Health Insurance, Chronic Disease, and the Affordable Care Act: How Important are Selection Effects?

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Abstract

We examine the impact of the Patient Protection and Affordable Care Act (ACA) on risk selection among the policyholders. With the individual mandate and its tax penalty, the ACA affects the individuals decision to take out health insurance. We hypothesize that the introduction or an increase of the penalty incentivizes more individuals to purchase health insurance coverage. This effect should be stronger for lower risk type individuals. We find supporting empirical evidence for our derived hypotheses utilizing the Behavioral Risk and Surveillance System (BRFSS) survey. We discover that the penalty is an important instrument to counteract general selection effects, i.e. that higher risks are more likely to take out health insurance. Consequently, the individual mandate induces lower risks to join the health insurance market and improves the overall risk pool.

Keywords: Health insurance; Affordable Care Act, Selection Effects, Individual Mandate.

1 Introduction

The Patient Protection and Affordable Care Act (ACA) is considered as one of the most significant regulatory changes of the U.S. health insurance market since the introduction of Medicare and Medicaid in 1965 (e.g., Gruber, 2011). One major provision of the act introduced a tax penalty if U.S. residents fail to provide proof of qualifying health insurance coverage. Specifically, the individual mandate prescribes that most non-poor U.S. residents are required to take out health insurance meeting certain minimum standards or pay the so-called individual shared responsibility payment instead. This payment is designed as an income tax penalty. The penalty was, however, repealed as part of the Tax Cuts and Jobs Act starting in 2019. Despite the introduction of the penalty in 2014 and the repeal in 2019, actual evidence of how the penalty impacted insurance demand and selection in health insurance markets is scarce. We aim at shedding light on this gap. We study how the ACA's individual mandate affected different health risks in their likelihood to take out health insurance coverage.

In particular, we examine the following two research questions: (1) What is the effect of the tax penalty (the shared responsibility payment) on coverage at the individual level? (2) Does the penalty affect the selection of policyholders? We formulate two hypotheses that we test empirically by using data from the Behavioral Risk and Surveillance System (BRFSS) survey.

Besides the individual mandate, the ACA is also composed of dozens of other new provisions. Among them, both the adjusted community rating and the guaranteed issue regulation have received most attention in the discussion about the ACA. Community rating forbids insurers to charge different prices based on characteristics that affect future medical expenses, e.g. pre-existing conditions, or to exclude certain conditions.[1] Guaranteed issue prohibits insurers to reject individuals because of pre-existing health conditions.

Critics argue that the ACA may have caused selection effects within the population, i.e., that healthier individuals are more likely to accept the tax penalty rather than taking out coverage because the average premium is relatively high for them due to their lower expected health care costs. High-risk patients, however, find the average-priced insurance premium relatively cheap and will have a higher tendency to ask for health insurance coverage. A potential downward spiral may be triggered with the consequence of increasing premiums in the health insurance market, which is due to a higher share of high-risk health types in the pool of insureds. The increasing prices can induce even more healthy individuals not to renew their coverage and drive the healthier risks out of the market, which again leads to higher prices, and so forth. This phenomenon is referred to as adverse selection and was first discussed in the prominent article by Akerlof (1970). In addition, the ban of individual

[1] The only allowable underwriting criteria are age where premium differences are restricted on a 3:1 ratio, tobacco use on a 1:1.5 ratio, family size, and geographic location.

underwriting may have aggravated adverse selection effects. Insurers must accept all individuals applying for coverage, while individuals have the choice to reject coverage and can pay a tax penalty instead. The introduction of the mandate aims at counteracting these selection effect. We are thus interested in the overall effect of the ACA's regulations on the selection of risks.

We derive the following two hypotheses. (1) The coverage effect predicts that the introduction (or increase) of the penalty leads more individuals purchasing health insurance coverage. (2) The risk selection effect implies that especially the healthier risk types take out health insurance coverage. Consequently, the penalty induces lower risks to join the health insurance market and, thereby, improves the overall risk pool. We test these two hypotheses by examining the BRFSS survey. The BRFSS is representative of the population in the United States. Our preliminary empirical results support the predictions that a higher penalty leads to (1) more individuals taking out health insurance and (2) that in particular the lower risk types are incentivized to purchase insurance. In addition, we find general selection effects that higher risks are more likely to take out health insurance. Consequently, the empirical evidence supports that the introduction of the penalty was important as it counteracts the adverse selection effect that in general higher risks are more probable to take out health insurance. We conclude that the penalty is an important instrument to keep the pool of insureds balanced in terms of the risks.

The article is structured as follows. The next section discusses institutional details of the U.S. health insurance market during the reform period. The third section reviews related literature and derives the hypotheses. Section 4 describes data, the methodology of the empirical investigation, and presents the results. The last section concludes this paper.

2 Institutional Background: The Affordable Care Act

Former president Barack Obama signed the ACA into law on March 23, 2010. Shortly afterwards, he enacted the "Health Care and Education Reconciliation Act" of 2010, which contained a few minor changes, on March 30, 2010. The final bill One of the aims of the ACA was to extend coverage to previously uninsured individuals who were not eligible for Medicaid and who were not offered coverage through their employer. The act itself is composed of a variety of different provisions. We provide background information on a selection of relevant major regulations in this section.

Individual Mandate and Individual Shared Responsibility Payment

The individual mandate aims at reducing potential adverse selection issues by creating financial incentives for individuals to take out health insurance. Unnderwriting bans are therefore often combined with an individual mandate (such that individuals cannot opt out). Examples are social

Table 1: Calculating the Individual Shared Responsibility Payment Amounts

	Year 2014	**Year 2015**	**Years 2016-2018**
Percentage amount	1% of income above filing threshold*	2% of income above filing threshold	2.5% of income above filing threshold
Flat dollar amount	$95 per adult $47.50 per child Family maximum: $285	$325 per adult $162.50 per child Family maximum: $975	$695 per adult $347.50 per child Family maximum: $2,085

Source: Kaiser Family Foundation (2018b)

security old-age benefits or basic health insurance in most European countries. The individual mandate in the U.S. works in a different way as it creates financial incentives to ensure rather than impose an enforced mandate.[2] In the U.S. health insurance market, individuals still have the option to opt out from obtaining coverage by paying a tax penalty. Individuals who do not qualify for exemption and go without health insurance for more than three months in a given year need to pay a penalty on their upcoming tax return. If the penalty does not induce a sufficient amount of healthy people to purchase coverage, a downward adverse selection spiral can be triggered.

The penalty amounts to either a share of the household income in excess of the return filing threshold or a flat dollar amount per uninsured household member, whichever is greater. Furthermore, it is capped at the national average premium for a bronze level health plan available through the health insurance exchanges.

The penalty was phased in in three installments as shown in Table 1 (Kaiser Family Foundation, 2018b). In 2014, the mandated penalty was $95 per adult and $47.50 per uncovered child up to a family maximum of $285 (three times the penalty for adults) or 1% of the taxable income, whichever is greater. In 2015, the penalty increased again to $325 per uninsured adult and $162.50 per uninsured child up to a family maximum of $975 or 2% of the taxable income, whichever is greater. In 2016, the penalty increased to $695 per uninsured adult and $347.50 per uninsured child up to a family maximum of $2,085 or 2.5% of the taxable income, whichever is greater. This penalty scheme is valid until the end of 2018. The penalty was repealed as part of the Tax Cuts and Jobs Act, which becomes effective in 2019.

Individuals can file an exemption of having to pay the penalty based on several grounds for hardship or certain life events. Also, members of certain ethnic groups are exempt as well as illegal immigrants. There are also other exceptions from the penalty. The penalty does not apply for households due to

[2] It imposes a penalty on individuals who do not have health insurance coverage or who have coverage that does not meet the minimum compliance statutes of the ACA. See also Huntington et al. (2011).

any of the following reasons (1) household income below the federal tax-filing threshold; (2) family income below 138% of the federal poverty level in a state that chose not to expand Medicaid; or (3) no affordable coverage is available. Coverage is not considered affordable if the lower-cost option has a premium that is greater than 8% of the household income.

Community Rating and Guaranteed Issue

Community rating prevents insurers from using risk-type information for pricing insurance based on individual characteristics other than age, location, tobacco use and family size. It is essentially a ban of individual underwriting activities. Also, insurers are not allowed to exclude coverage for pre-existing conditions or to reject individuals seeking coverage (guaranteed issue). For age and tobacco use, the ACA prescribes certain underwriting ratios that limit price discrimination.[3]

Health Exchanges and Standardized Health Insurance Coverage

In 2014, the so-called health exchanges were established. These are online marketplaces in which private health insurers can offer health insurance plans that comply with certain government requirements regarding coverage and presentation of information. The implementation of health exchanges in the U.S. has changed how purchasing health insurance in the individual and small group market works. Before the health exchanges, individuals seeking individual coverage had to directly contact health insurance providers. The health exchanges target at increasing competition in the health insurance marketplace by increasing transparency on prices, coverage, and quality.

Health insurance providers can offer four different levels of "medal" plans from bronze to platinum which differ in the percentage of costs that are reimbursed also called actuarial value. Bronze plans offer an actuarial value of 60% while platinum plans offer 90%. In addition, catastrophic plans are available for individuals age 30 and younger which have higher co-payments and out-of-pocket limits.

Each state can either run its own exchange website or participate in the federal exchange on www.healthinsurance.org. Individuals can sign up for coverage during an open enrollment period in the fourth quarter of the preceding year.[4]

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[3] Age has a 1:3 ratio implying that the premium for the oldest insured can only be three times more than the premium for the youngest. Tobacco use has a 1:1.5 ratio while location and family size are not subject to ratio limitations.

[4] Enrollment is only possible during the open enrollment period to ensure that individuals do not only sign up after they get sick.

Medicaid Expansions and Subsidies

Another set of regulations of the ACA includes includes Medicaid expansions, premium tax credits and cost-sharing reductions for qualifying lower income individuals and families. The ACA generally expands Medicaid to U.S. citizens and legal residents with incomes up to 138% of the Federal Poverty Level (FPL). According to the June 2012 Supreme Court ruling, states must not be obligated to expand Medicaid. Instead, the ruling clarified that states have the option to expand Medicaid. In 2014, 26 states (including Washington D.C.) used the option to expand in 2014. Until January 2018, 33 states (including Washington D.C.) have adopted the Medicaid expansion, whereas 18 states did not expand Medicaid (Kaiser Family Foundation, 2018a).

The ACA also introduced subsidies to decrease monthly premiums and out-of-pocket costs starting in 2014. The aim is to make affordable health insurance available for lower income households that do not receive health insurance through employer-sponsored plans or public programs.[5] Financial assistance is only provided for qualifying individuals and families who purchase plans offered through the health exchanges.

There are two forms of financial assistance: premium tax credits and cost-sharing reductions. Premium tax credits decrease the monthly premiums paid by qualifying policyholders. Tax credit eligibility differs across states. In states that have expanded Medicaid, the tax credit eligibility ranges from 138% to 400% of the FPL. In these states, households with an income below 138% of the FPL are eligible for Medicaid. In states that have not expanded Medicaid, the tax credit eligibility ranges from 100% to 400% of the FPL (Kaiser Family Foundation, 2017).

The subsidies determine a cap on the percentage of household income that individuals spend for health insurance. In year 2017, levels ranged between 2.04%, for individuals with incomes between 100% and 133% of the FPL, and 9.69%, for individuals with incomes between 300% and 400% of the FPL. The subsidies are calculated based on the price of the second-lowest priced Silver plan as benchmark plan. However, individuals are free to choose other plans. Premiums in excess of the premium cap are covered by the federal government if individuals choose the benchmark plan. If they choose a more expensive plan than the benchmark plan, they have to pay the difference in premiums. They have to pay a smaller premium or nothing at all if they choose a less expensive plan (Kaiser Family Foundation, 2017). The credit can also be granted in a way that reduces the cost of premiums upfront. Maximum levels for repayment vary between $300 if the individual has an income of less than 200% of the FPL up to $1,300 if the individual's income is between 300% and 400% of the FPL. It ranges between $600 to $2,600 for families and couples, analogously depending on household income.

[5] Kaiser Family Foundation (2017) provide an extensive summary of health insurance subsidies under the ACA.

3 Related Literature and Hypotheses Development

3.1 Related Literature

Naturally, the ACA has been focus of several studies published during the past years. However, most of them examine the effect of the ACA on coverage rates. For instance, Wettstein (2018) uses a difference-in-differences estimation approach involving Massachusetts as a control group to evaluate the impact of the ACA's individual mandate on insurance coverage rates. He finds that the coverage rate remained roughly constant at 98% in Massachusetts, while it increased in period 2013-2014 in the other states from approximately 95% to 96%. His further research findings reveal that the increase in coverage was concentrated among younger individuals. The author concludes that the ACA's regulations increased adverse selection in the individual health insurance market due to the better risk pool in terms of the age structure.

Several further studies investigate the early impact of the coverage extension for young adults implemented by the ACA in 2010. Lee (2018), Barbaresco et al. (2015), Chua and Sommers (2014), and Antwi et al. (2015) all show that coverage for young adults increased after 2010. They also find no evidence for higher utilization of preventive care or better self-assessed health in general. But they find evidence for a significantly higher likelihood to report excellent health at the top of the health distribution.

Only one study directly examines the effects of the individual shared responsibility payment. Frean et al. (2017) calculate a theoretical penalty payment amount but they find negligible effects on coverage rates. In contrast to their study, we take into account that the penalty might be moderated by the risk type. We explicitly model diversity in risk types in our research approach which has not been included the Frean et al. (2017) study.

Another study by Hackmann et al. (2015) adapts a model by Einav et al. (2010) to investigate the effect of the individual mandate on adverse selection. The authors further develop an empirical model to empirically test for the existence of adverse selection in the individual health insurance market before the introduction of the Massachusetts health care reform in 2006. The Massachusetts health care reform introduced many similar key regulations as the ACA and served as a role model for the ACA. Hackmann et al. (2015) use a difference-in-differences approach involving Massachusetts as treatment and all other states than Massachusetts as control states. Their main findings show that the introduction of the individual mandate increased health insurance coverage by 26.5 percentage points at a pre-reform coverage rate of 70.3% in Massachusetts. In addition, the authors find that the average cost of the policyholders in the individual market decreased by 8.7% due to the Massachusetts health care reform. According to the adapted model, this suggests that the individual market for health insurance was adversely selected prior to the Massachusetts health reform. Hackmann et al. (2015) argue that this was a result of community rating which is mandatory in Massachusetts since

1996. In contrast to Hackmann et al. (2015), we directly test the effect of the penalty by estimating a theoretical penalty amount in case of non-compliance with the mandate. This enables us to explicitly test for the effect of the penalty on coverage at the individual level. Hackmann et al. (2015) utilize a social welfare approach that does not calculate a penalty amount but takes into account the changes in insurance premiums, coverage, and claims expenditures to make statements about adverse selection effects.

We contribute to the scarce literature on the effects of the individual shared responsibility payment by examining the interaction between the payment and different risk types on health insurance coverage. We argue that it is important to take different risk types and its interaction with the individual shared responsibility payment into account. Taking the moderating effect into account can explain the overall insignificant effects that have been found in Frean et al. (2017). Instead of relying only on the traditional self-assessed measure, we analyze comprehensive and real long-term health information on severe chronic conditions such as cancer or heart conditions. Furthermore, we study the whole health insurance market except for the public programs Medicare and Medicaid.

3.2 Hypotheses

When investigating the decision to purchase health insurance, community rating makes health insurance financially more attractive for individuals with higher expected health costs. At the same time, introducing or increasing the tax penalty implies that remaining uninsured becomes financially less attractive, ceteris paribus. Consider the marginal risk type that was just below the utility threshold to purchase health insurance. Increasing the penalty will then elevate this individual to purchase health insurance. Accordingly, we arrive at Hypothesis 1:

Hypothesis 1: The Coverage Effect

An increasing tax penalty leads to more individuals purchase health insurance.

In addition, the risk type of additional individuals taking out health insurance becomes better as the penalty increases. This enables the insurance market to lower premiums, which has the following effects on the different risk types. High risk types above the risk threshold preferred insurance before and due to the higher penalty and the lower premium they continue to prefer health insurance coverage. Low risk types did not prefer insurance before but the higher penalty for no insurance and the lower premium incentivizes them to take out health insurance coverage now.

Hypothesis 2: The Risk Selection Effect

An increasing penalty leads to healthier individuals purchasing insurance coverage, and, in this way, improves the overall risk pool.

4 Empirical Evidence

4.1 Data

Our source of data for this analysis is the repeated cross-sectional 2014-2017 BRFSS survey. One of the main aims of the survey is to collect representative information on health and health-related behaviors among residents in all states of the United States. The BRFSS is the world's largest telephone survey and it is representative for adults at the state and federal level of the United States. It is conducted by the state health departments in collaboration with the the United States Centers for Disease Control and Prevention. The interviews are conducted by the states and residents are called on their landline and cell phone through a random digit dialing method. The BRFSS is a very comprehensive dataset as it contains a wide range of health-related variables. It includes questions on self-assessed health but respondents are also asked about their chronic health conditions. In total, respondents are asked about ten different chronic health issues (e.g., cancer or heart conditions). In addition, the data provide a number of other health-related behaviors, information on insurance coverage, and a number of other socio-demopgraphic characteristics at the individual level.

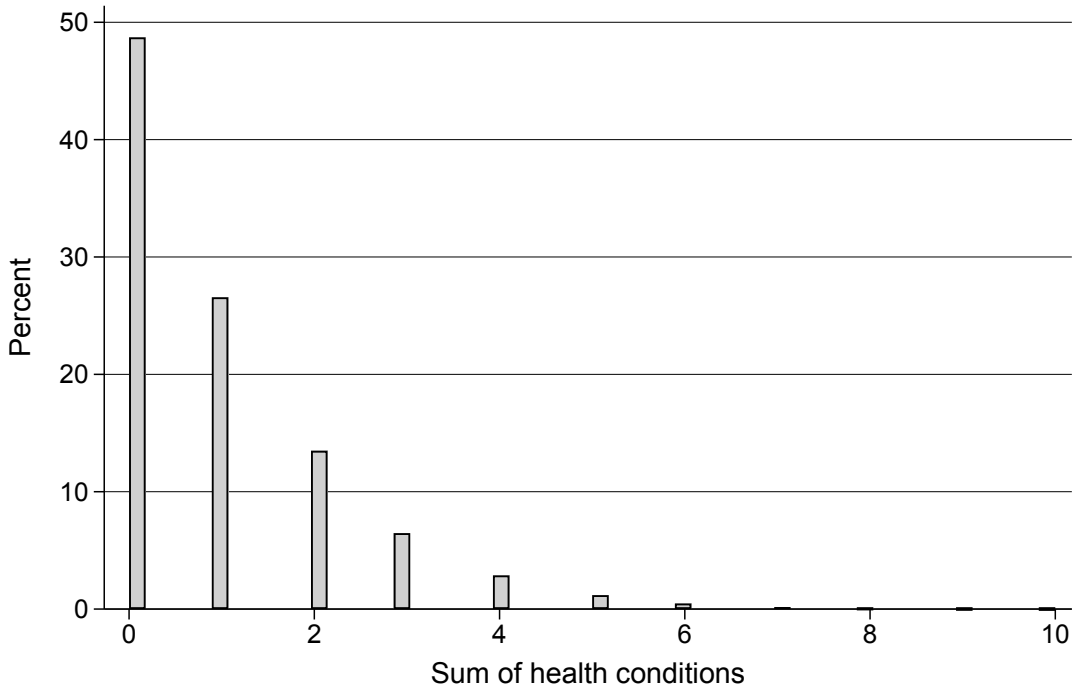
We make several restrictions to our sample in order to arrive at the potential study sample of interest. We restrict the sample to all individuals below 65 years because older individuals become eligible for the public program Medicare. Furthermore, we omit all individuals in Medicaid expansion states who have an income below 138% of the FPL. This restriction aims at dropping individuals that become eligible for Medicaid, which is not the main focus of our analysis. In addition, we restrict our baseline analysis to the time after 2014 when most of the provisions of the ACA became effective. We also remove observations for residents from Massachusetts as this state had already similar regulations in place before the ACA became effective and we drop observations on residents from Guam, Puerto Rico and Virgin Island as these are unincorporated U.S. territories.

We use a set of ten defined chronic illnesses that are asked in the questionnaire. The interviewers ask respondents to report whether they have ever had a doctor diagnosing them one of the following chronic conditions: Angina or coronary heart disease, arthritis, asthma, depressive disorder, diabetes, heart attack, skin cancer, other types of cancer, stroke, kidney disease.

We utilize this self-reported information on chronic illnesses to create a risk variable "HighRisk" indicating whether a person suffers from at least one of the stated conditions. In a further step, we complement this health measure by the respondent's own subjective assessment of his or her health status.

A histogram of the number of chronic conditions at the individual level is illustrated in Figure 1. It shows that approximately every second person does not report any chronic condition, while the other half reports suffering from at least one chronic condition. Furthermore, fewer individuals report a combination of two or more chronic conditions.

Figure 1: Histogram of the Number of Chronic Conditions



The BRFSS records household income in categories. It is classified in $5,000 to $10,000 brackets at lower-income levels until $35,000. After that, it is categorized from $35,000 to below $50,000 and from $50,000 to below $75,000. The highest income category is $75,000 or more. We use the upper threshold of each income category and the reported household size to calculate the income share of the FPL except for the last category, where we assume an income of $75,001. However, for our control variable, we use household income as categorical variable.

The BRFSS does not contain information on the exact individual shared responsibility payment. Therefore, we use the rich other socio-economic information given such as household size, marital, status and household income to construct a theoretical payment. We consider the calculated penalty as a proxy for the theoretical payment that has to be made in case of non-compliance with the individual mandate.

We differentiate between three categories of individuals living in a household to calculate a tax filing threshold: (1) Individuals, (2) household heads, and (3) married couple filing jointly. The tax filing threshold is necessary because only the household income beyond it is considered for the calculation of the penalty amount. We define these categories as follows. A single is a single adult according to the self-reported marital status. A married couple filing jointly is assumed if the respondent reports to be married. Lastly, the respondent is categorized as a head of household if more than one person live in the household and if the respondent is not married.

The penalty is calculated according to the rules described in the in Section 2. In general, it is the maximum of either a percentage amount of the household income in excess of the tax filing threshold or a flat dollar amount per person. The flat dollar amount is capped at a family maximum, which lies between $285 (for 2014) and $2,085 (for 2016-2018). In addition, the payment is capped at the cost of the national average premium for a bronze level health plan available through the Marketplace. We take two major exemptions from the penalty into account. However, due to data limitations we cannot consider all possible exemptions. First, we incorporate that households with incomes below the federal tax-filing threshold are exempt from the penalty. Second, we incorporate that households with incomes below 138% of the FPL in a state that did not expand Medicaid do not have to pay a penalty. However, at the current state we do not take into account that Native Americans individuals for whom no affordable coverage is available (based on the lowest-cost bronze plan in each rating area) are exempt from the penalty. We are also confronted with the data limitation that the highest household income category starts at $75,0000. However, we do not expect this to be an issue for the penalty calculation as this seems a fairly high income category in comparison to the FPL.

4.2 Empirical Model

We now present the methodology and describe the formal empirical model in this subsection. Our main goal is to estimate the effect of the penalty, the risk type and their interaction on the likelihood of an individual to take out health insurance coverage. We employ a linear probability model for our baseline regression results.

$$\begin{aligned} Pr[Y_{i,t,s} = 1|\cdot] = p = \alpha + \beta \times HighRisk + \gamma Penalty \\ + \delta \times (Penalty \times HighRisk) + \zeta_s + \eta_t + \theta X_{i,t,s} + \epsilon_{i,t,s} \end{aligned} \tag{1}$$

$Y_{i,t,s}$ denotes the dependent variable. We use a binary variable indicating whether the individual takes out any form of health insurance coverage. The term α represents the constant. $HighRisk$ is a dummy indicating whether the respondent reports suffering from at least one chronic condition. In a further specification, we use self-assessed health to construct this variable. In the latter case, the omitted category represents individuals with a self-assessed health that is categorized as worse than "poor". The variable *penalty* gives the estimated penalty amount in 1,000$ that an individual would have to pay in case of no compliance with the individual mandate. We add state and time dummies to account for common unobserved temporal shocks and state dummies to account for time-invariant and state-specific unobserved heterogeneity.

The variable X contains the following set of controls at the individual level: age in five-year categories, an indicator whether the person owns or rents a home, educational level, employment status, marital

status, gender, and the income level in several categories.[6] We use robust standard errors clustered at the state level to account for arbitrary serial correlation within states over time.[7]

Relating to our hypotheses, we are interested in the marginal effect of the penalty. This marginal effect can be represented by the following equation:

$$\frac{dp}{dPenalty} = \gamma + \delta \times HighRisk \tag{2}$$

Our Hypothesis 1 predicts that the sign of the estimated point estimate of γ should be positive as the low risks should be more likely to take out health insurance if the penalty increases. In addition, Hypothesis 2 predicts that the sign of the estimated coefficient of δ is negative because the high risks should be less likely to purchase health insurance as the penalty increases compared to the low risks. We rely on a linear probability model to conduct our baseline analyses because it allows us to interpret the sign of the coefficient of the interaction term. This is not be possible in non-linear models such as probit and logit (Ai and Norton, 2003). Yet, we plan to run a probit and logit model as robustness check as disucssed later. We use heteroskedasticity-robust standard errors that are clustered by state.

4.3 Empirical Results

The baseline results are shown in Table 2. The first column presents the results for the empirical model where we use chronic health illnesses to classify high risk individuals. As the coefficient of the penalty is significantly positive and the one for the interaction term is significantly negative, we find that the penalty affects the low risks significantly different than the high risks. This is in line with both hypotheses. Hypothesis 1 states that more individuals take out health insurance as the penalty increases. This is confirmed by the empirical result showing that the likelihood of the low risks to purchase health insurance increases significantly as the penalty marginally increases. In quantitative terms, the low risks are on average 3.2 p.p more likely to take out health insurance coverage if the penalty increases by $1,000, ceteris paribus.

[6] A table showing summary statistics can be found in Table 3 the Appendix.

[7] Serial correlation implies that the error term in a certain period is correlated with the error term in the next period within states. Serial correlation does not influence the unbiasedness or consistency of ordinary least squares estimators but it does have an impact on efficiency. If the error term is positively correlated with the other term of the next period, the standard errors are underestimated. They are smaller than the true standard errors (Bertrand et al., 2004).

Table 2: Baseline Empirical Results for Any Health Insurance Coverage as Dependent Variable

	Expected Sign	(1) Insurance Coverage	(2) Insurance Coverage
High Risk: One or More than One Conditions=1		0.066***	
		(0.012)	
Penalty (1,000 USD)	H1: +	0.032***	0.017***
		(0.005)	(0.003)
High Risk: One or More than One Conditions=1 × Penalty (1,000 USD)	H2: -	-0.038***	
		(0.008)	
High Risk: Poor Health=1			0.031***
			(0.009)
High Risk: Poor Health=1 × Penalty (1,000 USD)	H2: -		-0.034***
			(0.007)
Constant		0.489***	0.511***
		(0.027)	(0.029)
R-Squared		0.182	0.179
Observations		658,354	657,249
Clusters		50	50
Controls		Yes	Yes
State dummies		Yes	Yes
Time dummies		Yes	Yes
Overall Penalty Effect for High Risks (p-value)		0.193	0.014

Notes: *** indicates significance at the 1% level; ** 5% level; * 10% level. Heteroskedasticity-robust standard errors are clustered by state and reported in parentheses. We use BRFSS sampling weights. The dependent variable is a binary indicating whether the individual has any health care coverage. We control for state dummies, year dummies, and the following other independent variables: age in five-year categories, an indicator whether the person owns or rents a home, educational level, employment status, marital status, gender, and the income level in several categories.

In addition, we find that there is a significantly negative counter acting effect for the high risks as the coefficient of the interaction term is negative. In sum, we find that the penalty has no significant overall effect on the high risks. We report the p-value of the corresponding overall effect on the high risks in the bottom row of the table. We thus find supporting evidence for Hypothesis 2 that states that the penalty effect is moderated by the risk type as the estimated coefficient of the interaction term $\hat{\delta}$ is significantly different from zero. Specifically, the interaction term is significantly negative, which shows that high risks are less affected than the low risks by a marginal increase in the penalty. This shows that the penalty effect is moderated by the risk of the individual.

In conclusion, we find that only the low risk individuals are significantly affected by an increase of the penalty. In contrast, the high risky are not significantly affected because the sum of both estimated coefficients $\hat{\gamma}$ and $\hat{\delta}$ insignificant. This can be confirmed by examining the reported p-value for an F-test that tests whether the sum of the overall penalty effect for the high risks is significantly different from zero.[8] To summarize, we find that the results based on chronic conditions are in line with our predictions.

The second column shows the results for the model where we use self-assessed health status to identify high risk individuals. We find similar qualitative results. First, the penalty has a positive effect on the low risks, which are on average 2.2 p.p. more likely to purchase health insurance if the penalty increases by $1,000, ceteris paribus. Second, there is statistically significant overall effect on the high risks. Their likelihood of taking out health insurance decreases as the penalty increases. This result based on subjective health is different and we plan to deepen the its analysis in further steps.

4.4 Limitations and Next Steps

In this subsection, we discuss several limitations of this study and present the next steps to be followed in our further analyses. First, we cannot differentiate between individuals with employer-sponsored health insurance and individual health insurance. One might argue that this may dilute our empirical results given the fact that most individuals are insured through their employer. However, even individuals who make a choice between employer-sponsored or no coverage still need to take the penalty into account. The difference here is that their coverage is subsidized by their employer which makes the coverage option relatively more attractive. Second, our health status measure does not cover all possible health-related outcomes. However, it covers a wide variety of ten serious long-term chronic conditions. These conditions are important health illnesses as they are among the most common and serious health illnesses in most developed countries. Third, we have no information on the whole coverage status of all family members, therefore we can only examine the respondent's own coverage status.

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[8] The overall marginal penalty effect on the high risks is equal to $\gamma + \delta$ as shown in Equation 2. We report the associated p-value for an F-test in the bottom row of Table 2.

For our further analyses, we plan to complement the empirical model by examining non-linear models such as probit and logit models. This should further strengthen the results from our linear probability model. In addition, we plan to develop a stylized model that incorporates the tax penalty into the decision-making process of rational individuals. This approach will help us to base the hypotheses on a formal theory.

5 Conclusion

Reflecting the desire to increase enrollment in health insurance while avoiding a mandate, policymakers have stipulated an opt-out penalty in the ACA. This study evaluates the impact of a health insurance mandate in the form of a tax-based opt-out penalty system as implemented by the ACA.

We hypothesize that introducing or increasing a monetary penalty for not taking out health insurance generally incentivizes individuals to get insured. We also argue that especially the lower risks types should take out health insurance if the penalty is increased. In order to test these hypotheses, we use BRFSS survey data on chronic conditions, subjective health, and health insurance coverage. We estimate the tax penalty amount using the rich information in the survey to create a proxy variable for the theoretical amount that individuals would have to pay if they violate the individual mandate.

Our preliminary results empirically support the hypothesis that individuals are more likely to purchase health insurance if they have to burden a higher potential penalty for non-compliance. However, the results also suggest that it is the lower risks (i.e. individuals with no chronic conditions) who are more likely to get insured due to the penalty compared to individuals with chronic conditions. We also find evidence supporting that higher risk individuals (i.e. with more conditions) are more likely get insurance but this effect is offset by the penalty. Our conclusion is that the individual mandate with its penalty was an important instrument to address potential adverse selection effects in the U.S. health insurance market.

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Appendix

Table 3: Summary Statistics

	Mean	SD	Min	Max	N
Insurance Coverage	0.908	0.289	0.000	1.000	663,642
High Risk: More than One Condition	0.523	0.499	0.000	1.000	665,004
Penalty (1,000 USD)	1.058	0.575	0.000	2.085	665,004
Sum of Health Conditions	0.883	1.135	0.000	10.000	652,406
Education: Never attended school or only kindergarten	0.001	0.029	0.000	1.000	664,452
Education: Elementary	0.013	0.111	0.000	1.000	664,452
Education: Some high school	0.035	0.184	0.000	1.000	664,452
Education: High school graduate	0.246	0.431	0.000	1.000	664,452
Education: Some college or technical school	0.282	0.450	0.000	1.000	664,452
Education: College graduate	0.424	0.494	0.000	1.000	664,452
Female	0.552	0.497	0.000	1.000	664,909
Marital Status: Married	0.600	0.490	0.000	1.000	665,004
Education: Divorced	0.133	0.340	0.000	1.000	665,004
Education: Widowed	0.035	0.183	0.000	1.000	665,004
Education: Separated	0.022	0.146	0.000	1.000	665,004
Education: Never married	0.175	0.380	0.000	1.000	665,004
Education: A member of an unmarried couple	0.035	0.185	0.000	1.000	665,004
Employment Status: Employed for wages	0.617	0.486	0.000	1.000	662,356
Employment Status: Self-employed	0.107	0.309	0.000	1.000	662,356
Employment Status: Out of work for 1 year or more	0.020	0.142	0.000	1.000	662,356
Employment Status: Out of work for less than 1 year	0.023	0.149	0.000	1.000	662,356
Employment Status: A homemaker	0.055	0.228	0.000	1.000	662,356
Employment Status: A student	0.026	0.159	0.000	1.000	662,356
Employment Status: Retired	0.080	0.271	0.000	1.000	662,356
Employment Status: Unable to work	0.072	0.259	0.000	1.000	662,356
Own or Rent Home: Own	0.737	0.440	0.000	1.000	662,836
Own or Rent Home: Rent	0.227	0.419	0.000	1.000	662,836
Own or Rent Home: Other arrangement	0.036	0.187	0.000	1.000	662,836
Income: Less than $10,000	0.024	0.154	0.000	1.000	665,004
Income: Less than $15,000 ($10,000 to less than $15,000)	0.022	0.147	0.000	1.000	665,004
Income: Less than $20,000 ($15,000 to less than $20,000)	0.050	0.218	0.000	1.000	665,004
Income: Less than $25,000 ($20,000 to less than $25,000)	0.070	0.255	0.000	1.000	665,004
Income: Less than $35,000 ($25,000 to less than $35,000)	0.095	0.293	0.000	1.000	665,004
Income: Less than $50,000 ($35,000 to less than $50,000)	0.143	0.350	0.000	1.000	665,004
Income: Less than $75,000 ($50,000 to less than $75,000)	0.181	0.385	0.000	1.000	665,004
Income: $75,000 or more	0.416	0.493	0.000	1.000	665,004
Age: 18 to 24	0.055	0.229	0.000	1.000	665,004
Age: 25 to 29	0.058	0.233	0.000	1.000	665,004
Age: 30 to 34	0.073	0.260	0.000	1.000	665,004
Age: 35 to 39	0.086	0.280	0.000	1.000	665,004
Age: 40 to 44	0.092	0.290	0.000	1.000	665,004
Age: 45 to 49	0.113	0.317	0.000	1.000	665,004
Age: 50 to 54	0.146	0.353	0.000	1.000	665,004
Age: 55 to 59	0.178	0.382	0.000	1.000	665,004
Age: 60 to 64	0.200	0.400	0.000	1.000	665,004
Multiple Health Care Professionals: Only one	0.751	0.432	0.000	1.000	663,226
Multiple Health Care Professionals: More than one	0.067	0.250	0.000	1.000	663,226
Multiple Health Care Professionals: No	0.182	0.386	0.000	1.000	663,226