selection pressures within the insurance pool.

I use repeated cross-sections from the National Health Interview Surveys (NHIS) to examine the effect of the minimum standards on the probability of being covered by non-group Medigap. The NHIS is an annual U.S. household survey. Supplementary questions on individuals' source of private health insurance (i.e. group or non-group), if any, were asked in the 1976, 1978, 1980, 1982, 1983, 1984, and 1986 NHIS. The earliest data therefore pre-dates the introduction of the minimum standards in all but one of the states. The major drawback to the NHIS is that these data contain no information on health insurance premiums or on the benefits covered by the insurance. In the next section, I will turn to an alternative data source to examine the effect of the minimum standards on these other dimensions.

For the main analysis I restrict the sample to those aged 65-68 who are covered by Medicare.[14] I look only at these "young" old because these are the people who are most likely to be buying Medigap policies after the regulations went into effect. In additional analyses described below, I examine the effect on other age groups.

The dependent variable is the binary variable COVERAGE. It indicates whether the individual has non-group private health insurance, defined as insurance that was not "obtained through an employer or union." Individuals who do not have private health insurance or whose insurance was "obtained through an employer or union" are coded as not having non-group private health insurance.[15] The main analysis pertains to non-group coverage rates since the regulations applied to this market. Further analysis described below indicates that coverage rates in the group market were not affected by the reform.

I exploit the substantial variation detailed in Table 1 in the timing of different states' adoption of the minimum standards to identify the effect of these standards on coverage rates in

[14] I would like to further restrict the sample to those not on Medicaid and those without military health insurance. Unfortunately, data on these types of coverage are not available until the 1982 survey. Estimates of the effect of the reform using only data from 1982 and subsequent years did not differ from the estimates obtained using the whole sample and were not sensitive to whether those with Medicaid and military health insurance were excluded from the sample.

the non-group market. The empirical strategy compares non-group coverage rates after the reform has been imposed to non-group coverage rates prior to its imposition, while controlling for other possible confounding changes. The basic estimating equation is:

$$COVERAGE_{ijt} = \alpha + STATE_j + YEAR_t + X_{ijt}\beta + \lambda ADOPT_{jt} + \varepsilon_{ijt} \quad (1)$$

STATE and YEAR are fixed effects that control respectively for any fixed differences across states in coverage rates and for any yearly changes in coverage rates that are common across states. X is a vector of covariates. It controls for observable compositional changes in the sample along dimensions that may be related to the propensity to hold non-group coverage. It consists of a series of dummies for gender, race (white or non-white), education (less than high school, high school graduate, some college, college graduate and higher), marital status (married or not), and self-reported health status (excellent, very good or good versus fair or poor).[16] It also includes a linear control for age. $ADOPT_{jt}$ is an indicator variable equal to 1 if the individual in state j and year t is subject to the minimum standards regulation, and 0 otherwise. λ, the key parameter of interest, thus measures the estimated change in non-group insurance coverage rates associated with the implementation of the reform, after controlling for fixed differences across states in coverage rates, common yearly changes, and observable compositional changes in the sample.

To examine the dynamics in the timing of the impact of the minimum standards, I enrich the basic specification to allow for separate short-term and long-term effects of the reform as follows:

$$COVERAGE_{ijt} = \alpha + STATE_j + YEAR_t + X_{ijt}\beta + \lambda_1 ADOPT_{jt,1} + \lambda_2 ADOPT_{jt,2} + \varepsilon_{ijt} \quad (2)$$

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[15] 4% of the sample has both group and non-group coverage. For these individuals, COVERAGE is coded as 1 since the individual has non-group coverage. In results not reported here, I found that the estimated effect of the reform is not sensitive to how such individuals were coded.

[16] I group health status this way because until 1982 the individual is given a choice of reporting their health status as "excellent", "good", "fair" or "poor." In 1982 and in subsequent years, the individual also has the option of reporting "very good".

$ADOPT_{jt,1}$ is an indicator variable equal to 1 if it is the first or second year after adoption of the minimum standards in state j.[17] $ADOPT_{jt,2}$ is an indicator variable equal to 1 if it is three or more years after adoption of the minimum standards in state j. The omitted category is all periods prior to the adoption of the minimum standards.

The identifying assumption in equations (1) and (2) is that, absent the reform, states would have had similar trends in Medigap coverage. I conduct a partial test of this identifying assumption by examining whether there are significant changes in coverage rates in the periods prior to the reform. I therefore estimate the following:

$$COVERAGE_{ijt} = \alpha + STATE_j + YEAR_t + X_{ijt}\beta + \lambda_{-2}ADOPT_{jt,-2} + \lambda_{-1}ADOPT_{jt,-1} + \lambda_1 ADOPT_{jt,1} + \lambda_2 ADOPT_{jt,2} + \varepsilon_{ijt} \quad (3)$$

$ADOPT_{jt,-1}$ is an indicator variable equal to 1 if it is two or three years prior to adoption and $ADOPT_{jt,-2}$ is an indicator variable equal to 1 if it is 4 or more years prior to adoption. The omitted reference category is the year of adoption and the year prior to adoption (period 0).[18]

4.2. Results

Table 2 presents the results of estimating equations (1) and (2) by OLS.[19] Columns (1) and (2) present the results of estimating equation (1) without and with covariates respectively. They indicate that the reform is associated with a 5.1 to 5.3 percentage point decrease in coverage. This effect is statistically significant at the 1 percent level and is not sensitive in magnitude or significance to the inclusion of covariates.

Column (3) shows the estimated effect of the reform using the specification in equation (2). The effect of the reform persists after it has been in place for 3 or more years, and indeed

[17] Because the data are, for the most part, biannual, I do not look at potential year-to-year differences in the effect of the reform.

[18] The percentage of observations in each category ranges from 38 percent in $ADOPT_2$ to 12 percent in $ADOPT_{-1}$.

[19] All of the standard error estimates in section four allow for an arbitrary covariance matrix in the error structure within each state, as recommended by Bertrand, Duflo and Mullainathan (2001). The results are not sensitive to allowing an arbitrary covariance matrix in each state-year cell instead. The OLS estimates are also adjusted for heteroscedasticity in the linear probability model.

increases slightly. The reform is associated with a 4.9 percentage point reduction in coverage after 1 to 2 years and an 8.0 percentage point reduction after 3 or more years. Both of these estimates are statistically significant at the 1 percent level; they are also statistically significantly different from each other at the 10 percent level.[20] The one-to-two-year phase-in may be due to a lag in enforcement or the dynamics of adjustment to a new equilibrium.[21]

On average 33 percent of the sample had non-group insurance before the reforms. The estimates therefore indicate that the imposition of the minimum standards is associated with a 15 percent decline in non-group coverage in the first two years after implementation and a long-run reduction in coverage of almost 25 percent. Using detailed information on medical expenditures and sources of payment from the 1977 NMCES, I estimate that, ignoring moral hazard and adverse selection effects, the mandated Baucus benefits would have raised the expected payments (and hence an actuarially fair premium) for these policies by $168, or 30 percent. If the marginal utility of complying with the mandate is zero, this predicted premium increase represents a 30 percent net tax on the purchase of non-group insurance. Under this assumption, the 25 percent decline in non-group insurance coverage is consistent with estimates of the price elasticity of demand for health insurance, which lie in the range of –0.5 to –1 (Cutler 1996).[22] Of course, the marginal utility from the mandated insurance is likely to be positive, suggesting that the effect of the reform would be lower than the 15 to 30 percent decline in coverage predicted from a 30 percent net tax. On the other hand, accounting for administrative loads, insurance company

[20] The long run effects of the reform appear to be fully captured by allowing for differential effects of the reform in the first and second year compared to all later years. In results not reported here, I re-estimate equation (2) with separate indicator variables for the first and second year, the third and fourth year, the fifth and sixth year, and seven or more years that the reform has been in effect. All of these indicator variables are statistically significant at the 1 percent level, and their coefficients respectively are –5.0, -7.2, -11.0 and –8.1

[21] The fact that – with a sample of individuals aged 65 to 68 – more individuals may be buying policies under the new regulations as time passes does not appear to account for the larger long-run effect. In a sample of 65-year-olds, the long-run effect of the reform (a 7.5 percentage point decline in coverage) is still statistically significantly larger than the short-run effect.

[22] Most estimates of the price elasticity of demand for health insurance are based on the demand response for comprehensive health insurance. The available evidence of the price elasticity of demand for

profits and adverse selection suggests that the premium increase associated with complying with the mandated minimum benefits would likely be larger than the 30 percent calculated above. For example, I calculate in the 1977 NMCES that the load on non-group Medigap policies, as measured by the excess of premiums over claims as a percentage of claims, is 70 percent. If this load is proportional to claims, then the expected premium increase associated with the mandated benefits would rise from the 30 percent calculated based on expected claims to approximately 50 percent.[23]

I examined whether the effect of the reform differed across observable characteristics of the individuals such as educational attainment, marital status, gender, race or health status. The only substantive or statistical differences are by race. The estimated short- and long-run effects of the reform for whites (who make up approximately 90 percent of the sample) are smaller (–0.045 and –0.070 respectively) than for non-whites (–0.084 and –0.171 respectively). All of these estimates are statistically significant at the 1 percent level and the estimated long-run effect of the reform is statistically significantly smaller for whites than for non-whites at the 5 percent level.[24] The 1977 NMCES data indicate that, prior to the reform, whites were more likely than non-whites to have coverage for non-mandated benefits. It is therefore consistent with a rational response to the minimum standards that whites were less likely to have their purchase decisions affected by the minimum standards than non-whites. The lack of any substantive or statistically significant difference in the effect of the reform – in either levels or proportions – for individuals of different

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supplementary health insurance suggests that it is in the low end of the range of estimated elasticities for comprehensive health insurance (Finkelstein, forthcoming).

[23] The large long-run declines in insurance coverage also raise the interesting question of whether there was substantial insurance company exit associated with these minimum standards. Such exit could have increased market concentration and hence mark-ups. Unfortunately, I have been unable to locate any evidence on changes in insurance company market shares from the period under study. Conversations with insurance regulators and insurance company executives from that era, however, do not suggest widespread exit associated with the minimum standards.

[24] Since non-whites are less likely to have non-group coverage prior to the reform than whites (18 percentage points versus 34 percentage points), the proportional effects of the reform are even larger for non-whites than for whites

educational attainment further mitigates against a large role for consumer misinformation or irrationality.

Finally, I examine whether declines in non-group Medigap coverage associated with the minimum standards represent a net decline in insurance coverage or whether there is substitution toward alternative sources of supplementary insurance: public Medicaid and private group insurance.[25] Table 3 reports the results of estimating equation (2) using first an indicator for group coverage and then an indicator for Medicaid coverage for the dependent variable.[26] I find no evidence of substitution to either source of coverage associated with the imposition of minimum benefit standards in the non-group market. The Medicaid results are robust to restricting the sample to those in the lowest education category (who presumably are mostly likely to be eligible for Medicaid). This lack of substitution is not surprising given that group coverage and Medicaid tend to be both more comprehensive and cheaper than non-group coverage. The non-group market, presumably, consists of individuals without access to group insurance or Medicaid.

4.3 Specification checks

I perform several specification checks to test the robustness of the results in Table 2 and to investigate the validity of the identifying assumption.[27] Appendix Table B1 indicates that the results are not sensitive to estimating equations (1) and (2) by probit, instead of by OLS. In results not reported here, I also find that the results are not sensitive to the particular age range for the "young" old chosen; the results are robust to using a sample of individuals aged 65 to 67 or 65 to 69 instead of the baseline sample of individuals aged 65 to 68.

Table 4 reports results from several additional specification checks. The first column indicates that the results are robust to adding state-specific linear time trends to the basic

[25] Prior to the minimum standards, just under 10 percent of the sample has Medicaid coverage. Group coverage rates are similar to non-group coverage rates.

[26] Because I can only measure Medicaid coverage starting in 1982, I restrict the analysis of whether there was substitution to Medicaid to the 1982, 1983, 1984 and 1986 data. The results for non-group coverage reported above are robust to a similar restriction.

[27] The specification checks for Table 3 are not reported here, but are similarly supportive.

specification in equation (2). The second and third columns show the results of estimating equation (3) without and with state-specific linear trends respectively. There is no evidence in either specification of either substantive or statistical changes in non-group coverage in periods prior to the reform relative to period 0 (the year of the reform and the year prior to the reform). This serves as partial confirmation of the validity of the identifying assumption that absent the introduction of the legislation, states would have had similar trends in Medigap coverage. It also suggests that the reforms do not appear to have been adopted in response to pre-existing trends in non-group coverage rates.

The composition of states used to estimate the coefficient on any given $ADOPT_k$ varies with k. For example, since the earliest year of data is 1976, the coefficient on $ADOPT_{jt,-1}$ (two or three years before adoption), is identified only by individuals in states where the regulation's first full year in effect was 1978 or later. This could contaminate my results if the effect of the reform varies across states, or if the pre-period trends differ across states in ways not captured by a state-specific linear trend. To test for this, I re-estimate the model on two different balanced panels of states. In column (4), I re-estimate equation (3) using states in which regulations were first in effect in 1979 or later. In column (5), I re-estimate equation (2) using states in which regulations were first in effect in 1981 or earlier.[28] The results are not sensitive to these restrictions. The results in columns (4) and (5) are also not sensitive to the inclusion of state-specific linear time trends (not reported).

5. Effect of Minimum Standards on Coverage of Non-Mandated Benefits

The previous section established that the minimum standards were associated with a large, robust, and statistically significant decline in the proportion of individuals with any supplemental insurance coverage. This section examines the effect of the minimum standards on the intensive

[28] There is not sufficient variation in the timing of adoption in this sample to look separately at effects in various pre-periods, as in equation (3).

margin of insurance coverage by analyzing their effect on coverage of non-mandated benefits among those with non-group coverage.

5.1 Data and Empirical Strategy

The only available detailed data on the benefits covered by an individual's Medigap policy are the 1977 National Medical Care Expenditure Survey (NMCES) and its companion survey, the 1987 National Medical Expenditure Survey (NMES).[29] The long time period between these two cross-sections make the results of this section necessarily more speculative than those in the previous section. I use individuals with *group* Medigap insurance to try to control for changes in the demand or supply of various Medigap benefits that may have occurred during this 10 year period.

I examine the effect of the reform on the probability of provision of the six different non-mandated benefits measurable in the data. Two benefits – coverage of the Part A and Part B deductible – cover the remaining cost-sharing provisions in Medicare beyond those included in the mandated minimum package. Three benefits extend coverage for services that Medicare only covers in part: home health care, care in a skilled nursing home, and inpatient psychiatric care. The final benefit – prescription drug coverage – covers a service not covered by Medicare.

I restrict the sample along several dimensions. I limit it to Medicare recipients aged 65 to 71 who are policyholders of private health insurance and are not covered by Medicaid. The age cut is chosen in keeping with the results of the previous section, in which I found that individuals aged 65 to 68 were affected by the reform.[30] I exclude individuals who are covered as dependents because dependents have the same benefits as policyholders and this would involve double

[29] Benefit information is obtained by contacting each individual's source of insurance for policy details and then coding up these details. This is considerably more reliable than self-reported benefit information.
[30] These data do not contain information on state of residence. But anyone who is 71 or younger in 1987 was no older than 68 in 1984 (the last year that was the first full year for regulation to be in effect in any state) and therefore is in the age group that I found was affected by the reform in the previous analysis.

counting.[31] I also limit my sample to those who are retired, defined as individuals who are not in the labor force.[32] Finally, since the data are at the policyholder level, I exclude anyone who has both non-group insurance and group insurance (approximately 7 percent of the sample) because in such cases I cannot tell which market a given benefit comes from.

The empirical strategy is to compare changes in benefit coverage rates between 1977 and 1987 for privately insured individuals affected by the reform (i.e. those with non-group coverage) to changes in benefit coverage rates for a control group of privately insured individuals who were not affected by the reform (i.e. those with group coverage).[33] The basic estimating equation is:

$$BENEFIT = ß_1 AFTER*NON\text{-}GROUP + ß_2 AFTER + ß_3 NON\text{-}GROUP + X ß_4 + e \quad (4)$$

The dependent variable BENEFIT is a binary indicator of whether the individual's health insurance coverage includes a given benefit or not. I estimate equation (4) separately for the six different non-mandated benefits that are measurable in these data.

NON-GROUP is an indicator variable that is 1 if the individual has a Medigap policy through the non-group market and 0 if the individual has a Medigap policy through the group market. AFTER is an indicator variable for the year 1987. X is a matrix of covariates, similar to that used in section four, that controls for observed compositional changes that may be related to the propensity to hold various non-mandated benefits. It includes dummies for gender, region of the country, whether the individual lives in an SMSA, race (white or non-white), marital status, education (less than high school, high school degree, some college, college degree or higher) and

[31] As noted above, non-group Medigap policies are sold on an individual basis while group Medigap policies may include spousal dependents. The results in this section are not sensitive to including individuals who are dependents on group Medigap policies in the sample.

[32] Federal legislation introduced in 1982 required that employers offer the same health insurance packages to employed workers under and over age 65. I therefore limit my sample to retirees to whom the legislation did not apply. This is not a severe restriction as most individuals over 65 are retired. The results in section four are not sensitive to this restriction.

[33] By 1977, four states had already introduced the minimum standards, three in 1976. To the extent that the effect of these reforms was already partly felt by 1977, the empirical strategy will underestimate the effect of the reform on non-mandated benefit coverage.

self-reported health status relative to others' their age.[34] In addition, age is controlled for linearly. Because the relationship between these covariates and benefit coverage may be changing over time, I also estimate an enriched version of equation (4) in which I allow the effect of the covariates to vary in the two periods by interacting them with AFTER.

The key variable of interest – AFTER*NON-GROUP – measures changes in benefit coverage between 1977 and 1987 among those with non-group Medigap relative to changes in benefit coverage over the same period for individuals with group Medigap. A causal interpretation of the estimated coefficient on AFTER*NON-GROUP as reflecting the effects of the minimum standards requires the identifying assumption that, absent the minimum benefit standards, benefit coverage rates would have been following the same trends in the treatment and control groups between 1977 and 1987. Ideally, I would conduct a partial test of this identifying assumption by examining whether benefit coverage rates in the treatment and the control groups were following the same trends prior to the enactment of the reforms. The available data do not permit such a test. However, I can conduct a weaker version of this test using the NHIS data. I examine whether *insurance* coverage rates were trending similarly for the two groups in state-years prior to the introduction of the reforms. For each year (1978, 1980, and 1982), I cannot reject the null hypothesis that the year fixed-effects are the same in the treatment group and the control group. Nor can I reject the joint hypothesis that all three year fixed effects are the same in the treatment group and the control group. This is supportive of the identifying assumption. In addition, the validity of the group market as a control is reinforced by the fact that the group market was neither directly affected by the regulations nor indirectly affected by substitution to the group market in response to the regulation of the non-group market.

5.2 Results

[34] State identifiers are not available in the NMCES and NMES data. I therefore use the 9 region classifications and the SMSA designation to try to capture geographic effects.

Table 5 presents mean coverage rates for the six benefits in the non-group and the group market in 1977 and in 1987. The pre-treatment (1977) mean coverage rates for the Part A and Part B deductible are similar for the non-group and group markets. However, for the other four benefits, there are significant differences between the two groups in benefit coverage rates in 1977. Between 1977 and 1987, benefit coverage rates in the non-group market are decreasing for all benefits except for care in a skilled nursing home. In the group market, benefit coverage rates are decreasing for the two deductibles but increasing for the other four benefits.

Table 6 reports the difference-in-differences estimates of the change in benefit coverage in the non-group market relative to the change in benefit coverage in the group market. Columns (1) through (3) report the results without covariates, with covariates, and with interaction effects between the covariates and AFTER; the estimates are not sensitive to the specification. Appendix Table B2 indicates that the results are also not sensitive to estimation by probit rather than OLS.

The first two rows of Table 6 report the results for the Part A and Part B deductibles, the only cost-sharing provisions in Medicare for which coverage was not mandated. The empirical strategy is, a priori, most convincing for these particular benefits for two reasons. First, the deductibles are arguably the benefits for which the 10 year time lag in the data is least troubling. It is harder to think of demand and supply shocks affecting deductible coverage than affecting coverage of other benefits for which the underlying nature of the risk being insured may well be changing over time. Second, the data in Table 5 indicate that the pre-treatment mean coverage levels in the non-group and group market were most similar for these two benefits. The results indicate that the minimum standards are associated with a large and statistically significant decline in coverage for the Part B deductible but no change in coverage for the Part A deductible.

The last four rows of Table 6 indicate that the minimum standards are also associated with a substantial and statistically significant (at the 1 percent level) decline in the coverage of outpatient prescription drug benefits, inpatient psychiatric care, and home health care. There is also weak evidence of a decline in skilled nursing home care relative to the control group, but the

decline is only marginally statistically significant in one specification. The magnitude of the estimated declines in non-mandated benefits are quite large, ranging from 20 to 40 percentage point declines. In results not reported here, I find no evidence of systematic differences, either substantive or statistical, in the effect of minimum standards on non-mandated benefit coverage by observable characteristics such as educational attainment, marital status, gender, or self-reported health status.[35]

To gauge the magnitude of the change in total expected insurance payments associated with the minimum standards, I estimate the effect of the minimum standards on total insurance premiums. The 1977 and 1987 data report the total annual premium per policyholder; since my sample is limited to individuals with only one policy and without dependents, the premium reflects the per policy premium.[36] Not surprisingly, in 1977, premiums are higher in the group market than in the non-group market on average ($1,380 versus $557 respectively). Premiums rose in real terms in both markets between 1977 and 1987, reflecting in part the increasing real cost of medical care.

Table 7 shows the results of re-estimating equation (4) using the log of the premium (in 1999$) as the dependent variable. The first two columns show the results respectively without and with controlling for the X vector of covariates of individual characteristics. They indicate that the minimum standards were associated with an almost 50 percent decline in premiums in the non-group market relative to the group market. This suggests that the decline in expected payments from the decline in non-mandated benefits substantially outweighed the increase in expected payments from the mandated benefits.[37] Column 3 reports the results of re-estimating equation (4) with the inclusion of additional controls reflecting whether or not the policy covered

[35] Sample sizes do not permit separate analyses for whites and non-whites.
[36] The premium is defined as the total premium; for the group market it therefore includes employer and employee contributions.
[37] Assuming no changes in market structure, changes in premiums reflect changes in the expected payments from the insurance policy. They do not reflect changes in the amount of insurance provided by the policy,

each of the mandated and non-mandated benefits measurable in the data. The results indicate that with these controls the minimum standards are associated with an estimated 26 percent decline in premiums.[38] This significant decline in premiums associated with the minimum standards – even after controlling for the benefit composition of the policy – is consistent with their being unmeasured declines in non-mandated benefits. This might be due to declines in non-measurable non-mandated benefits or to decreases in the comprehensiveness of coverage for measured non-mandated benefits for which we can only observe whether or not there is any coverage.

Even the estimated declines in measured non-mandated benefits are too large to be explained solely by demand-side mechanisms in a perfect information, perfect competition, constant returns to scale model of the Medigap market.[39] While substitution effects may help explain declines in coverage for the Part B deductible – which may be a substitute for the mandated Part B copayments – they cannot explain declines in benefits such as inpatient psychiatric care and prescription drug coverage which are more likely to be complements to the mandated coverage for hospital stays and doctor visits. Furthermore, the income effect from the mandated benefits is insufficient to explain the magnitude of the estimated decreases in non-mandated benefits. The $168 actuarially fair increase in premiums that I estimate would be needed to upgrade policies to comply with the minimum standards represents only 0.8% of median income among those with non-group Medigap policies in the NMCES. Estimates of the income elasticity of demand for medical care range from 0.2 to 1 (Newhouse 1992).[40] Given

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since this depends on variance about the mean. Section seven discusses a way of estimating the changes in insurance coverage, or risk exposure, associated with the minimum standards.

[38] If I allow the effect of the various benefits on log premium to vary with NON-GROUP and with AFTER, the point estimate remains essentially unchanged (at 24 percent) but the standard error blows up so that the result is only significant at the 16 percent level.

[39] Compositional changes associated with minimum standards in the pool of the privately insured might potentially explain the large declines in non-mandated benefits. However, as noted in section four, the minimum standards appear to be associated with *larger* declines in insurance coverage among individuals with *less* coverage of non-mandated benefits; if anything, therefore, compositional changes in the pool of the insured should have tended to produce an increase in coverage of non-mandated benefits among the insured.

[40] Of course demand for medical care and demand for health insurance are not the same thing. But presumably the income elasticities are roughly similar.

median total health care spending among the non-group privately insured in the NMCES of $520 (not all of which was paid for by insurance), even an income elasticity of 1 would translate into a reduction in demand for health insurance of less than $5.20. Yet the NMCES data suggest that the loss of the Part B deductible coverage, alone, would result on average in a loss of health benefits of over five times this amount.

6. Theoretical explanations for the estimated effect of these minimum standards

As discussed in section three, there are a variety of mechanisms by which minimum standards can produce declines in both the proportion of individuals covered by insurance and coverage of non-mandated benefits among the insured. I argued that fully-rational demand-side mechanisms cannot explain the large magnitude of the estimated declines in non-mandated benefits. While consumer misinformation or irrationality might potentially magnify demand-side responses, there is no strong empirical evidence in support of this explanation; in particular, there is no evidence that the minimum standards were associated with differential declines by educational attainment in insurance coverage, on either the extensive or intensive margin.

The effect of minimum standards on non-mandated benefits could be magnified by the presence of joint costs in producing insurance policies; when the minimum standards force non-compliant policies to be dropped, joint costs could raise the price of the remaining compliant policies, producing additional insurance declines. This explanation yields the empirical prediction that the dropping of non-compliant policies for the "young" old who were directly affected by the regulation should increase the costs of providing the "old" old with insurance policies, and thus should be associated with a decline in insurance coverage among this latter group. To test this, I return to the NHIS data and re-estimate equation (2) on the sub-sample of individuals who were 70 or older when the regulations went into effect and on the sub-sample of individuals who were 70-74 when the regulations went into effect.[41] There is no evidence that the reform affected

[41] For periods prior to the reform, the sample is limited to individuals 70 and over (or 70-74). For periods after the implementation of the reform, the sample is limited to individuals who would have been at least 70

coverage for either group in either the short or long run; the coefficients on the ADOPT variables are all small in magnitude and statistically insignificant. This is consistent with the conventional wisdom that individuals tend to buy their Medigap policies shortly after becoming eligible for Medicare and then renew them without change; such older individuals would therefore not have been subject to the regulations. It also suggests that joint costs in the production of insurance policies do not play a large role in explaining the effects of the minimum standards.

As discussed in section three, a model of the private market with adverse selection is consistent with declines in insurance coverage on both the extensive and intensive margin associated with the introduction of minimum standards. Moreover, such a model is consistent with declines in non-mandated benefits that are substantially larger than demand-side responses based on income and substitution effects alone could generate, since the minimum standards may produce an unraveling of the market for the non-mandated benefits. We can generate additional testable predictions of the effect of minimum standards in insurance markets with adverse selection by developing the model in more detail.

I adopt the standard assumption that insurance markets respond to consumer private information by trying to design policies that separate individuals according to their risk type (Rothschild and Stiglitz (1976), Wilson (1977)). In a separating equilibrium, high risk individuals purchase full insurance coverage while incentive compatibility constrains low risk individuals to purchase less than full insurance. In such a setting, sufficiently high minimum standards may require the purchase of an amount of insurance above this incentive compatible amount. As a result, the separating equilibrium, and hence the ability to provide high risk types with comprehensive insurance in equilibrium, can be destroyed. In the Wilson (1977) model, if the minimum standards destroy the separating equilibrium, both types will pool at an amount of

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(or 70-74) when the reform was implemented. Because of concern that the estimates may be biased by the aging of the sample within each state over time, I re-estimate equation (2) on the sub-sample of individuals who are 82 or older in each year; these individuals are all at least 70 in 1974 (the first year that regulations went into effect) in each year of data. The results are not sensitive to this alternative sample definition.

insurance above the minimum and less than the full insurance high risk individuals were previously receiving. For sufficiently large minimum standards, the result can be a destruction of the market for policies with more insurance than the mandated minimum. Appendix C develops the effects of minimum standards in the Wilson (1977) model in more detail.[42] Three additional empirical regularities are consistent with this model.

First, Table 6 indicates that the minimum standards are associated with a large and statistically significant decline in coverage for the Part B deductible but no change in coverage for the Part A deductible. Recall that, prior to the imposition of minimum standards, individuals were much more likely to have coverage for both the Part A copayments and the Part A deductible than for the analogous Part B cost sharing provisions. In other words, individuals were more likely to be constrained from buying full insurance for the Part B cost-sharing provisions than for the Part A cost-sharing provisions. It is therefore consistent with the Wilson model that the imposition of the requirements for coverage of the Part A and Part B copayments should affect the market for full coverage of the Part B cost-sharing provisions but not for the Part A cost-sharing provisions.

Second, the Wilson (1977) model predicts that mandated minimum benefits can produce a switch from a separating equilibrium to a pooling equilibrium. This suggests that we should see a decrease in the amount of dispersion in plan types associated with the introduction of the minimum standards. The empirical evidence supports this prediction. Obviously, the entire policy space, and hence policy dispersion, will shrink mechanically when minimum standards are imposed. However, there is no mechanical reason for any change in the dispersion of non-mandated benefits included in different plans. I therefore define a plan based on which of the *non-mandated* benefits measurable in the data are covered. This produces about 20 different plans purchased in a given year and market. Between 1977 and 1987, the NMCES and NMES data

[42] These effects also obtain with the Grossman (1979) equilibrium (Neudeck and Podczeck (1996)) but not with the Miyazaki (1977) equilibrium (Encinosa, forthcoming).

indicate that the Herfindahl measure of plan concentration almost doubles in the non-group market (from 0.11 to 0.21) while remaining constant in the group market (at 0.12).[43] Figure 2 shows plan market share by plan rank in the non-group market prior to the introduction of the minimum standards (1977), and after their introduction (1987). The empirical cumulative distribution function of plan shares in the non-group market in 1987 lies everywhere above the 1977 empirical cumulative distribution function; there is no such clear ranking of the two periods in the group market (not shown). Using McFadden's (1989) test for first order stochastic dominance, I am unable to reject the null hypothesis that the 1977 distribution of plan shares in the non-group market first order stochastic dominates the 1987 distribution in the non-group market. I can reject this null in the group market, however, at the 10 percent level.

Third, the Wilson (1977) model suggests that the market for comprehensive, full-insurance plans can be completely destroyed by the minimum standards. This suggests that more comprehensive policies become even more adversely-selected. I test for this by examining whether premiums rise more between 1977 and 1987 on more comprehensive non-group policies relative to less comprehensive non-group policies. The final column of Table 7 shows the results of re-estimating the model estimated in column (3) with the addition of an interaction term between AFTER*NON-GROUP and the number of non-mandated benefits in the policy (which ranges from 0 to 6 and averages 3.4). The regression also includes indicator variables for whether each measurable mandated and non-mandated benefit is covered by the policy. As predicted, the interaction term in column (4) is positive, indicating that the minimum standards are associated with larger premium rises (or, more accurately, smaller premium decreases) on more comprehensive plans relative to less comprehensive plans in the non-group market relative to the group market. The point estimate indicates that the premium decrease in the non-group market

[43] An increase in plan concentration does not necessarily indicate an increase in insurer market concentration. Insurers tend to sell multiple plans and therefore the increased prevalence of some plans does not necessarily favor certain firms.

relative to the group market is 9 percent smaller for each additional non-mandated benefit on the policy; this estimate is statistically significant at the 5 percent level.

In sum, both the main empirical findings of the effect of the minimum standards on extensive and intensive margins of insurance coverage as well as three additional empirical results are consistent with the impact of minimum standards in a Wilson (1977) model of an insurance market with adverse selection. In fairness, the lack of a finding of a differential response to the minimum standards on either coverage margin by health status seems inconsistent with the Wilson model, which makes sharp predictions of differential responses to the minimum standards based on private information about health status (see Appendix C). The difficulty of capturing the private information component of health status may explain this finding.

7. Welfare Implications

This final section considers the welfare implications of the estimated effects of the minimum standards. The empirical results point to substantial declines in insurance coverage – on two margins – associated with the minimum standards. Yet compliance with the minimum standards themselves provides, on average, substantial additional insurance coverage. If markets function perfectly and individuals make fully rational insurance purchase decisions, any changes in insurance coverage associated with the minimum standards – whether increases or decreases – represent welfare losses. Minimum standards may be welfare-enhancing, however, if the unregulated insurance market results in sub-optimally low private insurance purchases.

As discussed at the outset, consumer misinformation or adverse selection may produce such results. The former was a major political motivation for the regulations; the latter is consistent with the preponderance of the empirical evidence presented above of the effects of minimum standards. Both suggest the interpretation of insurance gains as welfare gains and insurance losses as welfare losses.[44] The *net* welfare effect of the minimum standards depends on the

[44] If the government believes that individuals purchase insufficient insurance prior to the regulations, increases in insurance appear as welfare gains while decreases appear as welfare losses from the

relative magnitudes of the welfare gains and losses associated with the minimum standards. I quantify these effects by simulating the risk distribution under alternative insurance arrangements and evaluating the welfare changes associated with changes in risk exposure.

7.1 Changes in risk bearing associated with changes in insurance coverage

The estimates are based on the sample of 989 Medicare recipients in the 1977 NMCES who are not on Medicaid and who have private, non-group insurance.[45] The NMCES provides individual-level data on health expenditures and sources of payment for several different health expenditure categories. Figure 3 shows the distribution of out-of-pocket medical expenditures under four different insurance arrangements. The solid black bars show this distribution for those with non-group private health insurance coverage prior to the reforms. The other three bars simulate the medical expenditure distribution under alternative insurance arrangements for these individuals. The simulations are done by adjusting the portion of particular expenses paid out-of-pocket and those paid by private insurance to reflect the change in insurance coverage.[46] All of these calculations assume that total medical expenditures are unaffected by the change in insurance status.[47]

A comparison of the solid black bars with the adjacent speckled bars show the increased risk of out-of-pocket medical expenditures, particularly at the high end of the distribution, associated

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government perspective. Of course, from the *individual* perspective, since individuals believe they are optimizing and the minimum standards do not change their information set, the regulations must be welfare reducing. The welfare effects of insurance changes associated with the minimum standards in a model with adverse selection are discussed in more detail in Appendix C.

[45] None of these people has a hospital stay beyond 150 days. So that the welfare benefit from the mandated coverage for such stays is not undervalued, I adjust the risk distribution in my sample to take account of the fact that data from a 20% sample of Medicare beneficiaries in 1984 indicates that 0.1% of the elderly have hospital stays in excess of 150 days.

[46] An alternative approach to these simulations would be to estimate the changes in risk faced by different types of individuals using the difference-in-differences empirical approach of section five. The difficulty with this approach, however, is the estimation of the change in risk distribution associated with losing non-group coverage. A comparison of the medical expenditure distribution of those with insurance in 1977 to those with no insurance in 1987 conflates the effects of insurance coverage with compositional differences in the medical expenditure risk faced by the pool of people with and without insurance; a comparison of these differences in the 1977 NMCES data suggests that they are non-trivial.

with losing pre-reform coverage. The bars with horizontal lines indicate the medical expenditure risk distribution when pre-reform plans are upgraded as necessary to comply with the minimum standards; compared to the distribution under the pre-reform plans (sold black bars), out-of-pocket expenditures in the upgraded plans are lower at every expenditure decile. This comparison provides an upper bound on the increase in insurance associated with the minimum standards for those who maintained coverage since it ignores decreases in non-mandated benefits associated with the minimum standards.

Unfortunately, the health expenditure categories in the NMCES are not detailed enough to simulate the change in risk exposure associated with the declines in coverage for the non-mandated benefits estimated in section five. I can, however, simulate the distribution of medical expenditure risk if all insurance except for the mandated minimum benefits is dropped. This is shown by the gray bars, which provide a lower bound for the increase in insurance coverage associated with the minimum standards for those who maintained coverage.

7.2 Computing the welfare implications of these changes in risk bearing

To calculate the magnitude of the welfare changes associated with the changes in risk bearing shown in Figure 3 requires several additional assumptions.[48] I assume that utility is a function of non-health consumption (c) and a random variable m, which measures out-of-pocket medical expenditure. I assume that the utility function takes the form $u(c-m)$. Changes in private insurance coverage affect the probability density function of out-of-pocket medical expenditures, $f(m)$, and thus expected utility, which is given by $\int_0^{\overline{m}} u(c-m)\,f(m)dm$. I assume a constant relative risk aversion utility function and abstract from the possibility of state-dependent utility functions.

[47] Moral hazard is unlikely to have as much effect on private insurance expenditures in the Medigap market compared to other insurance markets since most of the moral hazard costs of Medigap are born by the public Medicare program rather than by private insurers (Ettner 1997).

The risk premium (p) measures the maximum amount that a risk averse individual would be willing to pay to completely insure against the random variable m. p is defined implicitly by:

$$(5)\ u(c-p) = \int_0^{\overline{m}} u(c-m)\, f(m)\, dm$$

For each individual in the data, I calculate the risk premium implicitly defined by equation (5) under different insurance arrangements. For each insurance arrangement, I use the empirical distribution of out-of-pocket medical expenditures summarized in Figure 3 for $f(m)$, and the individual's income for c.[49]

Several comments about the calculation are in order. First, it considers only private welfare and ignores public welfare losses from the negative moral hazard externality that the private policies exert on the public Medicare program. Second, it assumes that individuals are identical with respect to health risks and preferences. In practice, the response to the minimum standards will be related to how much individuals value their insurance coverage; this suggests that a calculation based on identical individuals will overstate net welfare losses.[50] Finally, the calculation ignores the existence of de-facto partial insurance for long hospital stays and other very expensive medical events.[51] Since coverage for long hospital stays was one of the mandated benefits and was rarely held prior to the introduction of minimum standards, the welfare

[48] This calculation closely follows Feldstein and Gruber (1995). More details on the calculation can be found there.

[49] Following Feldstein and Gruber (1995), I adjust the different distributions of medical expenditure risk to keep their mean constant. Any change in the mean risk should be captured in a change in premium and thus is simply a transfer between the insurer and the insured.

[50] How great an issue this is depends on the amount of dispersion in risk aversion in the population. Like estimates of mean risk aversion, estimates of the dispersion vary considerably. For example, Halpern and Hausman (1986) estimate a normal distribution for the coefficient of relative risk aversion and find a mean of 3.5 and a standard deviation of 0.17. Barsky et al. (1997) estimate a log normal distribution and find a mean risk tolerance of .24 with a standard deviation of 0.33.

[51] This may be provided by states' medically needy programs (which provide Medicaid to elderly individuals who have high medical expenses relative to their income in a given year), by the provision of uncompensated care to the indigent by some hospitals, and by the federal income tax system's co-insurance of large medical expenses.

calculation may overstate the welfare gains associated with the insurance provided by the minimum standards and thus understate the net welfare losses associated with the minimum standards.

Table 8 reports the average change in welfare across individuals associated with moving from the pre-reform status quo to a new insurance status. This welfare change is represented by the risk premium under the pre-reform insurance plans minus the risk premium under the new insurance status. An increase in the risk premium reflects an increase in the individual's exposed risk and is therefore associated with a decrease in welfare. I report results for two coefficients of relative risk aversion: 1 (i.e. log utility) and 3. The estimates of welfare changes increase (in absolute value) as risk aversion increases.

The average welfare loss associated with losing pre-reform coverage ranges from $37 to $943 per person (column 1). The average welfare gain associated with upgrading pre-reform plans to comply with the minimum standards, without altering the provision of non-mandated benefits, ranges from $4 to $196 (column 2). The estimates presented in column 3 indicate that changing from pre-reform insurance plans to insurance plans that cover only the mandated minimum benefits results in an average welfare *loss* of $29 to $734.

To calculate the average net welfare change associated with the Baucus regulations, I average the welfare changes associated with different types of insurance changes using the 25 percent long-run estimate for the proportion of the insured who lost coverage. Even under the conservative assumption that there was no decrease in non-mandated benefits among those who retain insurance coverage, this calculation (based on columns 1 and 2) suggests an average net welfare loss ranging from $6 for a coefficient of relative risk aversion of 1 to $89 for a coefficient of relative risk aversion of 3.[52] This loss represents 10 to 15 percent of the average welfare gains associated with having the pre-reform coverage (i.e. the negative of the results in column 1).

[52] Under the liberal assumption that all of the non-mandated benefits were dropped, the estimated average net welfare losses (based on columns 1 and 3) rise to $31 and $786 respectively.

Since approximately one-third of the 22 million Medicare beneficiaries in 1977 had private, non-group coverage, this suggests an aggregate welfare loss of $40 million to $587 million associated with imposing these minimum standards on the non-group market for private supplementary health insurance for the elderly.

8. Conclusion

This paper has examined the consequences of imposing large, binding minimum standards on a voluntary private health insurance market. Despite the widespread application of minimum standards in insurance markets, their theoretical effects are ambiguous and little is known empirically of their consequences. I find that the minimum standards are associated with a substantial decline in insurance coverage. The central estimate suggests a long-run decline in non-group Medigap coverage of 25 percent associated with imposing minimum standards on this market. There is no evidence of substitution from the regulated market to alternative sources of insurance. Additional evidence suggests that the minimum standards may have reduced coverage for some of the non-mandated benefits among those who retain insurance.

A model of the effect of minimum standards in insurance markets with asymmetric information appears to be the best candidate to explain these effects; several additional pieces of evidence are also consistent with this model. This model, as well as the concerns about consumer misinformation which were the political motivation for the regulation, suggest that insurance gains associated with the minimum standards can be interpreted as welfare gains, and insurance losses as welfare losses. Therefore, the welfare implication of these minimum standards depends on how welfare gains associated with upgrading plans to comply with the minimum standards compare to welfare losses for those who dropped coverage or reduced coverage of non-mandated benefits. I estimate that, even under relatively conservative assumptions, these minimum standards are associated with a net welfare loss.

These findings have important implications for government intervention in insurance markets. In particular, they highlight the need to think carefully about the nature of the market failure that motivates the intervention, and the nature of the interaction between the government intervention and the market equilibrium. Interestingly, both types of market failures that may provide a motivation for minimum standards may also serve to diminish their benefits. If, for example, misinformed consumers overestimate the amount of coverage provided through Medicare, they will undervalue the insurance protection offered by the mandated minimum benefits. As a result, they will be more likely to drop coverage altogether in response to the standards. Similarly, we have seen how asymmetric information can magnify the insurance losses associated with imposing minimum standards not only by contributing to declines in the proportion of the population that holds insurance coverage but also by producing large declines in non-mandated benefits among the insured.

This paper has concentrated on evaluating the impact of minimum benefit standards. Implicitly, the evaluation has been made relative to a benchmark of no government intervention. A more nuanced approach, and a fruitful direction for further work, would be to consider the impact of minimum benefit standards relative to alternative policy interventions that the government might undertake. In this vein, it is important to consider – both theoretically and empirically – how alternative policies might themselves interact with market failures. For example, the government could impose mandatory coverage requirements, as it does through the Medicare program, rather than minimum standards in a voluntary market. But in doing so it must choose the level of mandatory coverage. It must therefore consider the response on both the demand side, from potentially misinformed consumers, and on the supply side, from an asymmetric information market equilibrium, to the mandated level of government-provided insurance.

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Table 1: Implementation of Minimum Standards for Non-Group Medigap Policies.

First Full Year of Regulations in Effect	STATES	Percentage of National Health Interview Survey Sample[53]
1974	CA*	9.7
1977	IL, CT, MN*	8.1
1979	RI, PA, WI*	9.1
1980	MA**	2.5
1981	GA, OR, FL, NH, NV, VT, NE, WY*	10.9
1982	IA, SC, AK, AZ, CO, AL, ND, UT, NJ, AR, VA*, WV*, NY*, WA, TN	27.0
1983	ME, HI, IN, KS, OK, OH, ID, MS, DE, KY, TX, MT, MO, SD, NM, LA, NC, MD	28.5
1984	MI, DC	4.3

***** Denotes regulation that established classes of policies each with their own minimum benefit standards. In all of these cases, the least comprehensive category had minimum benefit standards as strict or stricter than the Baucus requirements, and with the addition of other benefits came other requirements.

****** Denotes standardization. Three policies were specified in detail and these were the only ones that were allowed to be sold. The least comprehensive policy satisfied the Baucus criteria.

Sources: The above table was compiled based on information in Van Ellet (1979), Merritt and Potemken (1982), McCall, Rice and Hall (1983), U.S. General Accounting Office (1986), and conversations with state regulators in Massachusetts and Wisconsin.

[53] This sample is described in detail in section four.

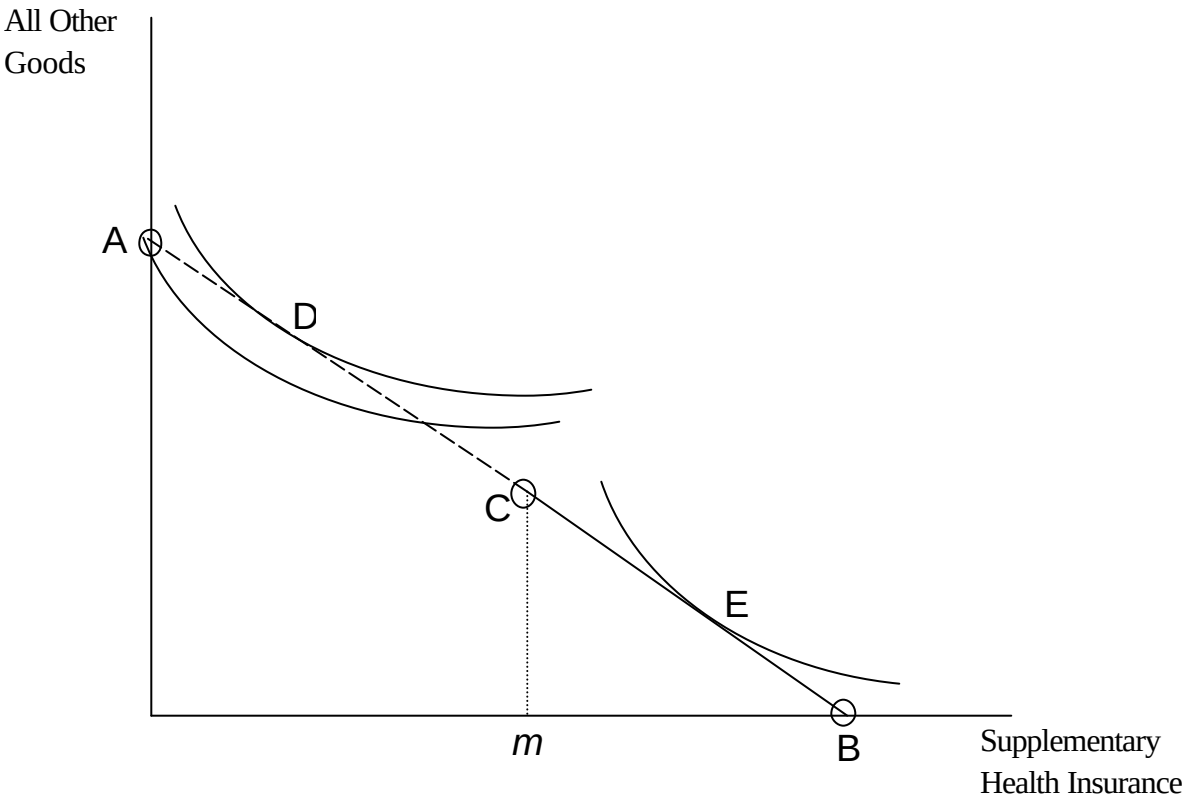


Figure 1: The effect of minimum standards on the decision to purchase insurance

Table 2: Effect of Minimum Standards on Non-Group Coverage Rate

	(1)	(2)	(3)
ADOPT (After Adoption)	**-0.051*** **	**-0.053*** **	
	(0.014)	**(0.014)**	------
ADOPT$_1$ (1 or 2 Years After Adoption)	------	------	**-0.049*** ** **(0.010)**
ADOPT$_2$ (3 or More Years After Adoption)	------	------	**-0.080*** ** **(0.022)**
State Fixed Effects	YES	YES	YES
Year Fixed Effects	YES	YES	YES
Age	------	0.016*** (0.003)	0.016*** (0.003)
Male	------	-0.066*** (0.007)	-0.066*** (0.007)
Married	------	-0.014 (0.010)	-0.014 (0.010)
High School Degree	------	0.025** (0.011)	0.025** (0.011)
Some College	------	0.012 (0.013)	0.012 (0.013)
College Degree of Higher	------	-0.025 (0.017)	-0.026 (0.017)
White	------	0.150*** (0.015)	0.150*** (0.015)
Health Status Excellent, Very Good or Good	------	0.025** (0.010)	0.025** (0.010)
Constant	0.425*** (0.011)	-0.757*** (0.190)	-0.754*** (0.191)
R^2	0.031	0.048	0.048
N	17,649	17,317	17,317

Notes: Coefficients in columns (1) and (2) are from OLS estimation of equation (1) using the 1976 through 1986 NHIS data. Coefficients in column (3) are from OLS estimation of equation (2) on the same data. The dependent variable is whether an individual has coverage in the non-group market. Sample is limited to those aged 65 to 68. Standard errors are in parentheses. They are adjusted for the heteroscedasticity in the linear probability model and allow for an arbitrary covariance matrix within each state over time. *** denotes significance at the 1% level. ** denotes significance at the 5% level. * denotes significance at the 10% level. The omitted education category is less than high school diploma. The omitted health category is "fair or poor."

Table 3: Effect of Minimum Standards on Coverage by Alternative Sources of Supplementary Insurance

	Group Coverage	Medicaid Coverage	Medicaid Coverage; Sample limited to individuals with less than high school education
$ADOPT_1$ (1 or 2 Years After Adoption)	0.012	0.009	0.017
	(0.015)	(0.012)	(0.022)
$ADOPT_2$ (Three or More Years After Adoption)	-0.001	0.021	0.031
	(0.013)	(0.015)	(0.027)
R^2	0.101	0.113	0.135
N	17,332	9,224	3,986

Notes: Coefficients are from OLS estimation of equation (2). Column headings give the dependent variable. The first column is estimated using the 1976 through 1986 NHIS data. Since information on Medicaid coverage is available only in 1982 and later years, the other two columns are estimated using the 1982 through 1986 NHIS data. Standard errors are in parentheses. They are adjusted for the heteroscedasticity in the linear probability model and allow for an arbitrary covariance matrix within each state over time. *** denotes significance at the 1% level. ** denotes significance at the 5% level. * denotes significance at the 10% level. All regressions include a full set of covariates and state and year fixed effects. Sample is limited to those aged 65 to 68.

Table 4: Effect of Minimum Standards on Non-Group Coverage Rate: Specification Checks

	Full Sample	Full Sample	Full Sample	States with Reforms First in Effect 1979 or Later	States with Reforms First in Effect 1981 or Earlier
	(1)	(2)	(3)	(4)	(5)
$ADOPT_{-2}$ (4 or More Years Prior to Adoption)	-------	0.011	-0.009	0.020	-------
		(0.018)	(0.045)	(0.029)	
$ADOPT_{-1}$ (Two or Three Years Prior to Adoption)	------	0.0002	-0.006	0.007	------
		(0.014)	(0.019)	(0.017)	
$ADOPT_1$ (1 or 2 Years After Adoption)	**-0.045****	**-0.049*****	**-0.044****	**-0.051****	**-0.053***
	(0.017)	**(0.014)**	**(0.019)**	**(0.021)**	**(0.026)**
$ADOPT_2$ (Three or More Years After Adoption)	**-0.078****	**-0.081*****	**-0.075****	**-0.070**	**-0.081*****
	(0.032)	**(0.021)**	**(0.035)**	**(0.043)**	**(0.023)**
State-specific Linear Trends	YES	NO	YES	NO	NO
R^2	0.052	0.048	0.052	0.050	0.038
N	17,317	17,317	17,317	14,329	6,950

Notes: Coefficients in columns (1) and (5) are from OLS estimation of equation (2) using the 1976 through 1986 NHIS data; the ADOPT variables are interpreted relative to the entire period prior to adoption. Coefficients in column (2) through (4) are from OLS estimation of equation (3) on the same data; the ADOPT variables are interpreted relative to period 0. The dependent variable is whether an individual has coverage in the non-group market. Sample is limited to those aged 65 to 68. Standard errors are in parentheses. They are adjusted for the heteroscedasticity in the linear probability model and allow for an arbitrary covariance matrix within each state over time. *** denotes significance at the 1% level. ** denotes significance at the 5% level. * denotes significance at the 10% level. All regressions include a full set of covariates and state and year fixed effects.

Table 5: Mean Benefit Coverage Rates in Non-Group and Group Market

	1977		1987	
Benefit Coverage	Non-Group Market	Group Market	Non-Group Market	Group Market
Part A Deductible	0.99	0.95	0.91	0.87
Part B Deductible	0.85	0.91	0.39	0.72
Outpatient Prescription Drug	0.27	0.79	0.21	0.91
Care in Skilled Nursing Home	0.62	0.46	0.75	0.68
Inpatient Psychiatric Care	0.36	0.67	0.05	0.75
Home Health Care	0.19	0.28	0.05	0.53

Note: Data are from the 1977 NMCES and 1987 NMES. All means are weighted.

Table 6: Effect Of Minimum Standards on Non-Mandated Benefit Coverage

Benefit Coverage	Difference-In-Differences Without Covariates	Difference-in-Differences with Covariates	Difference-in-Differences with Covariates and with Interactions between Covariates and AFTER
	(1)	(2)	(3)
Part A Deductible	0.0007 (0.034) [N=1,042]	0.004 (0.036) [N=940]	-0.006 (0.039) [N=940]
Part B Deductible	-0.269*** (0.054) [N=1,045]	-0.237*** (0.057) [N=943]	-0.241*** (0.061) [N=943]
Outpatient Prescription Drug	-0.177*** ((0.051) [N=1,130]	-0.198*** (0.054) [N=1,015]	-0.186*** (0.059) [N=1,015]
Care in Skilled Nursing Home	-0.091 (0.061) [N=1,165]	-0.110* (0.064) [N=1,047]	-0.103 (0.066) [N=1,047]
Inpatient Psychiatric Care	-0.389*** (0.055) [N=1,165]	-0.389*** (0.058) [N=1,047]	-0.359*** (0.059) [N=1,047]
Home Health Care	-0.396*** (0.054) [N=1,165]	-0.404*** (0.057) [N=1,047]	-0.389*** (0.058) [N=1,047]

Note: Data are from the 1977 NMCES and 1987 NMES. Table reports the estimated coefficient on AFTER*NON-GROUP from estimation of equation (4) by OLS. Different rows correspond to different dependent variables. Heteroscedasticity-adjusted standard errors are in parentheses. *** indicates significance at the 1% level; ** indicates significance at the 5% level; * indicates significance at the 10% level.

Figure 2: Market Share of Non-Group Plans

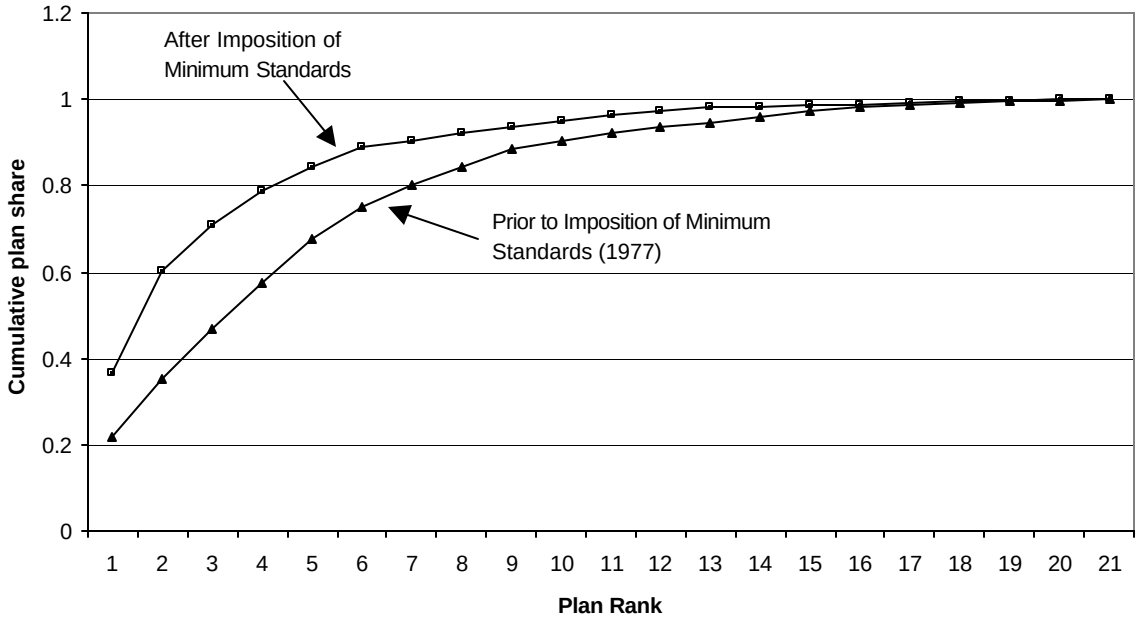


Table 7: Effect of the Minimum Standards on Log Premiums

	(1)	(2)	(3)	(4)
AFTER*NON-GROUP	**-0.481*** (0.098)**	**-0.468*** (0.094)**	**-0.259*** (0.103)**	**-0.475*** (0.147)**
AFTER*NON-GROUP*BENEFITS	-----	-----	-----	**0.092** (0.042)**
AFTER	0.997*** (0.085)	0.982*** (0.081)	0.889*** (0.090)	0.884*** (0.090)
NON-GROUP	-0.881*** (0.082)	-0.800*** (0.081)	-0.566*** (0.092)	-0.572*** (0.092)
Controls for Individual Characteristics	NO	YES	YES	YES
Controls for Each Benefit	NO	NO	YES	YES
R^2	0.491	0.534	0.551	0.553
N	1,165	1,047	937	937

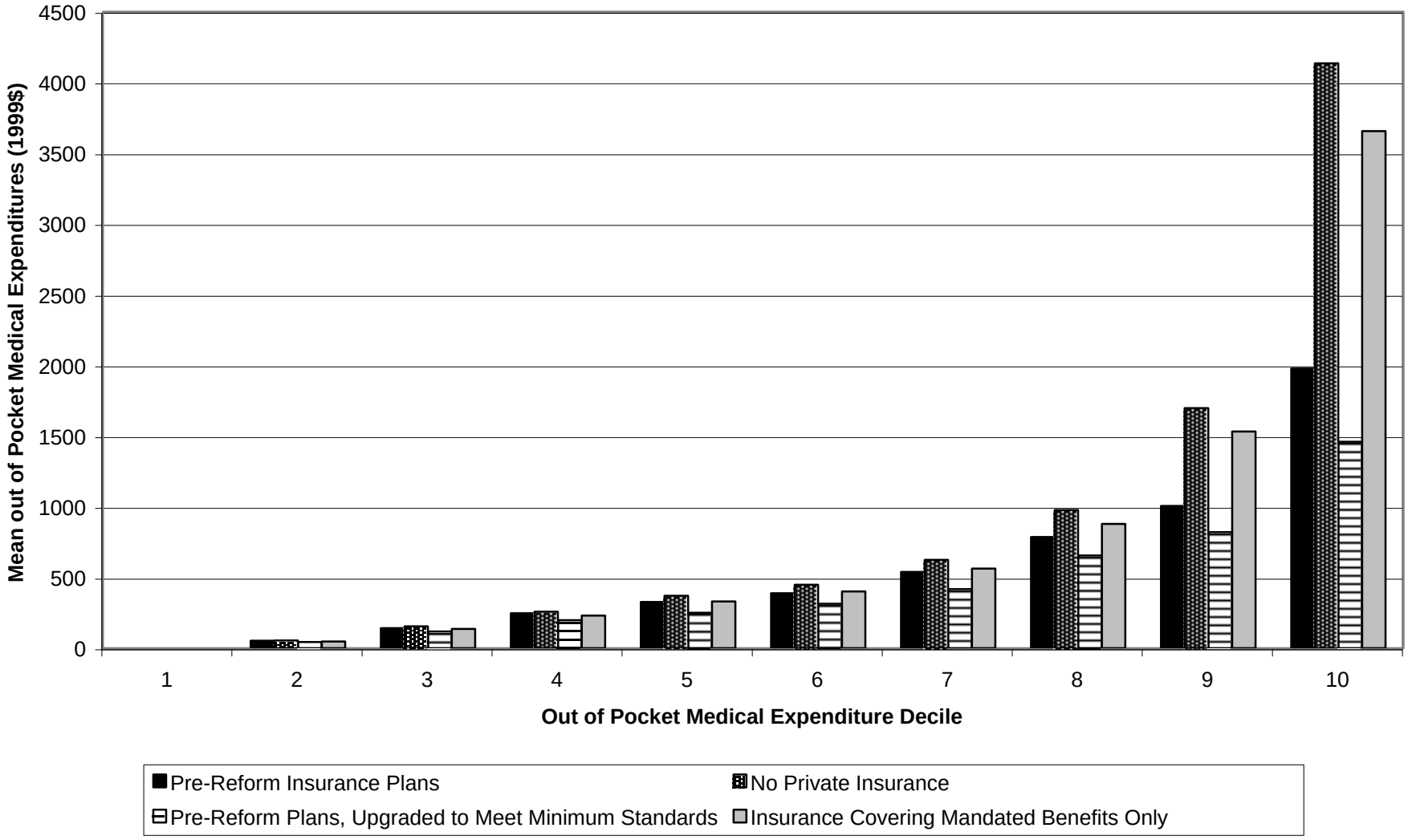
Note: Table reports the results from estimation of equation (4) by OLS, with the log of the premium as the dependent variable. BENEFITS is a variable that measures the number of non-mandated benefits in the policy; it ranges from 0 to 6. Heteroscedasticity-adjusted standard errors are in parentheses. *** indicates significance at the 1% level; ** indicates significance at the 5% level; * indicates significance at the 10% level. Data are from the 1977 NMCES and 1987 NMES.

Table 8: Welfare Change Associated with Insurance Plan Changes (1999 $)

Coefficient of Relative Risk Aversion	Losing pre-reform coverage	Upgrading pre-reform plans to comply with requirements	Upgrading pre-reform plans to comply with requirements but dropping all non-mandated benefits
	(1)	(2)	(3)
1	-36.9	+4.1	-28.6
3	-943.0	+195.5	-733.7

Note: Table entries indicate the negative of the change in risk premium associated with a moving from the pre-reform insurance status quo to a new insurance arrangement. Changes in risk premiums are reported in 1999 dollars.

Figure 3: Distribution of Out of Pocket Medical Expenditures Under Different Insurance Arrangements



Appendix A: Gaps in Medicare (1977-1987)

I. Cost Sharing Provisions in Medicare

A. Part A

1. Annual Deductible. ($341 in 1977; $764 in 1987)
2. **Copayment for hospital days 61-90 ($85 per day in 1977; $191 per day in 1987)**
3. **Copayment for lifetime reserve hospital days 91-150 ($170 per day in 1977; $382 per day in 1987)**[54]
4. **Annual Deductible for first three pints of blood used in the hospital**

B. Part B

1. Annual Deductible ($165 in 1977; $110 in 1987)
2. **20% Copay for approved physician charges**[55]
3. **Annual Deductible for first three pints of blood used.**

II. Services Covered Only Partially / With Restrictions By Medicare

1. Care in a Skilled Nursing Facility
2. Home Health Care Visits
3. Part A coverage for inpatient psychiatric care

III. Services Not Covered By Medicare

1. Outpatient prescription drugs
2. Dental care
3. Vision Care
4. Hearing Care
5. Preventive care: routine physical examinations, diagnostic tests and some immunizations
6. Care in custodial (not skilled) nursing homes
7. **Hospital stays beyond the lifetime reserve of 150 days**[56]
8. Physician charges above the "reasonable" rate reimbursed by Medicare Part B.[57]

Notes

- Benefit gaps in **bold** are those that the minimum standards require non-group Medigap policies to provide.
- All dollar figures are in 1999 dollars unless otherwise noted.

[54] Beyond 90 days in the hospital, Medicare Part A provides a "lifetime reserve" of an additional 60 days that will be covered (with copayments) only once in a person's lifetime

[55] The regulation requires that the Medigap policy cover the 20 percent Part B copay for approved physician charges, subject to a maximum deductible of $200 and a maximum benefit of no less than $5,000 (in nominal dollars).

[56] The regulation requires that the Medigap policy pay 90% of coverage of stays above the lifetime reserve maximum for a lifetime maximum of 365 additional days.

[57] The "reasonable charge" is defined as the lowest of the doctor's charge, the customary charge, or the prevailing charge in the area.

Appendix B: Probit Estimates

Table B1: Probit Estimates of the Effect of the Minimum Standards on Non-Group Coverage Rates

	(1)	(2)	(3)
ADOPT	**-0.052*** **	**-0.055*** **	
	(0.015)	**(0.015)**	------
ADOPT[1]			**-0.050*** **
	------	------	**(0.013)**
ADOPT[2]			**-0.081*** **
	------	------	**(0.021)**

Notes: Coefficients are the estimated marginal effects from probit estimation, evaluated at the means of the independent variables. Columns (1) and (2) report results from estimation of equation (1) without and with covariates respectively. Column (3) reports results from estimation of equation (3) with covariates. See Table 2 for more details on the data and specification. *** denotes significance at the 1% level. ** denotes significance at the 5% level. * denotes significance at the 10% level.

Table B2: Probit Estimates of Effect of Minimum Standards on Non-Mandated Benefit Coverage

Benefit Coverage	Difference-In-Differences Without Covariates	Difference-in-Differences with Covariates	Difference-in-Differences with Covariates and Interactions between Covariates and AFTER
	(1)	(2)	(3)
Part A Deductible	-0.041	-0.044	-0.016
	(0.035)	(0.036)	(0.019)
	[N=1,042]	[N=889]	[N=889]
Part B Deductible	-0.192***	-0.163**	-0.172**
	(0.075)	(0.079)	(0.082)
	[N=1,045]	[N=943]	[N=943]
Outpatient Prescription Drug	-0.275***	-0.302***	-0.284***
	(0.071)	(0.077)	(0.082)
	[N=1,130]	[N=1,015]	[N=1,015]
Care in Skilled Nursing Home	-0.075	-0.093	-0.088
	(0.064)	(0.068)	(0.071)
	[N=1,165]	[N=1,047]	[N=1,047]
Inpatient Psychiatric Care	-0.448***	-0.453***	-0.440***
	(0.040)	(0.040)	(0.043)
	[N=1,165]	[N=1,047]	[N=1,047]
Home Health Care	-0.297***	-0.293***	-0.277***
	(0.029)	(0.029)	(0.030)
	[N=1,165]	[N=1,047]	[N=1,047]

Note: Data are from the 1977 NMCES and 1987 NMES. Coefficients are the estimated marginal effects on AFTER*NON-GROUP from probit estimation of equation (4), evaluated at the means of the independent variables. Different rows correspond to different dependent variables. Heteroscedasticity-adjusted standard errors are in parentheses. *** indicates significance at the 1% level; ** indicates significance at the 5% level; * indicates significance at the 10% level.

Appendix C: Effect of Minimum Standards in the Wilson (1977) model.

The standard analysis of asymmetric information in insurance markets assumes perfectly competitive markets and individuals who differ only in their (privately known) probability of an accident. The Wilson (1977) "foresight" equilibrium is defined as follows:

Definition: A Wilson equilibrium is a set of policies such that when consumers choose contracts to maximize expected utility, each policy earns non-negative profits individually and there is no other set of policies outside of the equilibrium set which, if offered, would earn positive profits in the aggregate and non-negative profits individually, *after the unprofitable policies in the original set have been withdrawn*.

The italicized portion represents the refinement of the Rothschild and Stiglitz (1976) equilibrium definition; the refinement guarantees existence and allows for the possibility of a pooling equilibrium.

Figure C1 illustrates the effects of imposing a minimum standard in a Wilson (1977) separating equilibrium. The vertical and horizontal axes indicate, respectively, income in states with and without an accident. The point E represents the individual's endowment with no insurance. The 45 degree line represents points of full insurance. Movements to the northeast indicate increasing utility. The line HE (LE) represents the set of policies that earn zero expected profits when high (low) risk individuals buy them. High risk individuals purchase policy α_H and get full insurance at their actuarially fair price; low risk individuals purchase policy α_L, which is the maximum amount of insurance they can purchase at their actuarially fair price while maintaining incentive compatibility for the high risk type. As drawn, the equilibrium is separating rather than pooling because low risk individuals prefer their allocation α_L to their most-preferred outcome on the market odds line EF, which is given by γ.

The minimum standards then require that all individuals who purchase insurance must purchase at least the minimum amount *m*, which exceeds the amount of insurance low risk types receive with α_L. Therefore, the low risk type must choose between purchasing either the minimum insurance amount *m* on the high risk indifference curve through α_H or his most preferred outcome on the market odds line, which is given by γ. As drawn, low risk individuals prefer the latter and the result is a pooling equilibrium with both types buying policy γ. There is no profitable deviation from γ which remains profitable after the unprofitable contracts are withdrawn. By the single crossing property, there are policies above EF and below EL which, if offered in addition to γ, would attract low risk types and not high risk types and thus

earn positive profits. However, once this is offered, policy γ -- which now attracts only the high risk types – becomes unprofitable and would be withdrawn; high risk types would then purchase the remaining policy, making it unprofitable. Thus sufficiently high minimum standards can result in the destruction of a separating equilibrium and a resulting pooling equilibrium in which the market for very comprehensive policies has been destroyed.[58]

With the move from a separating equilibrium to a pooling equilibrium, low risk types gain insurance and high risk types lose insurance. Low risk types are worse off, since by definition they preferred the original separating equilibrium to any outcome on the pooling line. As a result, some may choose to purchase no insurance rather than comply with the minimum standards. High risk types are better off by revealed preference; they could have continued to purchase their policy in the separating equilibrium. The model is therefore consistent with the empirical findings that the minimum standards are associated with a decline in both the proportion of the population purchasing insurance and the purchase of non-mandated insurance by those who retain insurance coverage.

Welfare analysis can be made conceptually simpler by recognizing that the change in the prices of insurance associated with moving from a separating to a pooling equilibrium represents a transfer between risk types and so – with a social welfare function that weights both types equally – is irrelevant for welfare calculations.[59] In the separating equilibrium, high risk types have optimal (full) insurance while low risk types are constrained from buying their optimal (full) insurance. Therefore, from a social welfare perspective, the loss in insurance by low risk types who drop coverage and high risk types who drop some non-mandated coverage represents a welfare loss while the gain in insurance for low risk types who upgrade their policies to comply with the minimum represents a welfare gain.

[58] Indeed, if the minimum required insurance exceeds the amount γ that low risk types wish to buy at the market odds price, the result is a pooling equilibrium at the minimum requirement and a complete destruction of the market for any more comprehensive coverage.

[59] The model makes stark predictions about the risk type of individuals who experience various changes, with low risk individuals dropping coverage and high risk individuals dropping non-mandated benefits. Such selection effects only impact social welfare analysis, however, if the different risk types – which reflect differences in expected medical expenditure levels – have systematic differences in the variance in medical expenditure around its mean. Estimates of the coefficient of variation on total medical expenditure for individuals age 65 and older in the 1977 NMCES indicate no systematic differences by health status.

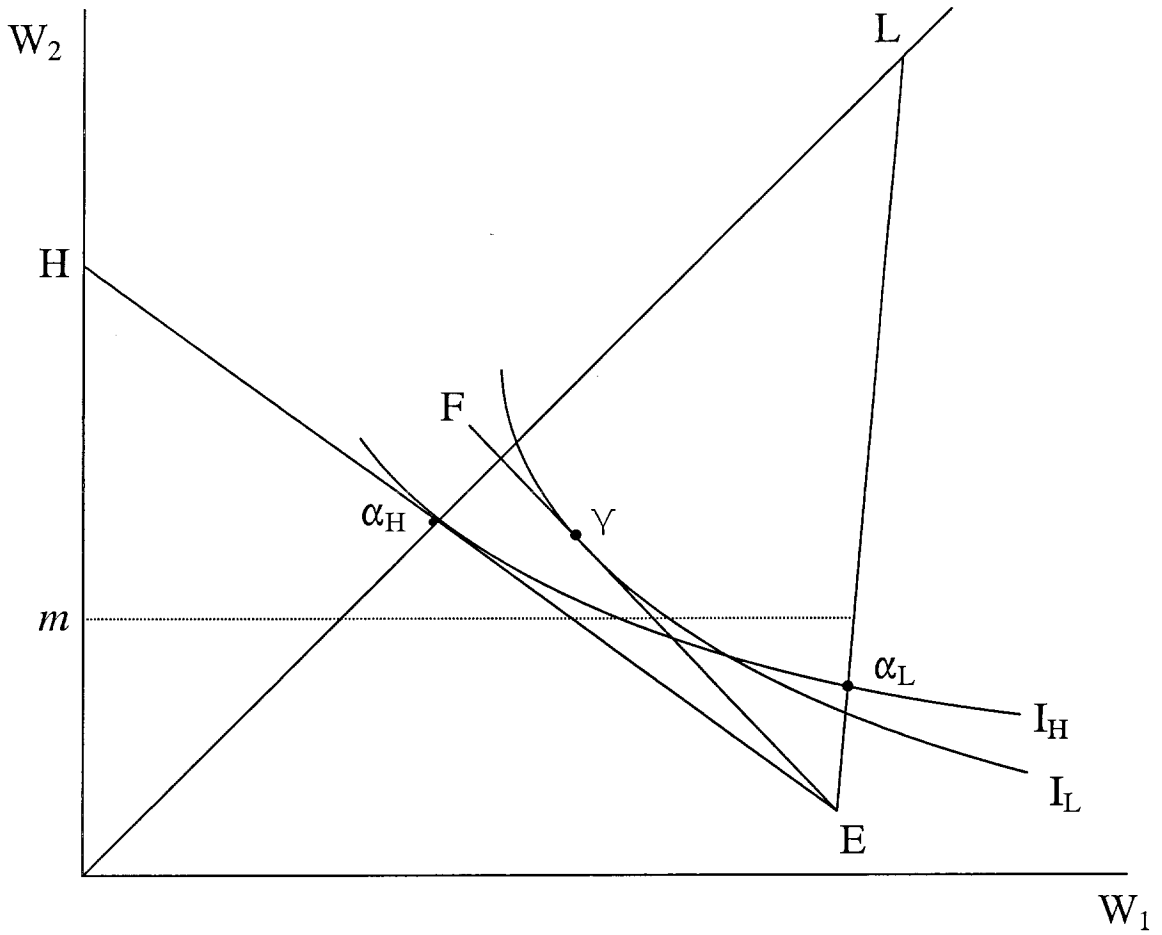


Figure C1: Minimum Standards in the Wilson (1977) Model