

# **Job-Lock and Health Insurance Premiums: Evidence from the Massachusetts Health Care Reform**

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## **ABSTRACT**

In this paper, I use the 2006 Massachusetts state health care reform to analyze the effect of a change in the price of individual market insurance on job-lock. I find that lower individual market insurance premiums do not reduce job-lock at levels significantly different from zero. Previous studies of job-lock have not explicitly quantified the relationship between premium prices and job-lock for the aggregate working population. My findings suggest that the Patient Protection and Affordable Care Act of 2010, which is largely modeled after the Massachusetts reform, may have a smaller effect on job-lock than originally anticipated.

Keywords: Labor mobility, turnover, health insurance, government policy

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## Contents

I. Introduction

II. Background and Motivation

- A. Understanding Job-Lock
- B. Alleviating Job-Lock Through Lower Premiums
- C. The Massachusetts Health Care Reform
  - 1. The Connector
  - 2. The Employer and Individual Mandates
  - 3. Reported Outcomes of Reform

III. Data

IV. Regression Framework

- A. Using Data on Individual Workers
- B. Empirical Implementation of Difference in Differences Model
- C. Providing an Improved Estimate of Job-Lock

V. Results

- A. Basic Results
- B. Specification Checks

VI. Conclusion

VII. Appendix

- A. Overview of the PPACA and the Massachusetts Health Reform Major Components
- B. Using the Survey of Income and Program Participation (SIPP) Data

### ***I. Introduction***

Rising health care costs, large numbers of uninsured Americans, and a growing perception that the health insurance market is inaccessible to those without employer-sponsored insurance (ESI) have led to health reform efforts at the state and federal level. At the federal level, the Patient Protection and Affordable Care Act of 2010 (PPACA) aims to improve the provision of health care by expanding coverage to near-universal levels. The PPACA is largely modeled after the Massachusetts 2006 health care reform (MHR).<sup>2</sup> The experience with Massachusetts' reform can therefore be used as an interesting natural experiment to assess potential effects of the PPACA on the labor market.

The economic literature on the relationship between health insurance, labor supply, and job mobility has shown that expected changes to health insurance provision resulting from the PPACA may affect individuals' labor market decisions. In particular, the potential for health care reform to reduce "job-lock" has received much attention. "Job-lock" is defined as workers staying in jobs they might otherwise leave for fear of losing access to affordable health care coverage. By definition, job-lock is a negative phenomenon for an individual worker because it keeps him or her from making productivity-enhancing labor mobility decisions.

Research shows that job-lock is especially acute for individuals with preexisting health conditions.<sup>3</sup> The PPACA regulates discrimination in the insurance market, by preventing insurers from excluding individuals. This regulation should reduce job-lock for workers with preexisting

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<sup>2</sup> A side-by-side comparison of MHR and the PPACA is available in Appendix A.

<sup>3</sup> For example, Bradley et al. (2012) found that among men with a newly diagnosed illness, those with ESI had a 20% higher probability of staying in a job compared to men who had coverage through a spouse. Stroupe et al. (2001) found employer coverage reduced the propensity of individuals with chronic illness to quit by 41 percent for men and 39 percent for women compared to those who did not rely on their employer for coverage.

health conditions who want to leave their employer and seek individual market coverage.<sup>4</sup> Experts in a congressional hearing and a report released by the Government Accountability Office (GAO) have already projected increased mobility for this traditionally job-locked group as a result of the PPACA.<sup>5</sup> In fact, this labor market consequence of reform has become so widely anticipated that major news sources like the Wall Street Journal, National Public Radio, and Washington Post have dedicated commentary to the topic.<sup>6</sup>

A less certain component of the PPACA's impact on job-lock is the possibility that more affordable individual market premiums will increase mobility. The group of experts interviewed by the GAO to evaluate the potential effect of national health care reform on job-lock generally agreed that more affordable premiums for health coverage would have job-lock implications. But, they cited uncertain or mixed effects.<sup>7</sup> The ambiguity among these experts partially stems from a shortfall of economic findings regarding the direct relationship between premium prices and job-lock for the working population as a whole. Economists have faced significant obstacles to quantifying the link between premium prices and job-lock accurately, since data combining the cost of alternative sources of insurance and employment information are not readily available.

In this paper, I take advantage of the fact that individual market premiums uniformly decreased in Massachusetts after its 2006 reform to isolate the effect of lower premium prices on job-lock. I do so by treating MHR as a natural experiment. MHR serves as a valid natural

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<sup>4</sup> Chaikind et al. (2012) presents a detailed overview of the regulations imposed on insurers by the PPACA.

<sup>5</sup> See Hearing Before the Subcommittee on Health Care (2011) and Government Accountability Office (2011).

<sup>6</sup> See Weber (2012), Gruber (2012), and Klein (2011).

<sup>7</sup> Enclosure IV in Government Accountability Office (2011) provides a full discussion of the experts' expectations.

experiment in this context for three main reasons. First, MHR presented a completely exogenous change in the opportunity set for workers making mobility decisions. The shift in the cost of individual market coverage was not correlated with an individual's access to, or valuation of, insurance, or his or her probability of changing jobs; it was solely determined by the individual's state of residence. Second, the PPACA is largely based on MHR and the reforms have similar structures.<sup>8</sup> Consequently, analyzing the impact of MHR to predict the effects of the PPACA has become an accepted practice in the economic literature.<sup>9</sup> Finally, MHR did not affect access to insurance for those with preexisting health conditions or change the quality of insurance offered. As a result, data surrounding MHR can be used to isolate the effect of a change in the price of individual market insurance from other national reform components likely to reduce job-lock.<sup>10</sup>

To identify the effect of lower individual market premiums on job-lock in Massachusetts, I develop a probability-based model of turnover for individual workers. My model leverages the variation induced by MHR to isolate the effects of living in Massachusetts in the periods before and after reform. I find the change in the price of individual market insurance does not reduce job-lock at levels significantly different from zero. Reform only increases turnover in Massachusetts by 0.068%, which is equivalent to reducing the rate of job-lock in Massachusetts by 1.04% of its prior-to-reform level.

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<sup>8</sup> See Appendix A.

<sup>9</sup> Amanda Kowalski and Jonathan Kolstad have most notably made contributions to the literature on health care reform using evidence from Massachusetts.

<sup>10</sup> It is important to note that there are two relevant downfalls to using MHR to predict the effect of the PPACA. First, the population in Massachusetts differs demographically from the rest of the United States (See Table 3). Second, there may be unaccounted for movements in and out of Massachusetts that bias my results.

The paper is organized as follows: Section II provides background on job-lock and MHR. Section III presents a description of the data. Section IV is a detailed overview of my methodology and model. Section V provides empirical results. Section VI offers my conclusion.

## ***II. Background and Motivation***

### ***A. Understanding Job-lock***

A predominant feature of private health insurance in the United States is its link with employment. In 2010, the majority (55%) of all Americans relied on ESI (DeNavas-Walt et al, 2011). Employer provision of health care has several advantages. Economies of scale in administrative costs and reductions in adverse risk selection associated with employer-sponsored groups permit significant savings. Employers also subsidize most (over 70% in 2011) of employee health care premium costs, the value of which is exempt from the determination of employees' federal and state income and Social Security payroll taxes.<sup>11</sup> This exemption alone reduces the effective price of insurance for employees by 35 to 40% (Gruber, 2001; Bernard and Seldon, 2001).

Employer provision, however, also has disadvantages. In particular, ESI may distort job mobility if employees decide to stay jobs they would otherwise leave for fear affordable employer-provided coverage.<sup>12</sup> This scenario is known as job-lock.

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<sup>11</sup> In 2011, employers contributed about 82% of the average annual premium for single coverage and 72% of the average annual premium for family coverage (Government Accountability Office, 2011).

<sup>12</sup> For the immediate period after leaving one's job, the federal Consolidated Omnibus Budget Reconciliation Act of 1985 (COBRA) and state laws provide employees and their dependents the opportunity to continue coverage temporarily under the former employer's plan. While there may be short-term concerns regarding premium increases post-departure, the fear of losing coverage altogether is a long-term concern.

Job-lock has been discussed in the economic literature for over half a century. Ross (1958) talked of industrial “feudalism,” whereby fringe benefits, ESI being one of them, create bonds between the worker and employer that discourage job mobility. Jovanovic (1979) asserted this ESI-induced bond between the worker and employer might be an important concern if there is a match-specific component of productivity that makes workers more productive in some jobs than in others.

The argument, according to elementary notions of efficient resource allocation, is that the economy works efficiently when workers move to the job where their marginal product is highest. Impediments to moving to that job, such as the bond created by fringe benefits, prevent these efficient matches from being made. The productivity of the economy as a whole therefore suffers if individuals who would like to move to more productive jobs are constrained to keep their current positions simply to maintain their health insurance.

Gruber (2000) presents a compensating differentials model to explain the theory of job-lock. However, a simpler model will suffice. As Adam Smith presented in *The Wealth of Nations*, a worker ( $i$ ) chooses among available jobs ( $j$ ) to maximize his or her utility. Utility ( $U_{ij}$ ) depends on worker  $i$ 's earnings in job  $j$  ( $W_{ij}$ ),  $i$ 's fringe benefits ( $B_{ij}$ ), which includes subsidized health care, and the non-monetary returns  $i$  enjoys with each job ( $N_{ij}$ ).<sup>13</sup>

Formally,

$$\max_j U_{ij} = U_i(W_{ij}, B_{ij}, N_{ij})$$

If a worker's utility is higher in another job, he or she switches. Since wages do not perfectly offset differences in the valuation of health insurance across jobs and a worker's

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<sup>13</sup> Adam Smith describes this concept in Book I Chapter X, “Of Wages and Profit in the Different Employments of Labour and Stock.”

marginal product is not necessarily equal to his or her compensation, a worker with ESI may not change jobs even when a new employment opportunity with higher match-specific productivity arises.

Interest in estimating job-lock surged during the Clinton Administration when the link between ESI and labor market mobility became an important factor in evaluating several health care reform proposals. Gruber and Madrian (2002) found that the 1990's literature generally indicated that health coverage encourages workers to remain in jobs they might otherwise leave. Literature published in the following decade also found that workers with employer-sponsored coverage are less likely to leave their jobs than workers who are not dependent on their employer for coverage (Government Accountability Office, 2011). Anecdotal evidence and surveys consistently indicate that a large percentage of workers have stayed in a job that they wanted to leave for fear of giving up their health benefits.<sup>14</sup> Despite the abundance of evidence supporting job-lock, it is still highly debated by economists. It is difficult to identify the extent of the job-lock problem, as ESI is often correlated with other variables that affect mobility, and estimates greatly vary by group analyzed, time period looked at, and source of variation used.

### ***B. Alleviating Job-Lock Through Lower Premiums***

If the affordability of ESI is an important component of the bond created between workers and employers and contributes to job-lock, a reduction in the price of individual market insurance should decrease its prevalence. In that setting, the employee places a lower value on the savings associated with ESI. As a result, ESI should factor into the worker's mobility decision to a lesser degree, and the worker will be less susceptible to job-lock.

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<sup>14</sup> For example, Buchmueller and Monheit (2009) report that nearly half of the respondents to a 2008 survey said that they or one of their family members have had this experience.

In terms of the equation used to describe the mobility model in Part A, the reduction in the price of individual market insurance diminishes the utility associated with employee fringe benefits ( $B_{ij}$ ). This means that, if all other things are equal, individuals are more likely to change jobs when opportunities with higher match-specific productivity arise.

### ***C. The Massachusetts Health Care Reform***

The Massachusetts health care reform, formally titled An Act Providing Access to Affordable, Quality, Accountable Health Care (Chapter 58 of the Acts of 2006), passed almost unanimously in the Massachusetts state legislature and was signed into law by Governor Mitt Romney on April 12, 2006. After several years of discussion and debate over whether and how to make health coverage nearly universal in Massachusetts, the concept of “shared responsibility” among government payers, employers, and individuals emerged as a framework for the law’s components (Raymond, 2011).

#### ***1. The Connector***

A main feature of this legislation is the creation of the Commonwealth Health Insurance Connector Authority (the Connector), which is a “health insurance exchange” that makes it easier for individuals and small businesses to find and purchase affordable coverage. The Connector manages Commonwealth Care (CommCare) and Commonwealth Choice (CommChoice).

CommCare is a subsidized program for adults who are not offered ESI, not qualified for Medicare, Medicaid, or certain other special insurance programs, and who earn up to 300% of the

federal poverty level (FPL). The premium varies by household income and place of residence.

Adults with household incomes less than 150% of the FPL pay no monthly premium.<sup>15</sup>

CommChoice offers commercial insurance products to individuals with household incomes over 300% of the FPL. Individuals without access to ESI, in addition to small employer groups, can purchase health insurance plans with pre-tax funds. Six Massachusetts-based, non-profit health insurance carriers offer plans through the Connector. Even though CommChoice only covers 1% of the population, the rest of the market can individually purchase insurance from these carriers at the same cost (Kaiser Family Foundation, 2012). Together, these six plans have a 90% share in the commercial, licensed health insurance market (Massachusetts Health Connector, 2010).

## ***2. The Employer and Individual Mandates***

MHR mandates employer-sponsored coverage for most firms. Effective July 1, 2007, the reform required employers with 11 or more full-time employees to offer their workers the option to purchase health insurance coverage. These health coverage options must include a plan allowing employees to purchase health insurance using pre-tax wages, and employers must contribute at least 33% of the value of the premium or pay a penalty of \$295 per employee per year. Despite the relatively low penalty, compliance in Massachusetts has also been high. Only 4.6% of employers large enough to be subject to the penalty (12% of all Massachusetts employers) were required to pay a penalty in 2010 (Kolstad and Kowalski, 2012).

Also starting on July 1, 2007, all Massachusetts residents were required to obtain health insurance coverage or pay a penalty. Initially, those who were unable to demonstrate they had

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<sup>15</sup> The law also expands MassHealth (Medicaid), which targets children, pregnant women, and mothers of young children, by increasing the eligibility threshold from 200% of the FPL to 300% and restoring MassHealth benefits that were eliminated in the 2002 budget cut (Pryor and Cohen, 2009).

coverage when they filed their taxes paid a \$219 per person per year penalty; in 2008, the penalty increased to 50% of the cost of the least generous plan available in the Connector. Compliance with the individual mandate in Massachusetts has been high – over 97% of tax filers submitted the tax form to comply with the individual mandate in 2008, and less than 2% reported any period of uninsurance (Kolstad and Kowalski, 2012).

### ***3. Reported Outcomes of Reform***

Overall, an estimated 411,000 more Massachusetts residents had health insurance in December 2010 than before the law's implementation in fall 2006 (Raymond, 2011). Most of the coverage gains during the first two years of the law were in CommCare. Membership in employer-sponsored insurance and individual market insurance rose during this period as well. After the sharp economic downturn in 2008, private coverage declined, while enrollment in public coverage programs increased. Table 1 contains a full breakdown of the data.

**Table 1: Non-Medicare Health Insurance Enrollment Since Enactment of Health Reform**

Type of Coverage	June. 2006	Dec. 2007	Dec. 2008	Dec. 2009	Dec. 2010
Private Group	4,333,014	4,457,157	4,474,466	4,358,867	4,315,040
Individual Purchase	40,184	65,465	81,073	88,541	95,186
MassHealth	705,179	764,559	780,727	848,528	898,572
Commonwealth Care	0	158,194	162,725	150,998	158,973
Comm Care Bridge *	N/A	N/A	N/A	26,127	21,616

Notes on Chart Categories: Private Group includes large group, small group, and self-insured employers. Individual Purchase includes Commonwealth Choice and other non-group plans. Insured individuals with partial coverage or premium assistance are counted with group and individual plan members. MassHealth numbers exclude individuals who also have Medicare or subsidized, employer-sponsored coverage.

\* On October 1, 2009, low-income legally documented immigrants, categorized by the state as Aliens With Special Status, were moved from Commonwealth Care to Commonwealth Care Bridge, and new enrollment for this population was frozen.

**Source:** Raymond (2011).

The price of individual market insurance dropped after Massachusetts implemented the Connector. A state report on health care cost trends found that, on average, premiums per member per month in the individual merged market were 33 percent lower in 2008 than premiums in the pre-reform, non-group market (Massachusetts Division of Health Care Finance and Policy, 2011). Table 2 shows that the price of insurance markedly decreased for individuals above 300% of the FPL. For instance, premiums at the second largest health insurance provider in Massachusetts, Harvard Pilgrim Health Care, decreased by 24% for a 25-year-old and 13% for a 35-year-old parent with children.

**Table 2: Monthly Premiums in Individual Market: December 2006 vs. October 2008**

Insurer	2006: Standard Plan	2008: Gold Plan	2008: Bronze Plan	% Change Gold vs. 2006 Plan	% Change: 8% annual inflation added to 2006 Plan
<b>25-year-old</b>					
HMO Blue	\$528	\$470	\$255	-11%	-23%
HPHC	\$507	\$441	\$220	-13%	-24%
NHP	\$436	\$343	\$197	-21%	-32%
Tufts	\$710	\$378	\$218	-47%	-54%
<b>Family (2 kids, 35-year-old parents)</b>					
HMO Blue	\$1,248	\$1,660	\$902	33%	16%
HPHC*	\$1,533	\$1,540	\$767	0%	-13%
NHP*	\$1,505	\$1,276	\$731	-15%	-26%
Tufts	\$1,683	\$1,330	\$766	-21%	-31%
<b>Couple in 60s</b>					
HMO Blue	\$1,888	\$1,879	\$1,020	0	-14%
HPHC	\$2,011	\$1,853	\$923	-8%	-20%
NHP	\$1,733	\$1,477	\$847	-15%	-26%
Tufts	\$2,397	\$1,587	\$914	-34%	-43%

\*Rate is for one adult and one parent with children

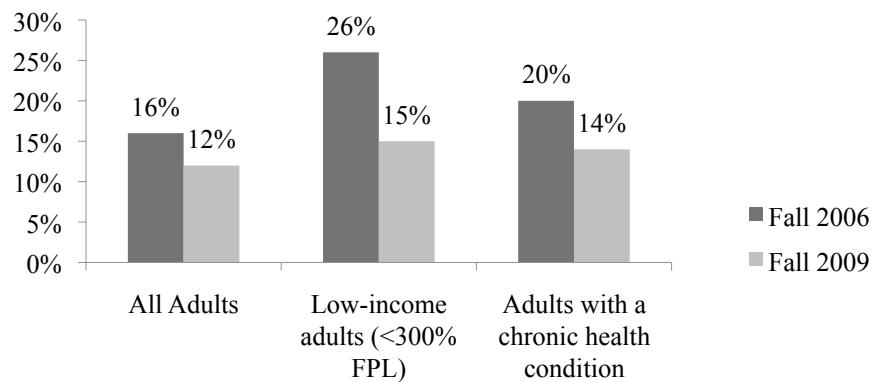
Data collected and provided by Professor Nancy Turnbull

Those with incomes below 300% of the FPL experienced an even greater decrease in the price of available individual market insurance. While the average premium for a 37-year-old

prior to reform was approximately \$335 for a plan with a \$5,000 deductible and no prescription drug coverage, CommCare plans were available after reform with premiums of \$39 a month for individuals with household income between 150% and 200% of the FPL, \$77 for individuals with household income between 200% and 250% of the FPL, and \$116 for individuals with household income between 250% and 300% of the FPL. These plans' deductibles were capped at \$2,000 and included prescription drug coverage (Pryor and Cohen, 2009).

Figure 1 displays the known consequences of the decrease in the price of insurance. Unmet insurance need due to costs fell by 25% for the non-elderly population as a whole, and between 30-40% among low income residents and residents with chronic health conditions (Urban Institute, 2010).

**Figure 1: Percent of Non-Elderly Adults Reporting Unmet Needs Due to Cost, Selected Populations**



**Source:** Urban Institute (2010)

While MHR drastically changed the provision and cost of health care, it did not change access to health care for those with pre-existing conditions or the quality of health care provided. Massachusetts already heavily regulated the private insurance market prior to reform. In the

1980s and 1990s, Massachusetts enacted several reforms of the private insurance market, including guaranteed issue, whereby insurers have to issue plans to any eligible applicant regardless of health status and community rating, which requires health insurance providers to offer health insurance policies to all persons at the same price, regardless of health status. These reforms restricted the price within a given area and prohibited insurers from charging individuals differently based on their health status or claims history. MHR did establish a Health Care Quality and Cost Council to involve public and private stakeholders in promoting quality improvement and cost containment, but direct evidence of improvements in quality have not been reported (Raymond, 2011).

As the above data imply, one of the major outcomes of MHR has been an increase in the number of residents receiving individual market insurance. Coupled with a corresponding decrease in the price of individual market insurance, the reform has provided greater access to lower cost insurance outside of employment.

### ***III. Data***

The data I use come from the 2004 and 2008 panels of the Survey of Income and Program Participation (SIPP).<sup>16</sup> SIPP is a nationally representative survey that collects information on the economic and demographic characteristics of individuals and their families. I specifically use data from the two years prior to reform, 2004-2005, and the two years following reform's full

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<sup>16</sup> The 2004-2005 data and 2009-2010 data come from two separate SIPP panels: the 2004 and 2008 panels. It is important to note that it is not possible to combine these distinct panels. Therefore, my analysis relies on two different subsamples.

implementation, 2009-2010.<sup>17</sup> It is important to note that I use data on individuals residing both in and outside of Massachusetts.<sup>18</sup>

SIPP offers the best data available to measure job turnover.<sup>19</sup> During each interview, SIPP respondents are asked questions about up to two jobs held during the previous four months. These include questions about industry, occupation, hours worked, pay of each job, and the start or end date for each job. With this information, I can determine whether an individual switched jobs in a given year.<sup>20</sup> The SIPP also enables me to follow workers over a longer period of time. Using the SIPP, I can estimate employment duration models that appropriately account for tenure, which numerous studies have found to be an important determinant of the likelihood of job mobility. The quality of SIPP data allows me to determine other job characteristics required to isolate the effect of ESI on job mobility, such as detailed information on a worker's health care provision, job tenure and benefits, and spousal characteristics.

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<sup>17</sup> I choose to start the after period in 2009, over a year after reforms full implementation. This is a later date than other researchers have used to determine the post-reform period. A temporary suspension of funding for SIPP in 2008 encouraged this decision.

<sup>18</sup> I use data from every state besides Hawaii, which has near-universal health insurance. Kolstad and Kowalski (2012) and Niu (2012) found that their results did not vary by whether states in the Northeast or the entire United States were used as controls.

<sup>19</sup> To study job-lock fully, one would like information on individual and family health status, worker mobility, the health insurance plan for the firm for which an individual works, and the health insurance plan for the firm to which an individual could move. Unfortunately, information on health status and health insurance is not widely available in labor force surveys, information on worker mobility is not typically available in health surveys, and information on insurance plans of companies for which an individual could have worked is nonexistent. As a result, it has become common practice to use labor force surveys, namely SIPP, to estimate job-lock.

<sup>20</sup> I therefore do not need to derive turnover from past employment data. Other nationally representative longitudinal labor force surveys, like the Panel Survey of Income Dynamics and the Current Population Survey, are inferior to the SIPP in this regard because they do not explicitly track job changes. How a researcher using these datasets defines job change can result in vastly different job turnover rates.

I restrict my sample to employed individuals between ages 25 and 64. I set the lower age cut-off because SIPP does not ask individuals younger than 25 questions regarding pensions, a fringe benefit critical to my model. I set the upper cutoff so that my results are not confounded by the effect of becoming eligible for Medicare. I follow the methodology of previous studies in excluding military personnel, agricultural workers, and construction workers.<sup>21</sup>

To achieve balanced panel data, I exclude individuals who were unemployed for over a full year during the two years I follow them, or failed to provide information on their employment both years. Unlike other studies, I use both married and unmarried men and women. I deliberately bring additional heterogeneity into my sample group to estimate the total effect of Massachusetts' reform on job-lock.<sup>22</sup> For a full overview of how I employ the SIPP, see Appendix B.

#### ***IV. Regression Framework***

Using the SIPP data, I create a model that compares the probability of job turnover during a given year for otherwise observationally equivalent employees who differ only in their state of residence and time period surveyed. Turnover is defined as changing employers or becoming self-employed.<sup>23</sup> Overall, the average yearly turnover rate for my sample is 7.35%.<sup>24</sup> Using this model, I can isolate the effect of employees in Massachusetts placing a lower value on their

<sup>21</sup> This is due to the highly idiosyncratic nature of job turnover in these sectors.

<sup>22</sup> For examples of papers that study one gender, see Dey and Flinn (2005), Gilleskie and Lutz (2002), and Gruber and Madrian (1994).

<sup>23</sup> Although my definition of turnover includes the switch from employment to self-employment, it does not include moving from one self-employed job to another. This is because individuals are excluded from the sample when they are self-employed.

<sup>24</sup> Individuals who remain unemployed for more than a year being excluded from my sample can explain the relatively low turnover rate.

current employer's health insurance policy as a result of less costly individual market insurance. I thereby measure the associated decrease in job-lock.

While a simple difference in differences model could isolate the effect of MHR on job-lock by comparing the average yearly turnover rate of individuals with ESI within and outside of Massachusetts, before and after reform, it is not the optimal approach. To measure the effect of reform appropriately, I need to incorporate additional sources of variation into the difference in differences approach. There are factors outside of the model that would bias my estimate of job-lock were I merely to compare averages. These factors are described below.

#### ***A. Using Data on Individual Workers***

I rely on variation within individuals over time by including data on individual workers. Individual level data are essential because they allow me to control for worker characteristics that are correlated with ESI and an individual's decision to switch jobs. Table 3 provides an overview of these characteristics and Table 4 breaks down the data by whether an individual has ESI. In other words, workers with ESI are likely to differ from individuals who do not have ESI, and these differences may be revealed in labor market outcomes.

A subtler, but still critical reason to incorporate these individual characteristics is the need to address compositional change among those with ESI in Massachusetts before and after reform. For instance, post-reform workers in Massachusetts with ESI had, on average, lower incomes than before reform. Table 5 shows the characteristics of workers with ESI, within and outside of Massachusetts, pre and post reform.

**Table 3: Worker Characteristics by State (all years)**

	MA		Non-MA	
	Mean	SD	Mean	SD
Female	0.5144	0.4999	0.4989	0.5000
Non-Hispanic White	0.1290	0.3353	0.2804	0.4492
Married	0.6480	0.4777	0.6493	0.4772
Age	42.99	10.25	42.7363	10.45
College Degree	0.2070	0.4052	0.1254	0.3312
Income Level (%FPL)	582.99	445.21	476.034	403.91
Union Member	0.1976	0.3983	0.1708	0.3762
Employer Sponsored Insurance	0.6408	0.4799	0.6718	0.4696
Sample Size	2,358		71,086	

**Table 4: Worker Characteristics by ESI Coverage (all years)**

	ESI		No-ESI	
	Mean	SD	Mean	SD
Female	0.4668	0.4989	0.5569	0.4968
Non-Hispanic White	0.2524	0.4344	0.3157	0.4648
Married	0.6277	0.4834	0.6897	0.4626
Age	43.25	10.39	41.87	10.61
College Degree	0.1429	0.3500	0.0793	0.2702
Income Level (%FPL)	517.41	415.56	413.75	379.24
Union Member	0.1932	0.3949	0.0899	0.2860
Sample Size	63,166		36,516	

**Table 5: Characteristics of Massachusetts and Non-Massachusetts Residents with Employer Sponsored Health Insurance, Pre and Post Reform**

	Pre-Reform		Post-Reform	
	Mean	SD	Mean	SD
<b>Massachusetts</b>				
Female	0.4589	0.4986	0.4547	0.4982
Non-Hispanic White	0.1335	0.3403	0.1137	0.3176
Married	0.5934	0.4914	0.6006	0.4900
Age	42.29	10.41	43.84	10.70
College Degree	0.2351	0.4243	0.2314	0.4219
Income level (%FPL)	625.59	498.22	594.37	369.85
Union Member	0.2146	0.4107	0.2052	0.4041
Sample Size	974		994	
<b>Not Massachusetts</b>				
Female	0.4612	0.4985	0.4731	0.4993
Non-Hispanic White	0.2520	0.4341	0.2611	0.4392
Married	0.6310	0.4825	0.6264	0.4838
Age	42.53	10.17	43.99	10.55
College Degree	0.1280	0.3341	0.1521	0.3592
Income level (%FPL)	510.94	424.66	517.95	403.95
Union Member	0.1905	0.3927	0.1950	0.3962
Sample Size	30,685		30,513	

### ***B. Empirical Implementation of Difference in Differences Model***

Using data on individual workers over two time periods, I estimate the effect of greater access to less costly individual market insurance in Massachusetts with the following probit specification:

$$\begin{aligned} PR(Leave Job) = & \Phi(\alpha + \gamma z' + \delta State + \beta_1 ESI + \beta_2 After \\ & + \beta_3 ESI * Massachusetts + \beta_4 ESI * After \\ & + \beta_5 Massachusetts * After + \beta_6 ESI * Massachusetts * After) \end{aligned}$$

An individual is described as changing jobs if he or she leaves his or her main source of employment in a given year.  $\Phi$  is the standard normal cumulative density function and  $z'$  is a vector of the observable demographic characteristics listed in Tables 3 through 5 (gender, race, marital status, age, schooling, income level, and union status). This type of probit specification with a difference in differences component is commonly used in the literature to estimate the presence of, and changes in, job-lock.<sup>25</sup>

In this specification,  $\beta_1$  provides an estimate of job-lock for the population as a whole.  $\beta_1$  and  $\beta_3$  can be used to estimate job-lock in Massachusetts, and  $\beta_6$  represents the change in job-lock associated with less costly individual market insurance after reform.

### ***C. Providing an Improved Estimate of Job-Lock***

A major concern with the model presented in Part B is devising a method for estimating job-lock that overcomes any correlation between ESI and factors that affect mobility independently from health insurance. The four main issues are:

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<sup>25</sup> Gruber and Madrian (2002) provide a detailed overview of how early studies of job-lock employed difference in differences specifications.

- 1) Couples make joint family employment and health insurance coverage decisions. The health insurance available through one's spouse could affect the individual's employment and job choice decisions.
- 2) Access to ESI is correlated with having a "good job." If I do not control for this, ESI becomes a proxy for desirable qualities associated with certain jobs.
- 3) Some individuals may have higher permanent turnover propensities.
- 4) Individuals are less likely to leave certain firms for reasons external to the firm's desirability or fringe benefits provided.

To account for these issues, I adopt the methodology employed by Buchmueller and Valleta (1996). They use a series of controls to account for the positive correlation between health insurance and other job amenities that are also likely to reduce job turnover.

Buchmueller and Valleta control for whether an individual has a working spouse and whether an individual with ESI also has ESI available through his spouse to help resolve the first issue.<sup>26</sup> To address the second concern, they add variables for pensions and wages to control for other "good job" characteristics. To deal with an individual's turnover propensity, they use a variable for tenure.<sup>27</sup>

I include each of these variables, and an additional variable, firm size, which accounts for the fact that individuals at large firms leave less often because turnover within the firm (promotion or demotion) is an alternative to switching employers. Correlation between spousal characteristics, "good job" controls, turnover propensity variables, firm size, ESI, and probability of changing jobs are presented in Table 6. While it is impossible given the nature of job-lock to control for

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<sup>26</sup> Madrian (1994) used this control in her seminal work on job-lock.

<sup>27</sup> Tenure is not a truly exogenous variable since it is partially determined by whether an individual switched jobs in previous years. Alternative measures of turnover propensity are similarly endogenous.

these factors fully, Buchmueller and Valleta find that adding these controls significantly changed their estimates of job-lock.

**Table 6: Correlations Between Selected Controls, ESI, and Probability of Changing Jobs in Given Year**

Variable	ESI		Probability Change Jobs	
	Correlation	SE	Correlation	SE
Spouse ESI	-0.254***	.003	.006***	.002
ESI*Spouse ESI	0.413***	.004	-.044***	.002
Pension	0.311***	0.003	-0.064***	0.002
Log (Monthly Wage Earnings)	0.217***	0.002	-0.036***	0.0001
Tenure	2.80e-05	2.48e-05	-0.001***	1.34e-05
Firm Size (100+ employees)	0.181***	0.003	-0.017***	0.002

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Another concern with the model presented in Part B is that it does an inadequate job accounting for the 2008 recession. State fixed effects and reform period specifications alone cannot control for the effects of the recession, since the recession affected states differently in each time period. Given that the macroeconomy affects job turnover – workers are more likely to leave jobs when the economy is either very good or very bad – it is important to control for this big event that occurred simultaneously with the implementation of the Massachusetts reform. To account for this variation, I include the unemployment rate by state and year as reported by the Bureau of Labor Statistics.

To address these additional concerns, I adjust the difference in differences model presented in Part B by adding spouse characteristics, “good job” variables, turnover propensities, firm characteristics, and the unemployment rate. The full empirical specification is:

$$PR(Leave\ Job) = \Phi(\alpha + \gamma z' + \delta State + \lambda s' + \varphi g' + \rho t + \kappa f \\ + \tau u + \beta_1 ESI + \beta_2 After + \beta_3 ESI * Massachusetts + \beta_4 ESI * After \\ + \beta_5 Massachusetts * After + \beta_6 ESI * Massachusetts * After)$$

Spousal characteristics are given by  $s'$ , which is a vector including whether an individual has a working spouse and whether an individual with ESI also has ESI available through his or her spouse. “Good job” characteristics are represented by  $g'$ , which contains whether the individual has a pension and the log of his monthly wage earnings. The individual’s tenure with the firm is denoted by  $t$ , and  $f$  denotes whether the firm has over 100 workers. In addition, the unemployment rate in the state in the given year,  $u$ , is included.

In this specification,  $\beta_1$  and  $\beta_3$  provide more accurate estimates of job-lock for the population as a whole and in Massachusetts, and  $\beta_6$  represents the improved evaluation of the change in job-lock associated with more affordable individual market insurance after reform.

## ***V. Results***

### ***A. Basic Results***

The results of my analysis indicate that reductions in the price of individual market insurance premiums had a negligible effect on job-lock. Table 7 presents the basic estimates of the specification described in Section III. The control variables have their expected effects. College-educated and older workers are less likely to leave jobs than other workers. Having access to insurance through one’s spouse increases the probability of leaving a job, and being at a “good job” (i.e. access to pension and higher wages) and having longer firm tenure decreases the probability. The only covariate that does not have its predicted sign is working at a large firm.

While significantly different from zero at the 1% level, the overall effect of being at a large firm on the probability leaving one's job is relatively small (~0.8%).

The negative and significant coefficient on ESI can be taken as evidence of job-lock.

Because I control for a number of reasons why individuals may stay at jobs other than ESI, I am able to isolate this effect. My model indicates that having ESI reduces turnover by 7.6%. This is a noticeably smaller estimate than that obtained by other recent studies of job-lock.<sup>28</sup>

Meanwhile, the estimated coefficient on having ESI in Massachusetts after reform is small and not significantly different from zero. In fact, my model reveals that reform only increases the turnover rate for those in Massachusetts with ESI by 0.068%.<sup>29</sup> Since job-lock exists at a rate of 6.5% in Massachusetts, as given by my model, this only represents a 1.04% change in the rate of job-lock prior to reform.

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<sup>28</sup> Many studies that find significant evidence of job-lock obtain estimates that range between 12% and 30%. See Gruber and Madrian (2002) and Government Accountability Office (2011) for an overview of the research on job-lock.

<sup>29</sup> It is important to note that this is the additional effect for those with ESI, not the effect for the Massachusetts population for the whole. Because I am measuring the effect on job-lock, which is a phenomenon specific to those with ESI, it is only the change for this group that matters.

**Table 7: Effect of MHR on Job Turnover**

<i>Independent Variable</i>	(1)	(2)
A. Probit Coefficient Estimates		
Female <sup>+</sup>	-0.0831*** (0.0128)	-0.0783*** (0.0135)
Non-Hispanic White <sup>+</sup>	-0.00803 (0.0149)	-0.0469*** (0.0152)
Married <sup>+</sup>	-0.209*** (0.0136)	-0.113*** (0.0154)
Age	-0.0318*** (0.00491)	-0.0172*** (0.00501)
Age2	0.000299*** (5.71e-05)	0.000197*** (5.84e-05)
College Degree <sup>+</sup>	0.0146 (0.0220)	0.0148 (0.0225)
FPL	-1.84e-05 (1.71e-05)	9.03e-05*** (1.84e-05)
Union Member <sup>+</sup>	-0.0988*** (0.0204)	-0.0315 (0.0210)
ESI <sup>+</sup>	-0.700*** (0.0166)	-0.671*** (0.0197)
Spouse ESI <sup>+</sup>		-0.223*** (0.0206)
ESI*Spouse ESI <sup>+</sup>		0.258*** (0.0319)
Pension <sup>+</sup>		-0.163*** (0.0153)
Log Monthly Wage Earnings		-0.0204** (0.00947)
Tenure		-0.0277*** (0.00109)
Large firm (100+ employees) <sup>+</sup>		0.0743*** (0.0134)
Unemployment Rate		-0.0137 (0.00861)
MA <sup>+</sup>	-0.108 (0.0845)	-0.113 (0.0856)
After <sup>+</sup>	-0.304*** (0.0171)	-0.230*** (0.0391)

MA*After <sup>+</sup>	0.118 (0.0941)	0.0990 (0.0957)
MA*ESI <sup>+</sup>	0.0490 (0.0958)	0.00915 (0.0971)
ESI*After <sup>+</sup>	-0.198*** (0.0275)	-0.202*** (0.0280)
MA*ESI*After <sup>+</sup>	-0.0295 (0.149)	0.00728 (0.152)
Log likelihood	-23445	-22862
N	99,682	99,682
<b>B. Marginal Effect</b>		
Marginal Effect of ESI for Population as a Whole	-0.0906426	-0.074959
Marginal Effect of ESI for Massachusetts Residents	-0.0768137	-0.0653993
Marginal Effect of MHR for those with ESI in Massachusetts	-0.0031482	0.0006847

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Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

+ Denotes that the variable is dichotomous

### ***B. Specification Checks***

To ensure the robustness of my finding that a decrease in the price of individual market insurance in Massachusetts had a small and insignificant effect on job-lock, I run tests on series of additional specifications.

The key identifying assumption behind my model is that a decrease in the price of individual market insurance affects all workers in Massachusetts. In theory, lower premiums in the individual insurance market should decrease the value workers place on ESI. However, since the prevalence of ESI in Massachusetts increased as a result of the employer-mandate, it is possible that workers changing employers may not factor the price of individual market insurance into their mobility decisions. Meanwhile, due to the individual mandate, workers transitioning into self-employment must factor the decrease in the price of individual market insurance into their mobility decision.

To confirm that the change in the price of individual market insurance affects all workers, I run an additional test on transitions into self-employment. To calculate the effect of reform on these transitions, I adjust the independent variable in my model to be the probability of moving to self-employment. Table 8, Column 2 presents the full results of this specification. MHR increased transitions to self-employment by .01%, which translates to a 1.5% change in the presence of job-lock for this population. This result is not significant, and is comparable to the effect of MHR on all turnovers, indicating that the decrease in the price of individual market insurance affected all Massachusetts residents. My result is similar to that of Niu (2012), who finds that reform does not have a persistent and economically significant effect on the likelihood of self-employment.

Another potential question about my model is whether the unemployment rate is an adequate control for the influence of the 2008 recession on job turnover. If it is not an adequate control, the fact that the rate of individuals being laid-off increases with recessions may be biasing results. To evaluate this concern, I change the independent variable to be the likelihood of an individual voluntarily leaving his or her job. I identify voluntary movements as reported by the SIPP respondents.<sup>30</sup> The results of this test are presented in Table 8, Column 3. I find that my results are not sensitive to whether or not I change the variable to exclude those who change involuntarily. Madrian (1994) presented similar findings.

The final query regards whether Massachusetts' reform affected individuals with household incomes under 300% of the FPL, who were eligible for markedly cheaper insurance after reform, at a different rate than the population as a whole. The results of this same specification, after restricting my sample to individuals with incomes below 300% of the FPL, are presented in Table 8, Column 4.<sup>31</sup> For this group, reform increases turnover by 2.7%, which is equivalent to a 30% decrease in job-lock. While the results imply that the change is higher for this low-income group than for the population as a whole, the results are still not significantly different from zero at standard levels.

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<sup>30</sup> Voluntary and involuntary departures are not easy to separate, and the self-reported variable I use to distinguish the two likely overstates the presence of involuntary transitions.

<sup>31</sup> While interesting, this specification is not statistically sound. FPL is significantly correlated with turnover in Table 7.

**Table 8: Effect of MHR by Specification**

	1*	2	3	4^
Dependent Variable	Turnover	Transitions to Self Employment	Voluntary Turnover	Turnover
Full Controls	Yes	Yes	Yes	Yes
Average Turnover Rate in Sample	7.40%	1%	4.40%	10%
Sample	Full Sample	Full Sample	Full Sample	Individuals Below 300% of the FPL
Sample Size	99,682	99,682	99,682	34,850
Coefficient on ESI Significant	Yes	Yes	Yes	Yes
Coefficient on MA*After*ESI Significant	No	No	No	No
Marginal Effect of ESI for Population as a Whole	-0.074959	-0.0061695	-0.0443823	-0.0683109
Marginal Effect of ESI for Massachusetts Residents	-0.0653993	-0.0061311	-0.0393654	-0.0692724
Marginal Effect of MHR for those with ESI in Massachusetts	0.0006847	0.0000932	0.0002927	0.0273905

\*The results presented in this column correspond to the entries in Column 2, Table 7.

^ The results presented in this column are not statistically sound due to correlation between FPL and turnover.

### *VI. Conclusion*

The potential for the PPACA to reduce job-lock has caught the public's attention. While experts expect national reform to reduce job-lock by expanding access to individuals with preexisting health conditions, they are less sure what the impact of decreased individual market premiums on job-lock will be. I find that less expensive individual market insurance premiums in Massachusetts did not reduce job-lock at levels significantly different from zero. This suggests lower individual market premiums under the PPACA may have a smaller effect on job-lock than anticipated.

While my results imply individual market premium prices do not reduce job-lock in the aggregate working population, premium declines may still affect job-lock for individuals with preexisting health conditions. Individuals with preexisting health conditions in Massachusetts had access to similar priced health care insurance to the rest of the population because of guaranteed issue and community rating laws. The PPACA implements guaranteed issue and community ratings for the first time nationally. Research on the independent effect of community ratings for individuals with preexisting conditions would provide further insight needed to predict the full effect of premium decreases in the individual insurance market under the PPACA on job-lock.<sup>32</sup>

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<sup>32</sup> A potential empirical strategy would be to adjust the model I present to look at states that do not have guaranteed issue before and after they enact some premium rating or community rating.

## *VII. Appendix*

### ***A. Overview of the PPACA and the Massachusetts Health Reform Major Components***

	Massachusetts Health Reform	PPACA
Insurance Market Reforms	The state requires guarantee issue, community rating, and created coverage and affordability standards. The state also merged the individual and small group markets into a single risk pool.	The PPACA requires guaranteed issue, community rating, and the creation of coverage standards through the essential health benefits by 2014. Early market reforms are already in effect, including the expansion of dependent coverage to age 26 and the elimination of lifetime limits.
State-based Exchange	The Connector was established as a marketplace for individuals and small businesses to compare and purchase private insurance that meets certain coverage and cost standards.	State Exchanges will be a marketplace for low to moderate income individuals and small businesses to compare and purchase private health insurance that meets certain coverage standards.
Subsidies for Private Coverage	Commonwealth Care provides subsidized private health coverage on a sliding scale for individuals with incomes up to 300% FPL. Individuals with incomes below 150% FPL are eligible for fully subsidized coverage. For those between 150-300% FPL, individual monthly premiums range from \$39- \$116.	Premium subsidies will be provided on a sliding scale for individuals with incomes up to 400% FPL to purchase private insurance in an Exchange. Cost-sharing subsidies will be available for those up to 250% FPL. An individual's expected contribution will range from 2-9.5% depending on household income.
Expansion of Public Coverage	Medicaid was expanded to cover children with family incomes up to 300% FPL. Eligibility levels for adults (parents –133% FPL, pregnant women– 200% FPL and long-term unemployed –100% FPL) remained the same, though enrollment caps for certain Medicaid programs for adults were raised.	Medicaid will be broadly expanded to all individuals under age 65 with incomes up to 133% FPL (plus a 5% automatic income disregard) based on modified adjusted gross income.
Individual Coverage Requirement	Individuals must have health insurance or face a financial penalty of up to 50% of the lowest cost premium an individual would have qualified for through the Connector.	Individuals must have health insurance or face a financial penalty of \$695 per year up to a maximum of 3 times that amount per family or 2.5% of household income-whichever is greater.
Employer requirements	Employers with 11 or more employees are required to provide insurance or pay a “Fair Share” contribution of up to \$295 annually per employee. Employers are required to offer a “cafeteria plan” that permits workers to purchase health care with pre-tax dollars or face a “free-rider surcharge” if employees make excessive use of uncompensated care.	Employers with 50 or more full-time employees that do not offer coverage are required to pay a fee of \$2,000 per employee, excluding the first 30 employees. Employers with over 200 employees must automatically enroll employees into plans offered by the employer. Employees may opt out of coverage.

Source: Kaiser Family Foundation (2012)

### **B. Using the Survey of Income and Program Participation (SIPP) Data**

In order to obtain balanced panel data on individuals by year, extensive manipulation of the SIPP is necessary. The SIPP is conducted in waves and rotation groups. Within a panel, the entire sample is interviewed at four-month intervals, called waves. The members of each panel are divided into four subsamples referred to as rotation groups. Each month, the members of one rotation group are interviewed. Over the course of four months, all rotation groups are interviewed, which constitutes a wave. Each wave contains core questions that are asked each time, along with topical questions that vary from one wave to the next. A graphical depiction of this process for the year 2004 is presented below.

<b>Reference Month</b>	<b>Rotation group</b>			
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Jan. 04	<b>W1 4</b>	W1 3	W1 2	W1 1
Feb. 04	W2 1	<b>W1 4</b>	W1 3	W1 2
Mar. 04	W2 2	W2 1	<b>W1 4</b>	W1 3
April. 04	W2 3	W2 2	W2 1	<b>W1 4</b>
May. 04	W2 4	W2 3	W2 2	W2 1
June. 04	<b>W3 1</b>	W2 4	W2 3	W2 2
July. 04	W3 2	<b>W3 1</b>	W2 4	W2 3
Aug. 04	W3 3	W3 2	<b>W3 1</b>	W2 4
Sept. 04	W3 4	W3 3	W3 2	<b>W3 1</b>
Oct. 04	<b>W4 1</b>	W3 4	W3 3	W3 2
Nov. 04	W4 2	<b>W4 1</b>	W3 4	W3 3
Dec. 04	W4 3	W4 2	<b>W4 1</b>	W3 4

<b>Notes on notation:</b>	
<b>Wa b</b>	<b>Rotation group:</b>
Wa: wave	1: Interviewed first month of wave
b: month of wave	2. Interviewed second month of wave 3. Interviewed third month of wave 4. Interviewed fourth month of wave

In addition to conducting interviews in waves and rotation groups, the survey data covers different reference periods. The reference period for most core items is the 4-month period preceding the month of the interview for the given wave, but some data on labor force characteristics are collected by week and data on health characteristics are collected by year. More information on the SIPP is available at <http://www.census.gov/sipp/>.

The process I use to turn the mixed reference period data into yearly data is as follows. First, I use the data provided in each wave to identify monthly variables. For variables reported by week, I take the average over the month. Next, I merge the data for the full panel. If a variable depends on information collected in preceding or following months, I identify the variable. I then split the panel up by year. For each year, I keep data from the first month of the year that the individual identifies employer information. If the individual left his or her job in a given year, I keep the data from the month prior to his or her departure. I merge together the years and identify variables that are calculated over multiple years. Finally, I delete entries for individuals who do not fall under my specifications or do not have full entries for both of the years used.

Variable definitions- All (VARIABLE NAMES) refer to the names in the dictionary file provided by the National Bureau for Economic Research.

**Age** (continuous): Age provided (TAGE).

**College Degree** (0/1): Identify as having a Bachelor's degree or higher (EEDUCATE)

**ESI** (0/1): Receives health insurance from their own (COVEREDSELF) workplace (SOURCEWORK).

**Federal Poverty Level** (continuous): total family income for given month (TFTOTINC) divided by Poverty threshold for this family in this month (RFPOV). This is converted to percentage points.

**Female** (0/1): Identify as female (ESEX).

**Firm Size 100+** (0/1): Employees at worker's location (TEMPSIZ1) is greater than 100.

**Leave Job** (0/1): Date respondent leaves his or her main source of employment (TEJDATE1) falls within the given year (RHCALYR).

**Leave Job to Enter Self-Employment** (0/1): Date respondent leaves main source of employment (TEJDATE1) falls within the given year (RHCALYR). In addition, the date the respondent starts a business (TSBDATE1) falls within a year from the date he or she leaves main source of employment (TEJDATE1). Alternatively, the hours worked (EHRSBS1) at a business the respondent owned at the time of departure (EBIZNOW1) increase by more than 20% the following year.

**Leave Job Voluntarily** (0/1): Date respondent leaves main source of employment (TEJDATE1) falls within the given year (RHCALYR), and respondent identifies that he or she has left the job voluntarily (ERSEND1). *Quit to take another job* and *Quit for some other reason* are considered voluntary.

**Married** (0/1): Identify as married (EMS)

**Pension** (0/1): 401k or thrift plan owned (EAST1C ).

**Non-Hispanic White** (0/1): Identify as white (ERACE) and do not identify as Spanish, Hispanic or Latino (EORIGIN).

**Spouse Insured** (0/1): Spouse, as identified by (SPOUSENUMBER), receives health insurance from their own (COVEREDSELF) workplace (SOURCEWORK).

**Tenure** (continuous): Year (RHCALYR) minus start date of job (TSJDATE1)

**Union Member** (0/1): Identify as being a member of either a union or an employee association like a union at their main source of employment (EUNION1)

**Wage** (continuous): Earnings from job received in given month (TPMSUM1). Variable is adjusted to include data from the previous eight months if not specified.

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