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Abstract

The Patient Protection and Affordable Care Act expands Medicaid and in-troduces health insurance subsidies, thereby changing work incentives for single mothers. To undertake an ex ante policy evaluation of the employment effects of the PPACA, I structurally estimate a model of labor supply and health in-surance choice exploiting existing variation in Medicaid policies. Simulations show that single mothers increase their labor supply at the extensive and the intensive margin by six and five percent, respectively. The PPACA leads to crowding-out of employer-sponsored health insurance of about 40 percent and increases single mothers' welfare by about $190 per month.

JEL Classification Codes: I18, I3, J2.

Keywords: health care reform, Medicaid, labor supply, single mothers.

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1 Introduction

The health care reforms passed in 2010 (Patient Protection and Affordable Care Act, PPACA) have the potential to significantly affect employment among the low-wage population. On the one hand, increased Medicaid eligibility and newly established health insurance subsidies will reduce the incentive to seek health insurance through employment. On the other hand, expanding the income cutoffs for eligibility will remove work disincentives for individuals who currently refrain from working to stay eligible for Medicaid. The effects of this law on work incentives for those marginally attached to the workforce are therefore ambiguous. At the same time, this population is important for policymakers because of its vulnerability and relative poverty.

In this paper, I aim to determine the work incentive effects of the PPACA provisions that apply specifically to single mothers, a group that is characterized by low attachment to the labor force and will be particularly affected by these reforms. Single mothers and their children are also the main recipients of existing Medicaid benefits. In contrast to married women, they are not able to obtain health insurance coverage through the employer of their spouse. Moreover, they often lack the qualifications necessary to find a job with employer-sponsored health insurance (ESHI).[1]

I estimate a structural model of labor supply that incorporates Medicaid and ESHI. In estimating the model, I rely on exogenous variation in recent expansions of Medicaid eligibility. After obtaining estimates of the preference parameters governing employment choice, I use them to simulate single mothers' labor supply and take-up of ESHI under health care reform. The structural approach allows me to analyze the effects of health insurance subsidies, a policy that has not yet been introduced at the national level.[2] This approach therefore constitutes an example of ex ante policy variation (Wolpin, 2013). In particular, I combine structural estimation with existing policy variation to evaluate a new policy that was only recently introduced and has not generated enough outcome data yet.

The existing literature on the effects of Medicaid on the labor supply of single mothers provides mixed evidence. Using data from the 1980s, Blank (1989) and Winkler (1991) find weak or no significant effects. Decker and Selck (2012) and Strumpf (2011) use variation generated by states introducing Medicaid in the 1960s and early 1970s and also find no impact on labor force participation. Meyer and

[1]With 13.1 million female-headed families with own children (U.S. Census Bureau, 2013), single mothers are also a quantitatively important group.

[2]The only other papers to directly estimate the labor market effects of PPACA use a general equilibrium approach, but do not include Medicaid expansions or an intensive margin, and their focus is not on single mothers (Aizawa and Fang, 2013; Brügemann and Manovskii, 2010). Another approach is to use local health care reforms that share some features with PPACA to estimate the employment effects of changes in health insurance availability. Examples include Colla, Dow, and Dube (2013) who use the employer mandate in San Francisco and Kolstad and Kowalski (2012) who exploit the Massachusetts reform. Finkelstein et al. (2012) analyze the Medicaid experiment carried out in Oregon, but do not consider labor market outcomes.

Rosenbaum (2001) compare the labor supply effects of different welfare programs and find that Medicaid has a relatively small positive effect compared to tax incentives. Moffitt and Wolfe (1992) and Dave et al. (2011) estimate that Medicaid lowers labor supply among women with large medical needs and pregnant women, respectively. In contrast, Yelowitz (1995) finds that increased Medicaid eligibility in the late 1980s and early 1990s reduced work disincentives and led to an increase in labor force participation, but Ham and Shore-Sheppard (2005) refute this result. In a recent paper, Garthwaite, Gross, and Notowidigdo (2013) analyze the effects of Medicaid disenrollment in Tennessee and find a substantial increase in labor supply among affected individuals. In contrast to my paper, these studies employ a reduced-form approach, mostly consider the labor force participation decision, and do not treat ESHI coverage as a choice variables.

I model take-up of ESHI jointly with the labor supply decision and let both depend on Medicaid availability, while the literature on health insurance and labor supply considers Medicaid and ESHI separately.[3] Potential ESHI coverage, however, may affect the direction of the employment effect of Medicaid. On the one hand, many low-income individuals are not qualified for jobs that provide health benefits. Moreover, they are only eligible for Medicaid if their income falls below the relevant threshold, which induces work disincentives. Expanding Medicaid eligibility or introducing health insurance subsidies relaxes this constraint and potentially increases labor supply. On the other hand, if the income threshold increases sufficiently, workers with ESHI coverage may become eligible for Medicaid or subsidies. If these alternatives are cheaper or more generous than ESHI, PPACA may lead to crowding-out of ESHI.[4,5] However, none of the existing studies treats ESHI coverage explicitly as a choice variable, although about a third of single mothers are covered by ESHI (Yelowitz, 1995).[6]

While the studies cited above mostly consider the participation decision, this paper allows for both full-time and part-time employment.[7] As I argue in the previous paragraph, workers with low initial labor supply may increase their hours when the Medicaid eligibility threshold increases. Others might work full-time prior to health care reform in order to qualify for ESHI coverage. Introducing health insurance subsidies allows these individuals to reduce their labor supply and drop ESHI coverage while obtaining subsidized health insurance. Therefore, not allowing for an intensive margin would mask these changes in labor supply and would also

[3] Currie and Madrian (1999), Gruber (2000), and Gruber and Madrian (2002) survey studies in both areas.

[4] For example, Cutler and Gruber (1996) estimate crowding-out of ESHI of about 30 to 50 percent due to Medicaid expansions.

[5] Medicaid expansions may also reduce job lock. Workers who hold a job that is not an ideal match only to obtain ESHI coverage may be able to switch to a more productive match if they become eligible for Medicaid (Hamersma and Kim, 2009).

[6] Moffitt and Wolfe (1992) and Meyer and Rosenbaum (2000) account for ESHI benefits, but assume that all workers are covered instead of treating ESHI coverage as the individual's choice.

[7] The studies by Keane and Moffitt (1998) on the effects of different welfare programs on labor supply and by Buchmueller and Valletta (1999) on the impact of ESHI on the labor supply of married women allow for an intensive margin, but their focus is not on Medicaid.

explain why existing studies find that Medicaid expansions have only small average effects on labor supply.

I also contribute to the literature by allowing individuals to differ in how much they value health insurance. Most prior studies on health insurance and labor market outcomes do not explicitly account for heterogeneity in the demand for health insurance coverage. By contrast, I allow the demand for health insurance to vary with individual health. For example, a healthy person might change her behavior less in response to Medicaid expansions than someone with chronic medical conditions that require expensive health care. To address individual valuation of health insurance coverage, Moffitt and Wolfe (1992), Keane and Moffitt (1998), and Aizawa and Fang (2013) match data on health expenditures and labor market outcomes from two different sources. In contrast, the data I use contain information on both, which makes matching unnecessary.

To estimate the model of labor supply, I draw on changes in Medicaid policies after the 1996 welfare reforms, a source of identifying variation that almost no study has used.[8] These expansions mostly affected parents while earlier expansions only increased the eligibility of children and pregnant women. States gained the opportunity to increase parental Medicaid eligibility beyond federal minimum requirements, thereby introducing more variation. Since PPACA extends Medicaid eligibility to even broader groups, the analysis of the more current Medicaid expansions is of particular policy interest. Moreover, this variation allows for more realistic policy simulations since some states already have Medicaid thresholds that are as high as the one specified by health care reform.

Hence, my contributions are fourfold. I treat Medicaid and ESHI coverage in a unified framework and distinguish between full-time and part-time work. Moreover, I allow for heterogeneity in individuals' valuation of health insurance and use data on recent policy changes.

The estimated preference parameters indicate that single mothers with medical conditions are significantly more likely not to work or to work part-time in order to be eligible for Medicaid. Hence, these women benefit particularly from PPACA since it allows them to enter the labor force or to work in full-time jobs while receiving subsidized health insurance. The simulation results show that health care reform increases labor force participation among single mothers by about six percent. Moreover, labor supply at the intensive margin grows by about five percent. These results are consistent with predictions of the Congressional Budget Office (2014) for low-income parents. Finally, health care reform leads to crowding-out of ESHI of about 40 percent in this population. These results are heterogeneous across subgroups, however, with single mothers with medical conditions reacting most strongly to the reform, as expected based on the preference parameter estimates. The welfare implications of the reform are positive. On average, families gain \$190 per month from PPACA while the costs associated with the reform amount to about \$150.

[8] To date, there are three papers exploiting the post-1996 Medicaid expansions (Hamersma and Kim, 2009, 2013; Hamersma, 2013)

The paper is organized as follows. In Section 2, I describe current Medicaid policies and the relevant provisions of the recent health care reform. I develop a labor supply model with health insurance in Section 3. Then I discuss my estimation strategy in Section 4 and describe the data used in the estimation in Section 5. Section 6 contains the estimation results and in Section 7, I develop theoretical predictions for the employment effects of PPACA and discuss the policy simulation results. Finally, Section 8 concludes.

2 Policy Background

In this section, I describe the relevant policy background on Medicaid and PPACA. I also highlight how variation in existing Medicaid rules helps to identify the labor supply effects of health care reform and explain the advantages and limitations of focusing the analysis on single mothers.

2.1 Current Medicaid Policies

Medicaid is the largest public health insurance program for working-age adults and children in the US, currently providing virtually free health care to 31.5 million children and 15.5 million parents in low-income households.[9] States administer their own Medicaid programs under broad guidelines set forth by the Centers for Medicare & Medicaid Services (CMS). In particular, each state can expand upon the minimum levels of Medicaid eligibility that are defined by the CMS (Iglehart, 1999). Therefore, the rules governing eligibility vary considerably between states.

The CMS mandates coverage of a broad range of services, such as hospital stays, physician care, laboratory and radiographic services, and preventive services (Iglehart, 1999). Federal law also prohibits excluding preexisting conditions or imposing waiting periods for coverage (Rosenbaum, 2002). There is also almost no cost sharing. On the other hand, physician reimbursement is lower for Medicaid patients than for those covered by private health insurance.[10] Therefore medical providers are less willing to treat Medicaid patients with over one third of physicians in small private practices not accepting Medicaid patients in 2005 (Iglehart, 2007). Hence Medicaid provides more generous health care coverage, but restricts health care access compared to private health plans. These features of Medicaid translate into the model assumption that Medicaid and ESHI are perfect substitutes (see Section 3).

Historically, Medicaid eligibility was tied to welfare receipt. A series of reforms has weakened the link between Medicaid and welfare, first for children and pregnant women starting in the mid-1980s and continuing for parents in the mid-1990s. In particular, the 1996 Personal Responsibility and Work Opportunity Reconciliation

[9]Centers for Medicare & Medicaid Services, Medicare & Medicaid Statistical Supplement 2012 Edition, https://www. cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/ MedicareMedicaidStatSupp/2012.html, Table 13.4.

[10]For example, Zuckerman, Williams, and Stockley (2009) find that Medicaid reimbursement rates are on average 30 percent lower than Medicare rates.

Act (PRWORA) enabled states to set Medicaid eligibility thresholds for parents independent of welfare rules. In this paper, I focus on the post-1996 changes in Medicaid eligibility. The eligibility thresholds for parental Medicaid in the post-1996 period are higher and therefore more comparable to the Medicaid threshold enacted by health care reform (see Section 2.2).

Children, parents, and pregnant women are eligible for Medicaid if family income falls below a threshold that varies by state.[11] These thresholds are often expressed as a percentage of the federal poverty line (FPL), which varies with family size. Federal regulation ensures that children and pregnant women are eligible if family income falls below 133 percent of the FPL. In contrast, there is no federal minimum level for parental Medicaid (Rosenbaum, 2009).[12]

This income test for Medicaid eligibility induces work disincentives. Families whose income exceeds the respective threshold by only one dollar lose eligibility. Since Medicaid is currently the only available source of public health insurance and ESHI is often not offered to low-wage workers, this means that most individuals are uninsured when they become ineligible for Medicaid. The sharp drop in benefits is also known as the Medicaid "notch" (Yelowitz, 1995). This "notch" leads to a strong incentive to reduce labor supply in order to keep earnings below the pertinent threshold. State specific income thresholds determine by how much parents have to reduce their labor supply to stay or become eligible for Medicaid.

Many states have used the increased opportunity to increase Medicaid thresholds above the minimum requirements after 1996. Figure 1 shows a histogram of population weighted parental Medicaid thresholds for a family of three for the years 1996 to 2007 in all states.[13] The graph illustrates the variation I use to identify the labor supply response to changes in Medicaid eligibility. There is variation in the income eligibility threshold for parental Medicaid across states and within states across time. Hence, I can compare single mothers residing in different states at different points in time and attribute differences in labor supply to differences in Medicaid eligibility conditional on other observables. I further discuss the identification strategy in Section 4.4.

[11] Prior to PPACA, childless adults were never eligible for Medicaid in most states. See Section 2.2 on changes in Medicaid eligibility through PPACA.

[12] In addition to income thresholds, asset tests were prevalent in determining Medicaid eligibility, but have been abolished in many states in recent years in an effort to simplify the application process. In 2009, 46 states did not require asset tests for children and 23 did not require them for parental Medicaid (Cohen Ross and Marks, 2009). Since there is no information on households' assets in the Medical Expenditure Panel Survey, the data set used in this paper, I ignore asset tests for Medicaid eligibility completely. This is a reasonable simplification, in particular for children's Medicaid.

[13] I am grateful to Sarah Hamersma for sharing state-level eligibility thresholds for parental Medicaid with me. See Hamersma and Kim (2009) for a complete list of Medicaid thresholds and their changes over time.

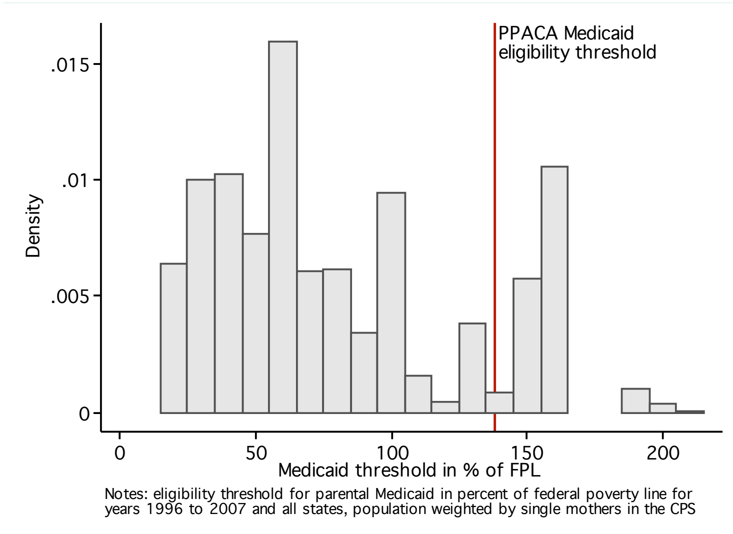


Figure 1: Distribution of Eligibility Thresholds for Parental Medicaid

2.2 The Patient Protection and Affordable Care Act

The components of the PPACA, which President Obama signed into law on March 23, 2010, can be classified into two major categories. First, it requires individuals to obtain health insurance coverage (individual mandate) and firms to provide it to their employees (employer mandate).[14] Second, it substantially expands Medicaid eligibility and provides health insurance subsidies to help low-income individuals comply with the insurance mandate. In this section, I focus on Medicaid expansions and subsidies since I simulate the effects of these provisions only.

In contrast to current Medicaid rules, citizens and legal residents below the age of 65 will be eligible for Medicaid starting in 2014, provided that family income does not exceed 138 percent of the FPL.[15,16] Childless individuals, who are not eligible for Medicaid under current rules, gain access to public health insurance through this expansion. In addition, the new law amounts to an eligibility expansion for parents in 38 states and older children in 26 states (Rosenbaum, 2009; Cohen Ross and Marks, 2009). PPACA also abolishes asset tests in the states where they are currently applied. States that had Medicaid thresholds above 133 percent of the FPL in place in March 2010 cannot lower them before 2014 and 2019 for adults and children, respectively.

Since childless adults will experience the largest increase in Medicaid availability, it is important to analyze how they change their labor supply in response to this

[14]Both individuals and firms have the option to pay penalties if they do not take up and provide health insurance, respectively.

[15]The official threshold will be 133 percent of the FPL, but there is a special adjustment of five percentage points, which effectively brings the threshold to 138 percent (Kaiser Family Foundation, 2010a).

[16]In 2013, 138 percent of the FPL amounts to about $27,000 for a family of three.

reform (Kenney et al., 2012).[17] However, these individuals are currently not eligible for Medicaid irrespective of their income. Since eligibility does not vary in this group, it is difficult to estimate the effect of Medicaid expansions on the labor supply of childless individuals and to simulate their employment choices under health care reform. Childless individuals also make different employment decisions than single mothers so that I cannot extrapolate from the latter to the former.

Moreover, single mothers are an important group when it comes to Medicaid and its effects on labor supply. Since they are not able to obtain health insurance through a spouse, they rely more heavily on public health insurance options and are at a greater risk of being uninsured than married women. Therefore it is particularly policy relevant to analyze whether single mothers increase or reduce their labor supply due to health care reform.

Figure 1 shows that few states have thresholds above 138 percent of the FPL.[18] This implies, however, that the current variation in the data includes the new Medicaid threshold. Predicting employment choice under health care reform with this data will consequently not be completely out-of-sample.

In addition to expanding Medicaid eligibility, PPACA introduces subsidies for individuals who earn up to 400 percent of the FPL.[19] Individuals whose income falls below this threshold can purchase coverage on newly established Health Benefit Exchanges at premiums that are limited to a percentage of their income. The highest income percentages that individuals have to pay for their coverage increase on a sliding scale as shown in Table 1. Subsidized health plans are limited to the silver plan with the second lowest cost in each state.[20] Moreover, these subsidies are not available to individuals whose employers offer ESHI. Since PPACA introduces subsidized health insurance for individuals and families in a wide range of the income distribution, this reform constitutes a substantial policy change. No similar policy exists on the national level, so simulating employment choice in the presence of health insurance subsidies requires structural estimation.

Immediately after President Obama signed the PPACA into law, several states started to challenge some of its components legally. In particular, these states argued that the individual mandate and the Medicaid expansions were unconstitutional. In 2012, the Supreme Court upheld the individual mandate, but struck down the Medicaid expansion being mandatory for states. In particular, Medicaid eligibility will still increase to 138 percent of the FPL in 2014, but states can opt out of this provision (Kaiser Family Foundation, 2012). However, the individual mandate and health insurance subsidies remain valid, and states will have to implement health insurance exchanges.

[17] For example, DeLeire et al. (2013) show that childless adults benefit from a Medicaid expansion in Wisconsin by increasing their health care utilization.

[18] Among the most populous states, some have Medicaid thresholds above 138 percent. For example, the thresholds in California and New York are around 150 percent of the FPL.

[19] For a family of three, 400 percent of the FPL is about $78,000.

[20] Health plans that are available on Health Benefit Exchanges are classified into bronze, silver, gold, and platinum plans according to their cost sharing. Silver plans cover essential health benefits and cover 70 percent of costs.

Table 1: Health Insurance Subsidies Under PPACA

Income range as percent of FPL	HI premium limit as percent of income
100 – 133	2
133 – 150	3 – 4
150 – 200	4 – 6.3
200 – 250	6.3 – 8.05
250 – 300	8.05 – 9.5
300 – 400	9.5

Notes: FPL = federal poverty level.
Source: Kaiser Family Foundation (2010b).

Policy makers are aware that PPACA has important consequences for the labor market. The Congressional Budget Office (2014) estimates, for instance, that health care reform will lead to an overall decrease in labor supply by about 2.0 million full-time equivalent workers by 2017. The most important components of the PPACA that are responsible for this decline in labor supply are health insurance subsidies, Medicaid expansions, employer penalties, and new taxes on earnings, according to the Congressional Budget Office (2014). In particular, the report argues that health insurance subsidies act as an implicit tax on earnings and therefore lead to reduced labor supply. In addition, childless adults in states that expand Medicaid have an incentive to work less in order to become eligible (see also Garthwaite, Gross, and Notowidigdo, 2013). On the other hand, the CBO argues that low-income parents who were eligible for Medicaid before the reform are likely to increase their labor supply. This prediction is in line with both the theoretical predictions and the empirical results of the present paper (see Section 7.1 for a in-depth discussion of the potential labor supply effects of PPACA). However, in contrast to the present paper, the CBO does not provide a model or quantify the labor supply effect among single mothers.

3 Theoretical Model

In this section, I develop a discrete static model of labor supply with ESHI and Medicaid. The model serves as a framework for estimating and simulating the impact of Medicaid expansions on the labor supply of single mothers.

Single mothers face a static labor supply decision.[21,22] Each period, they receive

[21] Single mothers are more likely to be liquidity constrained than married women and have small returns to work experience. Therefore, existing studies use a static approach when modeling single mothers' labor supply (Keane, 2011, p. 1070).

[22] Although the model is static, I use panel data to estimate it. Therefore, the time subscript t

three job offers, which are characterized by hours worked, a wage, and whether or not the job includes health benefits.[23] They can choose between one part-time offer and two full-time offers, one of which includes ESHI. Health benefits are not available for part-time jobs since most employers do not offer ESHI to their part-time workers. Weekly hours are 20 for part-time jobs and 40 for full-time jobs. The offered wage may differ by employment alternative. If a woman does not accept any of the three offers, she does not work for that period.

Individuals derive utility from per capita consumption, leisure (disutility from hours worked), and health insurance coverage for themselves and their children. Hence, utility of individual i in time period t when choosing either non-work ($j = n$), part-time employment ($j = p$), full-time employment without ESHI ($j = f_0$), or full-time employment with ESHI ($j = f_1$) is

$$U_{itj} = U\left(\tilde{C}_{itj}, H_{itj}, I_{itj}^P, I_{itj}^K; Z_i^u\right), \tag{1}$$

where $\tilde{C}_{itj}$ is per capita consumption,[24] $H_{itj} = \{0, 20, 40\}$ is hours worked, and I_{itj}^P and I_{itj}^K are indicators for mothers' (indicated by P as in parental) and children's (K as in kids) health insurance coverage, respectively. Z_i^u is a vector of individual characteristics that do not change over time and affect preferences. The goal of the estimation procedure laid out in Section 4 is to obtain the parameters of the utility function, which will allow me to carry out policy simulations.

The family's budget constraint is

$$C_{itj} + E_{itj}^P + E_{itj}^K + prem_{it} I_{itj}^S = w_{itj} H_{itj} + T_{it}\left(w_{itj} H_{itj}\right), \tag{2}$$

where E_{itj}^P and E_{itj}^K are out-of-pocket medical expenditure of the mother and her children, respectively, $prem_{it}$ is the part of the ESHI premium paid by the employee if she obtains ESHI coverage ($I_{itj}^S = 1$), w_{itj} is the wage in alternative j, and $T_{it}\left(w_{itj} H_{itj}\right)$ is the sum of government transfers (welfare, food stamps, payroll and income taxes, and the Earned Income Tax Credit) as a function of earnings. Each period individuals choose the alternative that yields the highest utility according to the utility function (1) subject to the budget constraint (2).

Single mothers value health insurance because it reduces out-of-pocket medical expenditures. Beyond that, individuals also directly derive utility from health insurance since it has a positive effect on health and reduces a family's financial risk. I assume that the two sources for health insurance coverage, ESHI and Medicaid ($I_{itj}^{M,h}, h = P, K$), are perfect substitutes in the utility function:

$$I_{itj}^h = \max\left\{I_{itj}^S, I_{itj}^{M,h}\right\}, h = P, K. \tag{3}$$

appears throughout this section.

[23] I do not model the probability of receiving an offer. However, the demand side of the labor market enters the model through the wage equation (6) below.

[24] Since there are economies of scale in consumption, I use an equivalence scale of the form $\tilde{C}_{itj} = C_{itj}/(1 + \sqrt{NK_{it}})$, where C_{itj} is total family consumption and NK_{it} is the number of children.

Medical services covered by ESHI and Medicaid are roughly comparable. Medicaid covers services that may be not available under some low-cost ESHI plans. On the other hand, Medicaid reduces access to health care due to lower provider reimbursement rates (see Section 2.1). In the only other structural study in this area, Keane and Moffitt (1998, p. 570) estimate separate utility parameters for Medicaid and ESHI, but they are not statistically significant from each other. Therefore, the simplifying assumption implied by equation (3) is reasonable.

Mothers and their children are covered by ESHI if the mother works full-time with health benefits, i.e. $I^S_{itj} = \mathbf{1}\{j = f_1\}$. I assume that mothers who work full-time with ESHI coverage obtain health benefits for both themselves and their children. In contrast, Medicaid coverage of mothers and children may differ due to differences in eligibility thresholds.

Medicaid coverage depends on eligibility thresholds that vary by state of residence, year, family size, and a child's age. Mothers and children are eligible if family income is less than the relevant income threshold. Ignoring unearned income, the eligibility rule for mothers is

$$I^{M,P}_{itj} = \mathbf{1}\left\{w_{itj}H_{itj} \le M^P_{s(i)t}\right\}, \tag{4}$$

where $M^P_{s(i)t}$ is the eligibility threshold for parental Medicaid according to state of residence s, year, and family size and $w_{itj}H_{itj}$ is monthly earnings.[25] For children, eligibility is determined separately for each age group. Let a index age groups and N^a_{it} be the number of children in age group a of mother i at time t. Then, a summary measure for children's Medicaid eligibility is

$$I^{M,K}_{itj} = \frac{1}{\sum_a N^a_{it}} \sum_a N^a_{it} \mathbf{1}\left\{w_{itj}H_{itj} \le M^{K,a}_{s(i)t}\right\}, \tag{5}$$

where $M^{K,a}_{s(i)t}$ is the Medicaid eligibility threshold for age group a. Hence $I^{M,K}_{itj} \in [0, 1]$.[26]

The above model implies that mothers take up Medicaid coverage for themselves or their children whenever eligible. This seems to be an unrealistic assumption given the evidence for relatively low take-up rates (e.g., Shore-Sheppard, 2008).[27]

[25] Medicaid eligibility depends on income, which includes unearned income other than welfare and food stamp payments. However, since I do not observe these income sources in the data, I am forced to make the simplifying assumption that unearned income equals zero.

[26] Therefore, $I^{M,K}_{itj}$ is not an indicator variable but can take on values on the unit interval. It is a summary measure that represents the fraction of children in a family who are eligible for Medicaid. Using this variable implies that mothers only care about the fraction of their children who are covered by health insurance and not about any particular child being covered. By including the fraction of children covered by health insurance in the utility function instead of their number, I can compare single mothers with different numbers of children.

[27] On the other hand, evidence from administrative data shows that take-up rates for Medicaid are higher than usually estimated based on survey data. Card, Hildreth, and Shore-Sheppard (2004) find that about 15 percent of individuals who are covered by Medicaid according to administrative data do not report coverage in the Survey of Income and Program Participation.

However, health care providers can sign up eligible patients for Medicaid and have the incentive to do so if the patient cannot pay for treatment herself. I also abstract from Medicaid stigma. Some studies including Meyer and Rosenbaum (2001) and Keane and Moffitt (1998) allow for a cost of signing up for Medicaid or welfare benefits. However, Medicaid coverage is less visible than welfare receipt, which reduces the importance of stigma. The cost of signing up is also small if health care providers take care of it. Moreover, the goal of this paper is to simulate employment choice under health care reform which includes a health insurance mandate. This mandate is expected to increase take-up of Medicaid.

In addition to the utility function and budget constraint, the model specifies equations for wage and out-of-pocket medical expenditure. The wage is determined by the wage equation

$$w_{itj} = \exp\left[\tilde{w}_j\left(Z_{it}^w, u_{itj}^w\right)\right], \tag{6}$$

where $\tilde{w}_j(\cdot)$ is a log-wage function and Z_{it}^w contains worker and labor market characteristics. The error term u_{itj}^w differs by employment alternatives to capture unobserved differences between job offers.

The out-of-pocket medical expenditure equations for mothers and children are:

$$E_{itj}^h = E^h\left(I_{itj}^S, I_{itj}^{M,h}, Z_{it}^{E,h}, u_{it}^{E,h}\right), h = P, K, \tag{7}$$

where I_{itj}^S and $I_{itj}^{M,h}$ are indicators for ESHI and Medicaid coverage, and $Z_{it}^{E,h}$ contains individual characteristics such as medical conditions. The expenditure shocks $u_{it}^{E,h}$ are the same for all alternatives for a given individual and time period. Out-of-pocket medical expenditure can vary across alternatives, however, since Medicaid and ESHI coverage are alternative specific and affect E_{itj}^h. Since I allow out-of-pocket medical expenditure to vary with health insurance status, I implicitly allow for ex post moral hazard. That is, having insurance coverage may affect medical expenditure conditional on having a medical condition. I assume that there is no ex ante moral hazard however. Hence, I take medical conditions as exogenous and assume that they do not depend on health insurance status.[28]

4 Estimation Strategy

The model described in the previous section consists of four equations: the utility function (1), a wage equation (6), and two equations for the out-of-pocket medical expenditure of mothers and children (7) (and implicitly the budget constraint (2)). In this section, I describe the three-step estimation procedure that I use to obtain the parameters of these equations. First, I estimate a multinomial logit model of employment choice to generate selection correction terms. Second, I estimate wage

[28] If there is ex ante moral hazard, health insurance could affect medical conditions when insured individuals reduce preventive efforts, for example. This assumption is in line with the empirical evidence reviewed by Zweifel and Manning (2000). There is strong evidence for ex post moral hazard while evidence for ex ante moral hazard is limited.

and medical expenditure equations in order to produce conditional distributions of these variables, which enter the utility function as arguments. Third, I estimate preference parameters using a structural multinomial logit model. I also briefly discuss identification of the model parameters at the end of this section.

4.1 Step 1: Selection Correction

Observed wages and medical expenditure depend on the chosen employment alternative. Wages are not observed for nonworking single mothers. Wages may also differ between full-time and part-time jobs and between jobs with and without ESHI. In addition, medical expenditures of mothers and children are a function of Medicaid and ESHI coverage, which in turn are determined by the mother's employment choice. Therefore, it is necessary to control for selection when estimating the wage and expenditure equations. I use a nonparametric multivariate selection correction procedure developed by Dahl (2002), which accounts for multiple choice alternatives and is both flexible and simple.

In particular, Dahl (2002) shows that it is sufficient to include a nonparametric function of the predicted choice probabilities, $f(\hat{p})$, in the outcome equation to control for selection. To obtain predicted choice probabilities, I estimate a multinomial logit model of employment choice, where choice is a function of individual characteristics and state-level Medicaid thresholds.[29] Utility from employment alternative $j = n, p, f_0, f_1$ is

$$U^1_{itj} = X^{1\prime}_{it}\alpha_j + \epsilon_{itj},$$

where X^1_{it} is a vector of individual and state-level characteristics, and ϵ_{itj} is an extreme-value error term. As a normalization, $\alpha_n = 0$. Single mothers choose the employment alternative j if $j = \arg\max_k U^1_{itk}$. Then the selection correction terms are a function of predicted choice probabilities, $f(\hat{p}_{itj})$, where

$$\hat{p}_{itj} = \frac{X^{1\prime}_{it}\hat{\alpha}_j}{1 + \sum_{k=p,f_0,f_1} X^{1\prime}_{it}\hat{\alpha}_k}, f = p, f_0, f_1 \quad \text{and} \quad \hat{p}_{itn} = \frac{1}{1 + \sum_{k=p,f_0,f_1} X^{1\prime}_{it}\hat{\alpha}_k}$$

In practice, $f(\hat{p}_{itj})$ is a fourth-order polynomial in the predicted choice probabilities.

4.2 Step 2: Wage and Medical Expenditure Equations

I estimate the parameters of the wage and expenditure equations to obtain the conditional distributions of wages and medical expenditures in all employment alternatives. Since earnings and medical expenditure are only observed for the chosen alternative, I draw counterfactuals for the other alternatives from these conditional distributions. Earnings determine Medicaid eligibility and transfers, so these simulations yield all the components that enter the utility function as arguments.[30]

[29] This "reduced-form" multinomial logit is different from the structural multinomial logit used to estimate the distribution of preference parameters in step 3 of the estimation procedure.

[30] Simulation of the utility arguments is necessary since they enter the choice probabilities nonlinearly. In other words, I have to integrate out the wage and expenditures to obtain choice probabilities, and I approximate this integration by drawing from the respective conditional distributions.

Wages may differ across employment alternatives. Part-time workers usually earn lower wages than full-time workers, and firms offering ESHI pay lower wages, all else equal (compensating wage differential). Therefore, I estimate separate wage equations for the three employment alternatives part-time and full-time without and with ESHI as the empirical counterpart for equation (6) in the theoretical model as follows:

$$\log w_{itj} = X_{it}^{w\prime} \beta_j^w + f\left(\hat{p}_{itj}\right) + \delta_{s(i)j}^w + \epsilon_{itj}^w, \tag{8}$$

where X_{it}^w is a vector of individual characteristics and $\delta_{s(i)j}^w$ is a state fixed effect. The state fixed effects capture state-specific characteristics other than the state unemployment rate and minimum wage (which are included in X_{it}^w). The selection correction function in regression $f\left(\hat{p}_{itj}\right)$ only includes the predicted probabilities for alternative j, which is sufficient to control for selection into that alternative (Dahl, 2002).

Using the estimated parameters in equation (8), I predict wages for the three employment alternatives for all single mothers in the sample. That is, independent of the chosen alternative (including non-work), each single mother is associated with three predicted wages. The predicted wages and hours worked determine monthly earnings for all employment alternatives. Hours worked $\hat{H}_{itj}$ are either the observed number for the chosen alternative or 20 and 40 for part-time and full-time employment, respectively. Given predicted and observed earnings for all alternatives, I simulate government transfers (denoted by $T\left(\hat{w}_{itj}^{(r)} \hat{H}_{itj}\right)$) and Medicaid eligibility for mothers and children (denoted by $\hat{I}_{itj}^{M,P}$ and $\hat{I}_{itj}^{M,K}$, respectively). I calculate transfers as the sum of welfare benefits (TANF), food stamps, and the Earned Income Tax Credit (EITC) and subtracting federal income and payroll taxes.[31]

The out-of-pocket medical expenditure regressions for mothers and children correspond to equation (7) in the theoretical model. Out-of-pocket expenditures are a function of health insurance coverage (Medicaid and ESHI) and other individual characteristics. Based on predicted Medicaid coverage, $\hat{I}_{itj}^{M,P}$ and $\hat{I}_{itj}^{M,K}$, and ESHI coverage $I_{itj}^S = \mathbf{1}\left\{j = f_1\right\}$, I use these estimates to simulate mothers' and children's out-of-pocket medical expenditures under the four employment and health insurance coverage alternatives. Hence, I use variation in Medicaid thresholds across states and time in order to estimate the effect of Medicaid coverage on medical expenditure.

To account for the high fraction of zeros and the skewness in the expenditure distribution, I estimate two-part models for mothers' and children's out-of-pocket expenditure following, e.g., Mullahy (1998) and Aizawa and Fang (2013). In the first part, I estimate a probit for medical expenditure exceeding zero and in the second part, I use a log-transformation of strictly positive expenditure. Hence, the

[31] Equations (4) and (5) in Section 3 describe the construction of the Medicaid eligibility variables. The online appendix contains details about these programs and the rules used to calculate transfers given monthly earnings.

two-part model consists of the following two equations:

$$\Pr\left(E_{it}^{h}>0\right) = \Phi\left(Z_{it}^{h\prime}\beta^{h}+f\left(\hat{p}_{itj}\right)+\delta_{s(i)}^{h,1}\right) \quad (9)$$

$$\ln\left(E_{it}^{h}\right)|E_{it}^{h}>0 = Z_{it}^{h\prime}\beta^{h}+f\left(\hat{p}_{itj}\right)+\delta_{s(i)}^{h,2}+u_{it}^{h,2}, h=P,K \quad (10)$$

for mothers ($h=P$) and children ($h=K$), where E_{it}^{P} is a mothers' annual out-of-pocket medical expenditure and E_{it}^{K} is the sum of expenditures for her children.[32] Z_{it}^{P} and Z_{it}^{K} contain demographics, the number of medical conditions, Medicaid eligibility of mothers and children, and ESHI coverage.[33] Medicaid eligibility is based on simulated earnings ($\hat{I}_{itj}^{M,P}$ and $\hat{I}_{itj}^{M,K}$, see above). $\delta_{s(i)}^{h,1}$ and $\delta_{s(i)}^{h,2}$ are state fixed effects and $u_{it}^{h,2}, h=P,K$ is a normally distributed time specific expenditure shock.

As with the wage equation, observed medical expenditures depend on the chosen employment alternative since they are a function of Medicaid and ESHI coverage. However, since I consider only out-of-pocket expenditure, it is not clear if ESHI status and unobserved determinants of medical expenditure are positively or negatively related. Being covered by ESHI may lead to lower out-of-pocket expenditure conditional on observables since the health insurance plan pays for medical care. On the other hand, individuals who are covered by ESHI may have an overall higher need for medical care, so that even their out-of-pocket expenditure is higher. Moreover, Medicaid covers most medical expenditures, so single mothers who are covered by Medicaid are likely to have lower out-of-pocket spending. To deal with this issue, I use the same selection correction procedure as above, i.e. I include a function of the predicted choice probabilities from the first-step multinomial logit, $f\left(\hat{p}_{itj}\right)$.

Based on the estimated coefficients in equations (9) and (10) and given the functional form assumptions of the two-part model, I simulate out-of-pocket medical expenditures $\hat{E}_{itj}^{P}$ and $\hat{E}_{itj}^{K}$ for all four employment alternatives. The simulated out-of-pocket medical expenditures for mothers and children, respectively, for employment alternatives without ESHI coverage are

$$\hat{E}_{itj}^{h}=\Phi\left(Z_{it}^{h\prime}\hat{\beta}^{h,1}+f\widehat{\left(\hat{p}_{itj}\right)}\right)\times\exp\left(Z_{it}^{h\prime}\hat{\beta}^{h,2}+f\widehat{\left(\hat{p}_{itj}\right)}+u_{it}^{h,2}\right), h=P,K, \quad (11)$$

where $u_{it}^{h,2}$ is a draws from $\mathcal{N}\left(0,\hat{\sigma}_{h,2}^{2}\right)$, and $\hat{\sigma}_{h,2}^{2}$ is the estimated variance of the error term $u_{it}^{h,2}$.

Having obtained simulated earnings, Medicaid eligibility, and medical expenditures, all arguments of the utility function (consumption, hours worked, and health insurance) are available, and I can estimate preference parameters in the third step.

[32] Out-of-pocket medical expenditures are health care expenditures incurred by the family, i.e. both cost sharing (deductibles and copayments) for insured individuals and medical expenditures paid for uninsured family members, or the cost of medical services not covered by health insurance. They do not include health insurance premiums.

[33] The medical conditions include long-term life threatening conditions, such as cancer, hypertension, and stroke; chronic, manageable conditions such as asthma and back problems; and mental health issues.

4.3 Step 3: Employment and Health Insurance Choice

Since employment choice is discrete, I estimate the parameters of the utility function (1) by multinomial logit.[34] Instead of imposing fixed preference parameters, I allow for both observed and unobserved heterogeneity in preferences. Using the conditional distributions of wages and medical expenditures estimated above, I simulate earnings and expenditures based on simulation draws of wage and expenditure shocks. Having simulated earnings and medical expenditures, all required components are available to obtain the utility arguments per-capita consumption ($\hat{\tilde{C}}_{itj}$), hours worked (H_{itj}), and health insurance coverage ($\hat{I}^P_{itj}$ for mothers and $\hat{I}^K_{itj}$ for children) for all four employment alternatives. The utility function is linear in its arguments. Consumption and health insurance coverage depend on simulated earnings and out-of-pocket medical expenditure, so I calculate utility for each simulation draw r as:

$$\begin{aligned} U^{(r)}_{itj} &= \beta^C \tilde{C}^{(r)}_{itj} + \beta^H_i \tilde{H}_{itj} + \beta^P_i \hat{I}^{P,(r)}_{itj} + \beta^K_i \hat{I}^{K,(r)}_{itj} + \gamma_j + \eta_{itj} \\ &= u^{(r)}_{itj} + \eta_{itj}, \end{aligned} \tag{12}$$

where η_{itj} is extreme value type I distributed. While marginal utility from consumption, β^C, is assumed to be constant across individuals, the remaining preference parameters ($\beta^H_i, \beta^P_i, \beta^K_i$) are individual specific. The parameters $\gamma_j, j = n, p, f_0, f_1$ are alternative specific constants that allow a better fit of the choice proportions in the data (van Soest, 1995), and $\gamma_n = 0$ as a normalization.

Given the budget constraint (2) and the scale assumption (see footnote 24), I calculate real per capita monthly consumption in 1,000 1996 dollars as

$$\tilde{C}^{(r)}_{itj} = \frac{1}{1000\left(1+\sqrt{NK_{it}}\right) CPI^{96}_t} \left[\frac{12}{52} w^{(r)}_{itj} H_{itj} + T\left(\frac{12}{52} w^{(r)}_{itj} H_{itj}\right) - \frac{prem_{itj} + E^{P,(r)}_{itj} + E^{K,(r)}_{itj}}{12} \right] \tag{13}$$

where NK_{it} is number of children, CPI^{96}_t is the price index for the base year 1996 used to obtain real values, and $prem_{itj}$ is the part of the annual health insurance premium paid by the individual.[35] In the estimation, a premium is only required for ESHI. When I simulate employment choice under health care reform, however, individuals also pay premiums for subsidized health insurance according to the schedule in Table 1. I normalize hours worked as $\tilde{H}_{itj} = H_{itj}/40$, where H_{itj} is observed hours worked, or 20 or 40 depending on the employment alternative. $I^{P,(r)}_{itj}$ and

[34] Zabalza, Pissarides, and Barton (1980), Fraker and Moffitt (1988), and van Soest (1995) are early examples for discretizing the hours distribution in estimating labor supply models. Keane and Moffitt (1998) and Buchmueller and Valletta (1999) use this approach in the context of welfare programs (including Medicaid) and private health insurance, respectively.

[35] I take state and year level ESHI premiums from the MEPS Insurance Component (see the online appendix for details).

$I_{itj}^{K,(r)}$ are calculated according to equations (3), (4), and (5) in Section 3 using simulated earnings in the Medicaid eligibility rules.

The preference parameters β_i are correlated coefficients that depend on observables and unobservables as follows:

$$\beta_i \sim \mathcal{N}\left(Z_i^{\beta}\delta, \Sigma\right), \tag{14}$$

where Z_i^{β} is a vector of observables and δ is a matrix of coefficients. Σ is an unrestricted variance-covariance matrix. Z_i^{β} includes mother's age (affecting β_i^H and β_i^P), indicators for Hispanic and black families (β_i^H, β_i^P, and β_i^K), the number of children under age four (β_i^H), the number of the mother's medical conditions (β_i^P), and the age of the youngest child and the sum of children's conditions (β_i^K). These variables capture observable characteristics that potentially affect labor supply and the demand for health insurance. These assumptions lead to a multinomial logit model with correlated random parameters (mixed logit), where the random components are multivariate normally distributed. The parameters δ and Σ of the preference distribution and the fixed preference parameters β^C and γ are estimated via Maximum Simulated Likelihood. Standard errors of the coefficients in all regressions are obtained using block-bootstrap to account for clustering within state (see details in the online appendix).

4.4 Identification

This section does not contain a formal identification proof, but I provide an intuitive argument that the parameter vector $\theta = \left(\beta^C, \gamma, \delta, \Sigma\right)$ is identified. Identification comes from both quasi-experimental variation in Medicaid eligibility rules and the structure imposed on the estimation method.[36]

Medicaid policies and other program rules that differ by state (such as welfare) are treated as exogenous. Although this is not a perfect experiment, there are many studies that treat between-state variation as exogenous. Moreover, I use variation in these policies over time. To account for unobserved state specific variation, I also include state fixed effects into the wage and medical expenditure regressions.

This exogeneity assumption may be violated if individuals choose their location based on Medicaid generosity. In the context of welfare, Kennan and Walker (2010) show that individuals do not migrate to a different state to take advantage of higher welfare payments. Another concern is that single mothers may base their marriage and fertility decisions on Medicaid rules, which vary by family size. This would also contradict Medicaid rules being exogenous. DeLeire, Lopoo, and Simon (2007) find that Medicaid expansions in the 1980s and early 1990s did not have a statistically significant effect on fertility. It is therefore unlikely that there was a relationship between Medicaid and fertility in the later period studied in the present paper.

[36] Conceptually, the combination of policy variation and structural estimation is similar to papers that use randomized experiments in conjunction with structural methods (Todd and Wolpin, 2006; Attanasio, Meghir, and Santiago, 2012; Ferrall, 2012).

In addition to exploiting exogenous variation in Medicaid policies, I also impose structure on the estimation that allows me to identify the preference parameters. In particular, I postulate a linear utility function and assume that the random preference parameters have a joint normal distribution (see equations (12) and (14)). Walker, Ben-Akiva, and Bolduc (2007) show that the mean and variance parameters in a multinomial logit model with random coefficients are identified for both continuous and categorical independent variables. In the present case, identification does not rely solely on exogenous variation in policy parameters and changes in medical condition or on the imposed structure, but rather on the combination of the two.

5 Data and Summary Statistics

The Medical Expenditure Panel Survey (MEPS) is a large-scale longitudinal and nationally representative survey of households, their medical providers, and employers carried out by the Agency of Healthcare Research and Quality (AHRQ).[37] It collects extensive information on the use of health care, associated expenditures, health insurance coverage, and medical conditions. In addition, it contains information of individuals' labor market outcomes and socio-demographic variables. The MEPS interviews each household five times over a period of 2.5 years. It is a rotating panel and has drawn a new sample every year since its start in 1996. Data for 14 completed panels are available to date (from the 1996 panel to the 2009 panel).

Since the public use version of the MEPS does not include geographic information, and estimating the effect of Medicaid policies on labor supply requires knowledge of individuals' state of residence, this paper uses restricted MEPS data that is not publicly available. State identifiers are encrypted in the restricted use version, but households are matched to state-level policy variables such as Medicaid eligibility thresholds and welfare rules.

Although the MEPS interviews each household five times within two years, some variables are measured at the annual level. In particular, the MEPS only contains annual medical expenditure variables. Therefore, I use data from one interview round for each year so that there are two observations for each household. I choose rounds 2 and 4 for variables that are measured at the round-level, i.e. all labor market variables. Rounds 2 and 4 both take place in the middle of the respective year so that no seasonal adjustments are necessary. To generate the estimation sample, I pool data from all panels.

To obtain a sample of single mothers, I select female household heads who are not married and have at least one child under the age of 18. The mothers' age is restricted to the range 18 to 55. From this sample, I select women who have at most five children. This is necessary because Medicaid eligibility thresholds vary by family size and I only have access to these thresholds for a maximum of six family members. Single mothers with more than five children constitute less than

[37] Data files and documentation are available from http://www.meps.ahrq.gov/mepsweb/data_stats/download_data_files.jsp.

one percent of the initial sample. Finally, I drop individuals who reside in states with fewer than 30 observations over the entire sample period, which leaves single mothers from 37 states in the estimation sample. Overall, these restrictions yield an estimation sample consisting of 7,852 single mothers.

Table 2 displays summary statistics for the individual-year-level variables used in the estimation by observed employment status (not working, part-time, full-time without ESHI, and full-time with ESHI, where part-time employment as defined as working less than 35 hours per week). The first two rows show frequencies and percentages for each employment category. About one third of year-level observations fall into the non-working and full-time work with ESHI categories, respectively, about one fifth of the sample work full-time without ESHI, and the remainder is in part-time work.

Characteristics of single mothers vary between employment alternatives. Women with full-time work and ESHI coverage are older, less likely to be Hispanic, and have more education on average. Their hourly wage is higher than that of single mothers in full-time or part-time jobs without ESHI coverage. Single mothers who are not employed not only have more children but also younger children than those working. They are also less healthy on average, measured by the fraction that has any medical condition and by the average number of conditions. Among working mothers, those with ESHI coverage have slightly more medical conditions. The children of non-working mothers are also less healthy on average. Out-of-pocket medical expenditure for both mothers and children are highest among women with ESHI coverage. Medicaid is an important source of health insurance coverage for single parents and their children. Seventy percent of single mothers who do not work and 85 percent of their children are covered by Medicaid. Over 40 percent of women working part-time or full-time without ESHI and about 70 percent of their children are covered by Medicaid. Overall, this sample of single mothers is relatively poor. Even among women working full-time with ESHI, average income is only 260 percent of the FPL.

Besides individual and family level variables, I merge a number of state-level variables to the MEPS.[38] Table 3 displays summary statistics of these variables. I obtain these statistics from the sample of single mothers, so they are weighted by the number of observations in each year-state cell. According to these weighted means, about 56 percent of firms offer ESHI, and employers pay $3.11 for ESHI per hour. The employee part of the ESHI premium amounts to about $2,200 per year for family coverage. The average threshold for parental Medicaid is about $1,000 per month. This value accounts for the family sizes observed in the sample. For infants, the Medicaid eligibility thresholds is over $2,300 per month. This number decreases to about $1,500 for older children. Using the Medicaid threshold under health care reform with the actual FPL from 1996 to 2010 yields an average eligibility threshold of $1,700, which is significantly higher than under current rules.[39]

[38]See the online appendix for details and sources.

[39]I calculate the Medicaid threshold under PPACA using the FPL that was in effect in the years when the respective individual was part of the sample. Hence, these thresholds are calculated as if

Table 2: Summary Statistics of Household Characteristics by Observed Employment Alternative

	Non-work	Part-time	Full-time, no ESHI	Full-time ESHI
Frequency	4940	2650	3126	4647
Percentage	0.322	0.172	0.203	0.302
Mother's age	34.59	34.83	34.37	38.00
	(9.06)	(8.62)	(8.25)	(7.72)
Black	0.381	0.342	0.343	0.368
	(0.486)	(0.475)	(0.475)	(0.482)
Hispanic	0.351	0.254	0.354	0.202
	(0.477)	(0.435)	(0.478)	(0.402)
Years of education	11.05	12.04	11.62	13.17
	(2.72)	(2.57)	(2.56)	(2.38)
Number of children	2.121	1.906	1.988	1.661
	(1.193)	(1.004)	(1.053)	(0.851)
aged 0 to 2	0.336	0.231	0.234	0.112
	(0.576)	(0.482)	(0.475)	(0.336)
aged 3 to 4	0.247	0.213	0.213	0.123
	(0.469)	(0.435)	(0.441)	(0.343)
aged 5 to 10	0.726	0.669	0.698	0.533
	(0.862)	(0.791)	(0.804)	(0.693)
aged 11 and older	0.812	0.794	0.844	0.893
	(0.954)	(0.925)	(0.932)	(0.828)
Age of youngest child	6.88	7.51	7.48	9.53
	(5.42)	(5.11)	(5.14)	(5.10)
Any med. cond., mother	0.428	0.353	0.319	0.374
	(0.495)	(0.478)	(0.466)	(0.484)
# of med. cond., mother	0.984	0.634	0.530	0.675
	(1.630)	(1.138)	(1.015)	(1.163)
Any med. cond., children	0.287	0.239	0.233	0.234
	(0.453)	(0.427)	(0.423)	(0.423)
# of med. cond., children	0.520	0.395	0.370	0.367
	(1.214)	(0.958)	(0.896)	(0.849)
Med. OOP expenditure, mother	322.51	340.74	252.27	421.92
	(1318.34)	(1224.30)	(649.03)	(812.27)
Med. OOP expenditure, children	145.80	197.66	172.83	351.67
	(1211.00)	(763.98)	(619.25)	(968.76)
Medicaid coverage, mother	0.692	0.471	0.428	0.051
	(0.462)	(0.499)	(0.495)	(0.219)
Medicaid coverage, children	0.855	0.712	0.713	0.251
	(0.340)	(0.441)	(0.442)	(0.427)
Hourly wage		9.49	9.10	14.97
		(19.81)	(4.45)	(8.37)
Hours worked		23.69	40.96	41.39
		(7.64)	(6.57)	(5.25)
Income as percentage of FPL	57.32	119.96	128.97	257.55
	(68.23)	(114.84)	(97.72)	(157.83)

Notes: Means and standard deviations (in parentheses). OOP = out-of-pocket, FPL = federal poverty level.
Source: Medical Expenditure Panel Survey.

Table 3: Summary Statistics of State-Level Variables

	Mean	Std.dev.
State unemployment rate	5.199	(1.017)
State minimum wage	5.482	(0.797)
Fractions of firms offering ESHI	0.556	(0.054)
Employee annual ESHI premium	2175.10	(718.00)
Annual federal poverty line	14818.40	(3315.70)
Medicaid eligibility threshold, parents	999.10	(648.50)
Medicaid eligibility threshold, children 0 to 1	2359.40	(674.30)
Medicaid eligibility threshold, children 1 to 5	1897.70	(663.80)
Medicaid eligibility threshold, children 6 to 14	1590.70	(714.70)
Medicaid eligibility threshold, children 15 to 16	1508.60	(792.80)
Medicaid eligibility threshold, children 17	1505.80	(794.80)
Medicaid eligibility threshold, children 18 to 19	1502.60	(797.00)
Medicaid eligibility threshold under PPACA	1704.10	(381.30)

Notes: Means and standard deviations (in parentheses) of state-level variables weighted by number of individual observations per state and year.
Source: See online appendix.

6 Estimation Results

In this section, I first show reduced-form evidence on the employment effects of Medicaid expansions. Then I discuss the results for the three-step estimator described in Section 4.

6.1 Reduced-Form Results

To show that Medicaid eligibility thresholds affect single mothers' employment choice, I regress labor market outcomes on Medicaid thresholds in a reduced form. When estimating the effect of Medicaid policies on health or labor market outcomes, using individual Medicaid eligibility as an independent variable leads to biased estimates. Actual eligibility is endogenous because Medicaid eligibility depends on income, which may be correlated with the unobserved component of the outcome variable. To avoid this problem, Currie and Gruber (1996) propose a simulated eligibility measure. They draw a national sample of women for different demographic cells and calculate the fraction eligible for Medicaid under every state's eligibility rules for each of the cells. Hence, variation in this eligibility variable comes from state policies and not from individual characteristics. Then they instrument individual eligibility with this simulated eligibility measure. Instrumenting individual Medicaid eligibility with the simulated eligibility measures does not lead to consistent estimates, however, since the relationship between employment choice and Medicaid choice is necessarily nonlinear because of the Medicaid eligibility rules. I avoid this problem by using the simulated eligibility measure as a proxy instead of as an instrument (Dave et al., 2011).

I follow Currie and Gruber's (1996) procedure with Dave et al.'s (2011) modification and divide the MEPS sample of single mothers into 30 demographic cells based on age, race/ethnicity, and education. Then I draw 300 individuals from the sample of the pooled 1996 to 2007 MEPS data for each cell and use the simulated Medicaid eligibility rates in these cells as proxies for actual eligibility. Tables 4 and 5 show the regression results from linear probability models for each of the four employment choices, including only simulated parental Medicaid eligibility and both parental and children's Medicaid eligibility, respectively.[40]

Parental Medicaid eligibility increases the likelihood of not working and reduces full-time work with ESHI (Table 4). Adding simulated eligibility for children's Medicaid makes the effects of parental Medicaid insignificant (Table 5). Children's Medicaid eligibility decreases the odds of working full-time with ESHI and makes full-time work without ESHI more likely. These results suggest that Medicaid expansions have two main effects on the employment choice of single mothers: 1) they lead to work disincentives, consistent with Dave et al.'s (2011) findings and 2) there

PPACA had been in effect during the sample period, 1996 to 2010.

[40]In addition to simulated Medicaid eligibility, these regressions include individual characteristics, state-level variables describing the availability and cost of ESHI and labor market conditions, and state and year fixed effects.

Table 4: Reduced Form-Results: OLS Regressions of Employment Choices on Simulated Medicaid Eligibility for Parents

	(1) Non-work	(2) Part-time	(3) Full-time, no ESHI	(4) Full-time, ESHI
Simulated Medicaid eligibility, mother	0.139***	0.011	0.025	-0.172***
	(0.031)	(0.021)	(0.024)	(0.038)
Number of children aged 0 to 2	0.141***	-0.020*	-0.029*	-0.090***
	(0.012)	(0.011)	(0.015)	(0.013)
Number of children aged 3 to 4	0.075***	0.007	0.003	-0.084***
	(0.014)	(0.010)	(0.010)	(0.013)
Number of children aged 5 to 10	0.047***	-0.001	0.009	-0.053***
	(0.011)	(0.005)	(0.008)	(0.007)
Number of children aged 11 or older	0.022**	0.002	0.026***	-0.046***
	(0.008)	(0.006)	(0.006)	(0.009)
Any medical condition - mother	-0.01	0.008	0.007	-0.007
	(0.014)	(0.014)	(0.010)	(0.015)
Number of medical conditions - mother	0.065***	-0.013***	-0.021***	-0.026***
	(0.005)	(0.005)	(0.004)	(0.005)
Any medical condition - children	0.026*	-0.014	-0.003	-0.006
	(0.015)	(0.015)	(0.013)	(0.018)
Number of medical conditions - children	-0.004	0.002	0	-0.001
	(0.006)	(0.006)	(0.005)	(0.006)
State unemployment rate	0.025**	-0.007	-0.005	-0.018*
	(0.010)	(0.008)	(0.008)	(0.009)
Minimum wage	-0.003	0.01	0.016	-0.015
	(0.015)	(0.009)	(0.011)	(0.012)
Hourly ESHI premium paid by employer	0.002	0.048*	-0.015	-0.038
	(0.026)	(0.025)	(0.026)	(0.025)
Hourly ESHI premium paid by employee	0.027	-0.058	0.072*	-0.045
	(0.041)	(0.038)	(0.041)	(0.045)
Fraction of firms offering ESHI	0.054	-0.203	0.101	-0.07
	(0.206)	(0.136)	(0.159)	(0.203)
Constant	0.879***	0.487***	0.091	-0.343**
	(0.179)	(0.142)	(0.172)	(0.161)
Observations	11,411	11,411	11,411	11,411

Notes: Medicaid eligibility simulated based on national sample of single mothers (see text for details); age, age squared, black, Hispanic, education, and state and year fixed effects included; standard errors clustered at state-level in parentheses; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.
Source: Author's calculations.

Table 5: Reduced-Form Results: OLS Regressions of Employment Choices on Simulated Medicaid Eligibility for Parents and Children

	(1) Non-work	(2) Part-time	(3) Full-time, no ESHI	(4) Full-time, ESHI
Simulated Medicaid eligibility, mothers	0.065	-0.05	-0.063	0.065
	(0.064)	(0.051)	(0.047)	(0.062)
Simulated Medicaid eligibility, children	0.092	0.076	0.109**	-0.294***
	(0.063)	(0.058)	(0.043)	(0.059)
Number of children aged 0 to 2	0.141***	-0.020*	-0.029*	-0.090***
	(0.012)	(0.011)	(0.015)	(0.013)
Number of children aged 3 to 4	0.075***	0.007	0.003	-0.083***
	(0.014)	(0.010)	(0.010)	(0.013)
Number of children aged 5 to 10	0.047***	-0.001	0.009	-0.053***
	(0.011)	(0.005)	(0.008)	(0.007)
Number of children aged 11 or older	0.021**	0.002	0.026***	-0.046***
	(0.008)	(0.006)	(0.006)	(0.009)
Any medical condition - mother	-0.01	0.008	0.008	-0.007
	(0.014)	(0.014)	(0.010)	(0.015)
Number of medical conditions - mother	0.065***	-0.014***	-0.021***	-0.026***
	(0.005)	(0.005)	(0.004)	(0.005)
Any medical condition - children	0.026*	-0.015	-0.003	-0.005
	(0.015)	(0.015)	(0.013)	(0.018)
Number of medical conditions - children	-0.004	0.003	0	-0.001
	(0.006)	(0.006)	(0.005)	(0.006)
State unemployment rate	0.025**	-0.007	-0.005	-0.016*
	(0.010)	(0.008)	(0.008)	(0.009)
Minimum wage	-0.002	0.011	0.019*	-0.021*
	(0.015)	(0.010)	(0.010)	(0.011)
Hourly ESHI premium paid by employer	0.007	0.052**	-0.01	-0.053**
	(0.026)	(0.025)	(0.026)	(0.026)
Hourly ESHI premium paid by employee	0.029	-0.057	0.074*	-0.05
	(0.040)	(0.038)	(0.041)	(0.043)
Fraction of firms offering ESHI	0.067	-0.192	0.116	-0.111
	(0.207)	(0.137)	(0.158)	(0.193)
Constant	0.787***	0.412**	-0.019	-0.049
	(0.190)	(0.167)	(0.169)	(0.147)
Observations	11,411	11,411	11,411	11,411

Notes: Medicaid eligibility simulated based on national sample of single mothers (see text for details); age, age squared, black, Hispanic, education, and state and year fixed effects included; standard errors clustered at state-level in parentheses; * p<0.1, ** p<0.05, *** p<0.01.
Source: Author's calculations.

is substantial crowding-out of ESHI. This finding is also consistent with the literature (Cutler and Gruber, 1996). Hence, expanding Medicaid eligibility affects single mothers' work incentives at both ends of the labor supply distribution. However, these results do not capture heterogeneous effects. To account for heterogeneity and to allow for the different mechanisms in how Medicaid affects work incentives, I estimate a structural model of labor supply with health insurance coverage. The structural estimation has the added advantage of allowing me to simulate policy counterfactuals.

6.2 Structural Estimation Results

Here, I present the estimation results for the three-step estimator described in Section 4. I also discuss summary statistics for the simulated variables, such as earnings, Medicaid eligibility, and medical expenditure, that are based on these estimates.

Table 6 shows the estimated coefficients from the first-step multinomial logit model. The state- and year-specific eligibility threshold for parental Medicaid significantly reduces the probability that a single mother chooses one of the three employment choices involving a positive number of hours. This finding confirms the reduced-form results in Table 4. Hence, higher Medicaid threshold and eligibility lead to work disincentives. I then use the multinomial logit estimates reported in Table 6 to calculate polynomials of predicted choice probabilities that serve as selection correction functions in the wage and medical expenditure regressions.

The results for the three separate log-wage regressions by observed employment choice are reported in Table 7. The predicted choice probabilities are only significant in the full-time employment with ESHI regression. Moreover, single mothers who live in a state with a higher minimum wage earn higher wages in all three employment alternatives, while the state-level unemployment rate generally does not have a significant effect. Other variables such as race, ethnicity, and education have the expected signs.

Using the estimated conditional wage distributions, I simulate hourly wages and monthly earnings for the three work alternatives. Their means and standard deviations are shown in panel A of Table 8. Estimating a wage equation with selection correction allows me to simulate wages and earnings for all individuals in the sample, including those who do not work. The average hourly wage is $9 for jobs without ESHI and $12.70 for jobs with ESHI. Average earnings are about $800, $1,600, and $2,200 for part-time and full-time jobs without ESHI and full-time jobs with ESHI, respectively.

Table 8: Summary Statistics of Simulated Outcomes by Employment Choice Under Different Health Insurance Policies

	Non-work	Part-time	Full-time, no ESHI	Full-time, ESHI
A. Independent of Medicaid rules				

Continued on following page

Table 8 – continued from previous page

	Non-work	Part-time	Full-time, no ESHI	Full-time, ESHI
Hourly wage	0	8.993	8.994	12.678
		(3.178)	(3.139)	(5.369)
Hours worked per week/40	0	0.515	1.008	1.011
		(0.080)	(0.066)	(0.074)
Monthly earnings	0	808.60	1567.39	2239.06
		(345.57)	(567.15)	(1083.28)
Monthly transfers	745.44	666.16	353.09	89.93
	(250.90)	(257.38)	(337.75)	(425.52)
B. Current Medicaid rules				
Health insurance, mothers	1	0.862	0.598	1
		(0.358)	(0.497)	
Health insurance, children	1	0.969	0.751	1
		(0.170)	(0.424)	
OOP medical expenditure, mothers	180.73	170.15	191.1	701.57
	(650.82)	(475.92)	(360.55)	(808.38)
OOP medical expenditure, children	94.96	88.33	102.99	526.12
	(810.46)	(366.79)	(489.98)	(1388.67)
Monthly per-capita consumption	0.262	0.504	0.647	0.706
(in 1,000 1996 $)	(0.067)	(0.091)	(0.101)	(0.299)
C. PPACA Medicaid expansion only				
Health insurance, mothers	1	0.992	0.831	1
		(0.084)	(0.365)	
Health insurance, children	1	0.993	0.862	1
		(0.083)	(0.344)	
OOP medical expenditure, mothers	120.37	121.57	144.11	863.36
	(146.09)	(147.90)	(184.64)	(748.07)
OOP medical expenditure, children	106.91	108.2	113.31	617.65
	(315.00)	(314.39)	(316.22)	(1301.81)
Monthly per-capita consumption	0.258	0.518	0.652	0.704
(in 1,000 1996 $)	(0.067)	(0.081)	(0.097)	(0.277)
D. PPACA Health insurance subsidies only				
Health insurance, mothers	1	0.999	0.997	1
		(0.022)	(0.057)	
Health insurance, children	1	1.000	0.998	1
		(0.019)	(0.061)	
OOP medical expenditure, mothers	120.33	145.87	463.24	863.80
	(144.45)	(436.64)	(758.05)	(750.32)
OOP medical expenditure, children	106.48	130.79	280.91	617.53
	(314.75)	(1240.84)	(529.97)	(1300.65)
Monthly per-capita consumption	0.260	0.492	0.375	0.701
(in 1,000 1996 $)	(0.059)	(0.105)	(0.298)	(0.288)

Continued on following page

Table 8 – continued from previous page

	Non-work	Part-time	Full-time, no ESHI	Full-time, ESHI
E. PPACA Medicaid expansion and subsidies				
Health insurance, mothers	1	1.000	0.997	1
		(0.021)	(0.058)	
Health insurance, children	1	1.000	0.998	1
		(0.018)	(0.062)	
OOP medical expenditure, mothers	120.05	146.87	463.08	863.61
	(145.33)	(435.76)	(757.65)	(748.40)
OOP medical expenditure, children	107.06	131.66	281.39	616.69
	(314.89)	(1228.29)	(530.27)	(1301.44)
Monthly per-capita consumption	0.269	0.494	0.374	0.692
(in 1,000 1996 $)	(0.067)	(0.100)	(0.307)	(0.284)

Notes: Predicted outcomes by employment alternative based on wage and medical expenditure regressions and different health insurance policies (current Medicaid policies, Patient Protection and Affordable Care Act [PPACA] Medicaid expansions, PPACA health insurance subsidies, and PPACA Medicaid expansions and health insurance subsidies); means and standard deviations (in parentheses) shown.
Source: Author's calculations.

Monthly earnings determine government transfers and Medicaid eligibility through various policy rules. Transfers are highest in the non-work alternative, at about $750, since single mothers receive welfare and food stamp payments when not working.[41] Even for full-time jobs, transfers are positive on average due to the Earned Income Tax Credit. Panel B of Table 8 contains average health insurance coverage under current Medicaid rules.[42] Coverage comes from Medicaid (for alternatives non-work, part-time, and full-time without ESHI) if simulated monthly earnings are below the relevant threshold, or from ESHI. All single mothers and their children are eligible for Medicaid if they do not work, and the fraction covered by health insurance when working full-time with ESHI is one by definition. Large fractions of single mothers are eligible for Medicaid when holding part-time or even full-time jobs. Eighty-six percent of single mothers are eligible when working part-time and 60 percent are eligible when working full-time. For children's Medicaid, 97 and 75 percent are eligible, respectively.[43]

Table 9 contains the estimates from two-part models of mothers' and children's out-of-pocket medical expenditure with selection correction. Controlling for demographics and medical conditions, ESHI coverage leads to higher lower out-of-pocket expenditure, and children's Medicaid eligibility leads to expenditure. These estimates point to higher cost sharing under ESHI. The number of medical conditions

[41]Transfers are calculated as the sum of welfare, food stamps, and taxes (federal income tax, payroll taxes, and the Earned Income Tax Credit) based on the policy rules described in the online appendix.

[42]Current Medicaid rules are those in place during the sample period 1996 to 2010.

[43]These fractions are higher than those reported in Table 2 since the latter are self-reported Medicaid coverage rates while the averages in Table 8 are based on eligibility and assume full take-up.

Table 6: First-Step Multinomial Logit of Employment Choice

	Part-time	Full-time, no ESHI	Full-time, ESHI
Age	0.111***	0.145***	0.370***
	(0.0240)	(0.0234)	(0.0238)
Age squared	-0.166***	-0.232***	-0.485***
	(0.0327)	(0.0322)	(0.0317)
Black	-0.466***	-0.256***	-0.348***
	(0.0583)	(0.0569)	(0.0525)
Hispanic	-0.418***	0.0538	-0.341***
	(0.0654)	(0.0608)	(0.0609)
Years of education	0.130***	0.0826***	0.318***
	(0.0108)	(0.00961)	(0.0107)
Number of children	-0.0943***	-0.0156	-0.261***
	(0.0335)	(0.0312)	(0.0320)
Age of youngest child	0.0327***	0.0518***	0.0580***
	(0.00771)	(0.00734)	(0.00680)
Any conditions - mother	-0.388***	-0.467***	-0.477***
	(0.0552)	(0.0528)	(0.0502)
Any conditions - children	-0.154**	-0.176***	-0.189***
	(0.0604)	(0.0575)	(0.0551)
Medicaid threshold - mother / 1000	-0.0612**	-0.101***	-0.240***
	(0.0305)	(0.0288)	(0.0299)
Medicaid threshold - children / 1000	0.0173	-0.0140	-0.0286
	(0.0418)	(0.0406)	(0.0394)
Constant	-3.350***	-3.334***	-9.818***
	(0.413)	(0.400)	(0.429)

Notes: Estimated coefficients and standard errors (in parentheses) from multinomial logit with alternative-specific parameters. The baseline choice is non-work.
* p<0.1, ** p<0.05, *** p<0.01.
Source: Author's calculations.

Table 7: OLS Regressions of Log-Wage by Observed Employment Choice

	(1) Part-time	(2) Full-time, no ESHI	(3) Full-time, ESHI
Age	-0.00489	0.0348***	0.0215**
	(0.0113)	(0.00910)	(0.0109)
Age squared	0.0129	-0.0465***	-0.0161
	(0.0154)	(0.0133)	(0.0137)
Black	-0.133***	-0.0475**	-0.0500***
	(0.0376)	(0.0225)	(0.0183)
Hispanic	-0.203***	0.00208	-0.0535**
	(0.0446)	(0.0296)	(0.0238)
Years of education	0.0566***	0.0436***	0.0914***
	(0.00534)	(0.00448)	(0.00747)
Any conditions - mother	-0.0735***	-0.0484**	0.000389
	(0.0272)	(0.0237)	(0.0174)
Unemployment rate	0.0131*	0.000572	0.00215
	(0.00771)	(0.00615)	(0.00539)
Log-minimum wage	0.621***	0.681***	0.865***
	(0.0939)	(0.0735)	(0.0663)
Predicted choice probability	18.60	16.63	-5.096***
	(27.98)	(18.32)	(1.414)
Predicted choice probability^2	-240.7	-145.4	18.00***
	(270.1)	(132.5)	(6.226)
Predicted choice probability^3	1026.9	462.5	-26.54**
	(1106.0)	(410.2)	(11.24)
Predicted choice probability^4	-1545.6	-500.4	14.47**
	(1625.8)	(459.8)	(6.973)
Constant	0.379	-0.600	-0.396
	(1.061)	(0.931)	(0.242)
State fixed effects	X	X	X
Number of observations	2274	2848	4284

Notes: Estimated coefficients and standard errors (clustered on state-level, in parentheses) from OLS regressions of log-hourly wage. For each regression, the sample consists of single mothers whose observed employment choice is a given alternative. Predicted choice probabilities are calculated based on multinomial logit results reported in Table 5 and control for selection (see text). * p<0.1, ** p<0.05, *** p<0.01.
Source: Author's calculations.

Table 9: Two-Part Regressions of Out-of-Pocket Medical Expenditure Regressions for Mothers and Children

	Mothers		Children	
	1(E>0) Probit	ln(E)|E>0 OLS	1(E>0) Probit	ln(E)|E>0 OLS
Parental Medicaid	-0.0293	0.0194		
	(0.0436)	(0.0533)		
Children's Medicaid			-0.0646***	-0.0670**
			(0.0241)	(0.0317)
ESHI	0.492***	0.341***	0.461***	0.503***
	(0.0420)	(0.0495)	(0.0392)	(0.0568)
Mothers' age	-0.0507***	-0.00879		
	(0.0150)	(0.0179)		
Age squared	0.0740***	0.0484**		
	(0.0209)	(0.0242)		
Black	-0.256***	-0.661***	-0.515***	-0.665***
	(0.0368)	(0.0423)	(0.0338)	(0.0492)
Hispanic	-0.184***	-0.239***	-0.240***	-0.270***
	(0.0422)	(0.0512)	(0.0400)	(0.0574)
Years of education	0.0695***	0.0557***	0.0599***	0.114***
	(0.00717)	(0.00911)	(0.00682)	(0.0104)
Mother's conditions	0.420***	0.217***		
	(0.0227)	(0.0154)		
Children's conditions			0.363***	0.176***
			(0.0236)	(0.0209)
# children 0 to 2			0.210***	-0.0956
			(0.0426)	(0.0615)
# children 3 to 4			0.139***	-0.0383
			(0.0442)	(0.0630)
# children 5 to 10			0.139***	0.0869**
			(0.0311)	(0.0423)
# children 11 to 18			0.212***	0.303***
			(0.0291)	(0.0386)
Predicted choice probability	-11.80***	-2.938	-6.595**	-5.460
	(3.521)	(3.715)	(3.086)	(4.234)
Predicted choice probability^2	53.67***	9.298	28.55*	15.09
	(16.86)	(17.11)	(14.62)	(19.43)
Predicted choice probability^3	-95.99***	-11.40	-47.38*	-16.89
	(32.26)	(31.37)	(27.57)	(35.54)
Predicted choice probability^4	59.84***	5.136	28.09	6.900
	(21.17)	(19.72)	(17.82)	(22.29)
Constant	1.307***	4.200***	-0.252	3.402***
	(0.378)	(0.446)	(0.247)	(0.357)
State fixed effects	X	X	X	X
Number of observations	9670	7406	9670	6549

Notes: Separate two-part regressions of mothers' annual out-of-pocket medical expenditure and sum of children's annual out-of-pocket medical expenditure (first part: logit of positive expenditure, second part: OLS of log-expenditure for positive expenditure); standard errors clustered at state level in parentheses; * p<0.1, ** p<0.05, *** p<0.01.
Source: Author's calculations.

increases both the probability of observing positive expenditure and the level of expenditure for mothers and children.

Using the functional-form assumption of the two-part model and the estimated coefficients, I obtain the conditional distributions of out-of-pocket medical expenditure for mothers and children. Summary statistics for simulated expenditure under current Medicaid rules are shown in panel B of Table 8. Based on simulated earnings, transfers, and medical expenditure, I calculate monthly per capita consumption in $1,000 in 1996 terms for all alternatives according to equation (13). This completes the second step of the estimation procedure, which yields simulated values for the arguments of the utility function (consumption, hours worked, and health insurance coverage) under current Medicaid policies.

In the last step of the three-step estimation procedure, I estimate the preference parameters of the empirical utility function in equation (12) via multinomial logit with correlated random parameters (mixed logit). The estimated fixed preference parameters are shown in the top panel of Table 10. The consumption parameter is positive and significant. The utility constants for part-time work and full-time with and without ESHI (γ_j) are negative, which implies that single mothers prefer not to work at all, conditional on the other arguments of the utility function. The bottom panel of Table 10 contains the estimated mean and variance-covariance coefficients of the preference parameter distribution, i.e. the matrices δ and Σ in equation (14). The estimates show that women with young children dislike working more. Mother's and children's medical conditions increase the marginal utility of health insurance coverage, although only the parameter for children is statistically significant. The estimated variance-covariance matrix of the unobserved preference components implies that single mothers who like working more also have a higher preference for health insurance coverage for themselves. The unobserved components of the preferences for own and children's health insurance are negatively correlated.

Since the coefficients in Table 10 cannot be easily interpreted, I also report average marginal effects of the individual characteristics on the probability of choosing each of the four employment alternatives in Table 11.[44] Single mothers with a child under the age of four are three percent more likely not to work, a little more likely to work part-time, and one to 1.5 percent less likely to work full-time. Moreover, the more medical conditions a single mother or her children have, the more likely she is to choose the non-work and part-time alternatives, which make Medicaid coverage more likely. This result implies that less healthy individuals are constrained in their employment decisions because of health insurance availability. If health insurance were more easily available—such as under health care reform—women who are afraid of losing Medicaid eligibility when working may enter the labor force or work longer hours.

[44] I obtain the average marginal effects by first calculating the marginal effect as the difference in predicted probabilities of choosing each employment alternative. Since the individual characteristics are discrete variables, I calculate differences in predicted probabilities based on a discrete change in the independent variables instead of approximating an infinitesimal change. Then I average these marginal effects over all individuals, time periods, and simulation draws.

Table 10: Parameter Estimates for Third-Step Mixed Multinomial Logit

Fixed preference parameters			
Consumption		9.152***	
		(0.135)	
γ_p		-4.676***	
		(0.119)	
γ_{f_0}		-8.292***	
		(0.217)	
γ_{f_1}		-8.898***	
		(0.217)	
Random preference parameters			
	Hours	HI, mother	HI, children
Mean of preference shocks	-5.290***	-1.597***	3.452***
	(0.283)	(0.611)	(0.268)
Age	-0.0264***	-0.00317	
	(0.004)	(0.017)	
Black	0.0894	-0.461	-0.191
	(0.074)	(0.330)	(0.220)
Hispanic	-0.000504	0.281	-0.426*
	(0.075)	(0.368)	(0.237)
Number of kids under 4	-0.351***		
	(0.052)		
Number of conditions, mother		0.159	
		(0.126)	
Age of youngest child			-0.112***
			(0.018)
Number of conditions, children			0.245**
			(0.101)
	Variance of preference shocks		
Hours	0.361***		
	(0.103)		
Health insurance, mother	2.268***	19.318***	
	(0.459)	(2.756)	
Health insurance, children	0.675***	-4.951***	1.958***
	(0.144)	(1.063)	(0.646)

Notes: The first panel shows estimates of the fixed preference parameters; the second panel shows estimates of the effects of observables on preference parameters and estimates of the means and variance-covariance matrix of the unobserved preference component (see equations (12) and (14) in the text for the functional form of utility function and preference parameters); block-bootstrapped standard errors in parentheses; * p<0.1, ** p<0.05, *** p<0.01.
Source: Author's calculations.

Table 11: Marginal Effects of Observable Characteristics From Mixed Multinomial Logit (in Percent)

	Employment alternative			
	NW	PT	FT0	FT1
Age	-0.207	-0.00567	0.118	0.0952
	(0.00112)	(0.000863)	(0.000686)	(0.000584)
Black	0.324	-0.258	-0.191	0.124
	(0.00884)	(0.00913)	(0.00744)	(0.0101)
Hispanic	-0.143	-0.106	0.0447	0.205
	(0.00545)	(0.00696)	(0.00623)	(0.00619)
Children under 4	2.73	0.0409	-1.52	-1.26
	(0.0141)	(0.0114)	(0.00899)	(0.00805)
Mother's conditions	0.0861	0.0615	-0.0515	-0.0963
	(0.00211)	(0.00240)	(0.00206)	(0.00248)
Age of youngest child	-0.0755	-0.0566	0.0347	0.0976
	(0.00165)	(0.00203)	(0.00156)	(0.00216)
Children's conditions	0.156	0.121	-0.0736	-0.204
	(0.00345)	(0.00438)	(0.00329)	(0.00460)

Notes: Average marginal effects (in percent) of discrete changes in the observable characteristics, holding other variables constant at their actual values. NW=not working; PT=part-time; FT0=full-time, no ESHI; FT1=full-time, ESHI. Block-bootstrap standard errors in parentheses.
Source: Author's calculations.

7 Policy Simulation

In this section, I simulate single mothers' employment choices under health care reform using the preference parameter estimates from the previous section. Before I present the simulation results, I derive theoretical predictions for labor supply and take-up of ESHI in response to health care reform.

7.1 Theoretical Predictions for Labor Supply and Take-Up of ESHI

A simplified budget constraint for single mothers who may be eligible for Medicaid and can obtain ESHI in full-time jobs is shown in consumption-leisure space in Figure 2a. Under current policies, mothers are eligible for Medicaid in the working-hours range AB. Medicaid increases disposable income by the amount BC since it covers most expenditures for health care. The amount BC depends on the mother's and her children's health conditions and their associated health care costs. For simplicity, I assume that single mothers are not eligible for Medicaid when working.[45] The segment CH corresponds to part-time work where no health insurance coverage is available under current policies. When a mother works full-time without ESHI, her budget constraint continues on the segment HK. When she works in a job with health benefits, the relevant segment is GL. This segment can have a different slope than HK because jobs with ESHI may pay a different wage. Theory suggests that the slope of GL should be smaller in absolute value than the slope of HK because of the compensating wage differential. Point G is higher than H because ESHI coverage increases disposable income compared to being uninsured. Hence, the value of ESHI is given by GH, which may be less than the value of Medicaid due to the higher cost-sharing under ESHI. Depending on the family's health care needs, point L may be above or below point K.

Health care reform changes the budget set in two ways.[46] First, for a given wage, it increases the range of hours in which individuals are eligible for Medicaid up to point D (shown in Figure 2a). Second, it introduces health insurance subsidies in the range EJ. While Medicaid remains free, the implicit wage of workers who are covered by subsidized health insurance is lower, since subsidies decrease as earnings grow. Hence, segment EJ has lower slope than CK, but a higher slope than GL where no subsidies are available (see Figure 2b).[47]

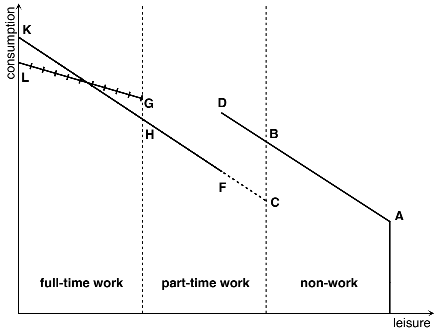
The theoretical effects of expanding Medicaid without introducing health insurance subsidies are ambiguous.[48] Individuals who do not obtain ESHI when working

[45]Single mothers may not be able to find a job that allows them to work the small number of hours that would be required for Medicaid eligibility in states with low eligibility thresholds. The segment "non-work" in Figures 2a and 2b refers to this hours range.

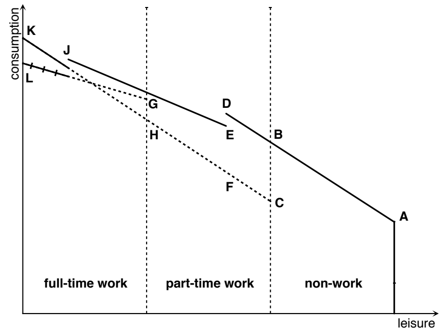
[46]Health care reform also includes other provisions such as employer mandates which may affect employment, but since I only consider labor supply responses in this paper, I abstract from these policy changes here.

[47]The budget constraint in Figure 2b is slightly simplified since the segment EJ, on which a single mother is eligible for health insurance subsidies, has several small kinks (see Table 1).

[48]Although health care reform combines Medicaid expansions and health insurance subsidies, it is important to analyze these policy changes separately. This allows me to infer which part of the



(a) Under Medicaid Expansion Only



(b) Under Medicaid Expansion and Health Insurance Subsidies

Figure 2: Budget Sets Under Health Care Reform

full-time are subject to budget constraint ADFK while those with ESHI coverage make decisions based on budget constraint ADFHGL (see Figure 2a). Single mothers who do not work prior to the reform because they want to stay eligible for Medicaid may enter the labor force and receive Medicaid coverage while working part-time. For these individuals, the higher payoff from working increases their labor supply. On the other hand, increasing Medicaid eligibility also raises disposable income in the range BD, which leads to higher demand for leisure. If this income effect outweighs the reduced work disincentive (or substitution effect) labor supply decreases. Moreover, the Medicaid "notch," i.e. the sharp drop in eligibility, moves from point B to D so that individuals located above, but close to, point F on the budget line have a lower incentive to work. They may reduce their labor supply to obtain Medicaid coverage (Yelowitz, 1995).

In addition, individuals who work full-time with ESHI coverage may reduce their labor supply to become eligible for Medicaid. As depicted in Figure 2a, the consumption level when working part-time with Medicaid may be about as high as when working full-time with ESHI because of the lower cost-sharing under Medicaid and the potential compensating wage differential (points D and G). Therefore, expanding Medicaid can lead to crowding-out of ESHI in addition to reducing labor supply (Cutler and Gruber, 1996).[49] Finally, individuals who work full-time without ESHI are unlikely to change their labor supply. They reveal their preference for consumption over health insurance and leisure. Hence, giving them the option to obtain health insurance coverage at lower earnings does not make these workers change their employment choice. The reduced-form results in Tables 4 and 5 show

reform affects employment and whether effects of different reform components might go in opposite directions.

[49]To simplify the presentation, I assume that working full-time makes single mothers ineligible for Medicaid under the expansion. There are workers with low wages, however, who may be eligible for Medicaid when working full-time. These individuals may drop ESHI coverage without reducing their labor supply.

that existing Medicaid expansions reduce labor force participation and crowd out ESHI, but may also lead to increasing labor supply at the intensive margin.

Combining Medicaid expansions and health insurance subsidies makes it more likely for single mothers to increase their labor supply. As Figure 2b shows, the Medicaid "notch" DF almost disappears. Since individuals who become ineligible for Medicaid pay at most two percent of their income for subsidized health insurance, the discontinuity in the budget line is reduced to DE. Overall, health insurance subsidies increase the payoff from working for single mothers who value health insurance highly.[50] Hence, these individuals are expected to increase their labor supply and switch to part-time or full-time work without ESHI. On the other hand, for individuals who do not value health insurance coverage, the subsidies imply work disincentives since they include an implicit marginal tax on working.[51] If there are enough single mothers who value health insurance, however, expanding Medicaid and introducing subsidized health insurance is expected to increase labor supply overall.

The eligibility threshold for health insurance subsidies at 400 percent of the FPL induces a potential work disincentive since individuals lose the benefit if their income exceeds this level. However, there are two reasons, why I do not expect this effect to be important in the sample of single mothers. First, at 400 percent of the FPL, individuals pay up to 9.5 percent of their income, which is not much different from the average cost of ESHI.[52] Hence, losing this benefit does not have the same effect as losing free health insurance coverage through Medicaid. Second, most single mothers in this sample earn less than the 400 percent threshold. As the summary statistics in Table 2 show, even women working full-time with ESHI earn only about 260 percent of the FPL on average. Therefore, the work incentives of health care reform are likely to prevail among single mothers. In the general population, the work disincentives are likely to dominate (Congressional Budget Office, 2014).

In addition, health care reform can lead to lower take-up of ESHI. Full-time work with ESHI is dominated by working full-time without ESHI but with subsidized health insurance since disposable income is always higher on segment EJ than on segment GL. Moreover, depending on the size of the compensating differential, the wage for full-time jobs with ESHI may be lower than the full-time wage without ESHI net of health insurance costs. Hence, health care reform is predicted to lead to crowding-out of ESHI.

In the simulations below, I consider a third policy counterfactual, which includes health insurance subsidies but no Medicaid expansion. This simulation is particularly policy-relevant because it corresponds to the environment in states that will not implement the Medicaid expansions, whereas subsidies are a federal policy.[53]

[50] In order to qualify for health insurance subsidies under PPACA, individuals or families have to earn at least 100 percent of the FPL.

[51] These implicit tax rates are shown in Table 1, and I account for them in the simulations below.

[52] According to MEPS data, average ESHI cost for family plans amounts to 17 percent of family income. Since employers cover a part of this cost, individuals who become ineligible for subsidized health insurance may pay not much more than 9.5 percent of their income for ESHI.

[53] See Section 2.2 on the Supreme Court decision that struck down the Medicaid expansion.

The budget set that corresponds to this counterfactual is described by ABCFEJK. The only difference to the "complete" PPACA policy counterfactual is the absence of the segment BD. Depending on the pre-reform Medicaid threshold, there is now a range where a single mother earns too much to qualify for Medicaid, but it not eligible for subsidies since the latter start at 100 percent of the FPL. Many states that will not implement the Medicaid expansions of the PPACA have Medicaid thresholds for parents below that level (see Section 2.1).

The theoretical predictions for this counterfactual are similar to the one that combines subsidies and Medicaid expansions. Without Medicaid expansions, the possible reduction in labor supply disappears, so the prediction is unambiguously positive. In particular, women who do not work under current Medicaid policies may increase their labor supply enough in order to "jump" over the gap BD and earn more than 100 percent of the FPL. At the same time, women located on the segment CH before the reform do not have to decrease their labor supply in order to qualify for Medicaid. Instead, they switch from the CH to the segment EG without changing their labor supply, but attain a higher indifference curve.

So far, I have only considered the labor supply effects of Medicaid expansions and health insurance subsidies that operate through changes in hours worked and disposable income. In my model, however, I include health insurance coverage in the utility function. To the extent that health insurance coverage affects the marginal utility of consumption and leisure, changes in health insurance coverage also influence labor supply through this channel.[54] For example, if better health due to increased coverage raises the marginal utility from consumption more than the marginal utility from leisure, expanding Medicaid and introducing subsidies leads to a larger increase in labor supply. Single mothers who have a high valuation of health insurance coverage because of their own or their children's medical conditions are especially expected to change their behavior more when health care reform relaxes the current restrictions on employment and health insurance availability. Hence, these women are more likely to increase their labor supply.

7.2 Simulation Results

In this section, I use the estimates from Section 6.2 to simulate single mothers' employment choices under health care reform. I consider two provisions of PPACA: 1) Medicaid expansions and 2) health insurance subsidies. To assess whether these two provisions have a differential impact on labor supply, I simulate employment choices separately under Medicaid expansions only, under subsidies only, and under both provisions. Being able to disentangle the separate effects of these policy components is another advantage of the structural estimation and simulation approach in addition to conducting ex ante policy evaluation.

To obtain the arguments of the utility function, I simulate consumption according to equation (13), health insurance coverage (equations (4) and (5) for Medicaid),

[54] Finkelstein, Luttmer, and Notowidigdo (2013) provide evidence on the positive relationship between health status and marginal utility of consumption, for example.

and medical expenditure (equation (11)) using the estimated conditional distributions from the first-step regressions. I draw $R_1 = 1000$ from these distributions for each individual and time period. Summary statistics for the simulated utility arguments are shown in panels C, D, and E of Table 8. Under Medicaid expansions only (panel C), health insurance coverage increases substantially. When working part-time, 99 percent of single mothers and their children are covered by Medicaid and when working full-time, 83 percent of mothers and 86 percent of children are covered.[55,56] Health insurance is universal under health insurance subsidies only (panel D) and the combined policy (Medicaid expansions and health insurance subsidies, panel E) for mothers and children with part-time and full-time employment without ESHI.

These statistics show that health care reform will lead to a substantial increase in health insurance coverage for single parent households.[57] Average simulated consumption is lower in panels D and E, which involve health insurance subsidies, than under Medicaid expansion only (panel C), since cost-sharing under subsidized health insurance is assumed to be the same as under ESHI and higher than under Medicaid.

In addition to the utility arguments, I also simulate preference parameters by drawing $R_2 = 1000$ times from the estimated distribution $\mathcal{N}\left(Z_i^{\beta}\hat{\delta}, \hat{\Sigma}\right)$ for each individual, where $\hat{\delta}$ and $\hat{\Sigma}$ are the estimated matrices reported in Table 10. Then I calculate the utility for every individual i, time period t, simulation draw r, and employment alternative j under policy pol, $U_{itj}^{pol,(r,s)}$, according to equation (12). The four policies considered are 1) current Medicaid rules, 2) PPACA Medicaid expansions only, 3) PPACA health insurance subsidies only, and 4) a combination of Medicaid expansions and health insurance subsidies.[58] For each individual, time period, and simulation draw, I calculate the alternative with the highest utility under each policy, and average over i, t, and r for each $j = n, p, f_0, f_1$:

$$\bar{d}_j^{pol} = \frac{1}{NR_1} \sum_{i=1}^{N} \sum_{r=1}^{R} \frac{1}{T_i} \sum_{t=1}^{T_i} \frac{1}{R_2} \sum_{s=1}^{R_2} \mathbf{1} \left\{ j = \arg\max_k \; U_{itk}^{pol,(r,s)}, k = n, p, f_0, f_1 \right\}.$$

The resulting choice fractions are reported in Table 12. I assess the model fit by comparing simulated choices under current Medicaid policies to actual choices in the

[55]Medicaid eligibility differs between mothers and children although the same threshold applies. This difference is due to a provision in PPACA that prohibits states to decrease Medicaid eligibility below the thresholds in place in 2010 until 2014 for adults and 2019 for children.

[56]Since the MEPS data stem from a 15 year period, I use the FPL that was in effect in the respective years to calculate the Medicaid eligibility threshold that enters the simulated health insurance coverages. In other words, Medicaid eligibility is imputed as if the health care reform had been in effect since 1996.

[57]I assume that everyone who is eligible to receive subsidies for health insurance also takes them up since there is an individual mandate under PPACA. However, PPACA also allows individuals to pay a tax of min{max{\$695, 2.5% of income}, \$2085} per year if they are not covered by a health insurance plan.

[58]By current policies, I mean the Medicaid eligibility thresholds for parents and children that were in place in the respective state of residence of the sample members in the years 1996 to 2010.

Table 12: Simulated Employment Choice under Policy Counterfactuals

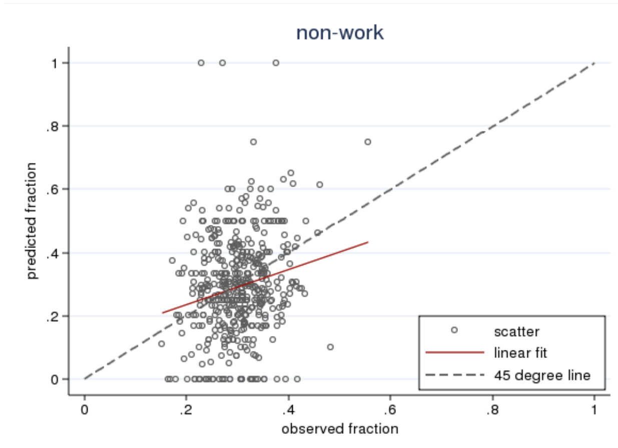
	Employment alternative (fractions)			
	NW	PT	FT0	FT1
Observed	0.309	0.161	0.199	0.331
	(0.00372)	(0.00300)	(0.00320)	(0.00365)
Simulated				
Current policies	0.311	0.148	0.212	0.329
	(0.00268)	(0.00124)	(0.00144)	(0.00247)
Medicaid only	0.326	0.148	0.218	0.308
	(0.00271)	(0.00111)	(0.00140)	(0.00240)
Subsidies only	0.295	0.119	0.387	0.200
	(0.00116)	(0.00140)	(0.00172)	(0.00208)
Complete PPACA	0.293	0.126	0.380	0.202
	(0.00125)	(0.00137)	(0.00165)	(0.00223)

Notes: Observed and simulated fractions choosing each employment alternative. NW=not working; PT=part-time; FT0=full-time, no ESHI; FT1=full-time, ESHI. Block-bootstrap standard errors in parentheses.
Source: Author's calculations.

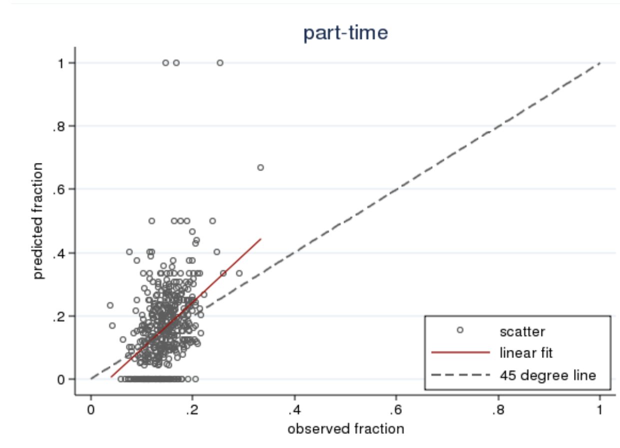
first two rows of Table 12. Only the part-time and full-tim employment alternatives without ESHI shows a small significant difference between observed and simulated choice fractions. Hence, the model fits the observed choices well. In addition, I compare predicted and observed employment choices by state and year (see Figure 3). These graphs, in which each point corresponds to a state-year cell, show an overall good model fit. In particular, the model predicts non-work and full-time employment with ESHI well. The fit for part-time and full-time work without ESHI is a little less good since these two alternatives only differ in hours worked and are differentiated by an arbitrary cutoff (35 hours).

The third row in Table 12 shows that simulated choices under PPACA's Medicaid expansions do not change substantially compared to current policies. The percentage of single mothers in the non-work alternative increases by 1.5 percentage points, full-time employment without ESHI increases by 0.5 percentage points, and full-time employment with ESHI decreases by two percentage points. The income effect of increased Medicaid eligibility outweighs the substitution effect, and this policy change leads to an overall decrease in labor supply. These simulation results are consistent with the reduced-form results reported in Section 6.1. Both sets of findings indicate that Medicaid expansions lead to work disincentives at the extensive margin and crowd out ESHI.

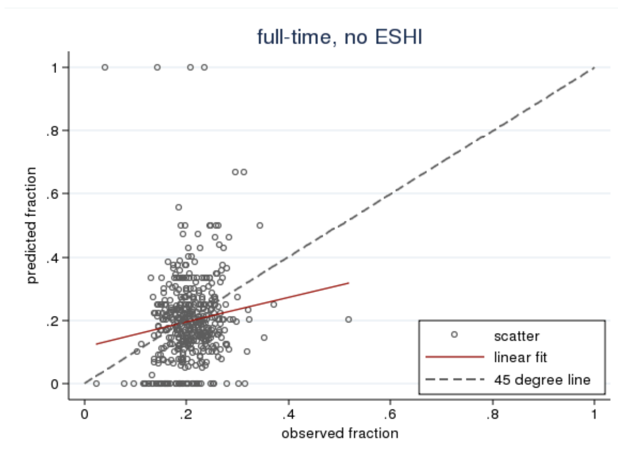
The fourth row in Table 12 shows several changes in simulated employment



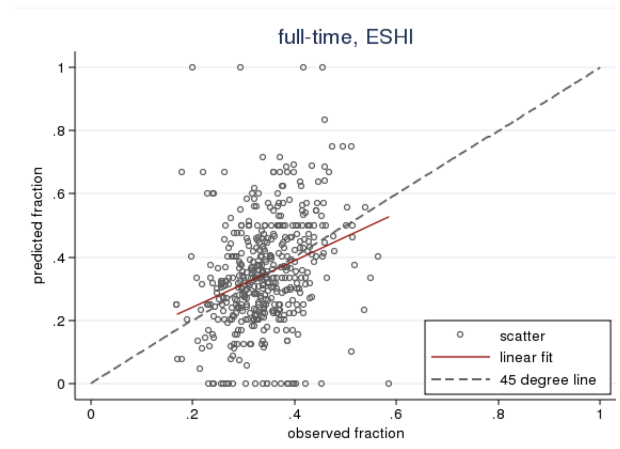
(a) Non-Work



(b) Part-Time Work



(c) Full-Time Work Without ESHI



(d) Full-Time Work With ESHI

Figure 3: Scatter Plots of Average (by State and Year) Observed and Predicted Employment Choices

under health insurance subsidies (without Medicaid expansions) compared to current policies. In particular, the fraction of single mothers not working decreases by five percent. At the intensive margin, labor supply also increases. Fewer women work part-time and the total fraction working full-time increases from 54 to 58 percent. Hence, in contrast to Medicaid expansions, health insurance subsidies lead to an increase in labor supply both at the extensive and intensive margins. At the same time, there is crowding-out of ESHI. The fraction of single mothers in full-time jobs with ESHI decreases from 33 to 20 percent while the fraction in full-time jobs without ESHI grows from 21 to 39 percent. As shown in Table 8, panel D, virtually all of these women are covered by subsidized health insurance.

The last row in Table 12 shows simulated employment fractions under PPACA Medicaid expansions and health insurance subsidies. Labor supply increases at the extensive and intensive margins and there is crowding-out of ESHI. The fraction choosing the non-work alternative decreases by almost two percentage points compared to current Medicaid rules, which corresponds to a six percent decrease. In addition, there is an increase in labor supply at the intensive margin: part-time work decreases by two percentage points and full-time work without ESHI almost doubles from 22 to 38 percent. Hence, labor supply increases by five percent at the intensive margin. Finally, there is substitution of Medicaid and subsidized health insurance for ESHI since full-time employment with ESHI decreases by almost 13 percentage points. Therefore, adding health insurance subsidies beyond the Medicaid eligibility threshold leads to a decrease in the Medicaid "notch" that is sufficient to increase labor supply as predicted in Section 7.1. Moreover, subsidized health insurance constitutes a valuable alternative to ESHI.

Comparing the last two rows of Table 12 reveals that the simulated employment fractions under both policies and health insurance subsidies only are very similar. Hence, it is mostly the subsidies that change single mothers' labor supply. This result is policy relevant since it shows that single mothers increase their labor supply in states that do not implement the Medicaid expansion following the Supreme Court decision.

In Table 13, I assess the amount of heterogeneity in the simulation results by showing the same statistics as in Table 12 by individual characteristics. I focus on the policy simulation with Medicaid expansions and health insurance subsidies here (corresponding to the final row in each panel of Table 13). First, comparing panels A.1 and A.2 reveals that the increase in labor force participation and the crowding-out of ESHI are mostly concentrated among single mothers without young children. Second, panels B.1 and B.2 show that single mothers with medical conditions react more strongly to health care reform. In particular, they are more likely to work full-time without ESHI and more likely to enter the labor force. Hence, health care reform allows women with a higher need for health insurance to obtain subsidized health insurance instead of relying on ESHI. These single mothers benefit from health care reform because they gain access to health insurance. In addition, the reform reduces restrictions in employment choice that force single mothers with medical conditions to not work at all or to work full-time with ESHI under pre-

Table 13: Simulated Employment Choice under Policy Counterfactuals by Observable Characteristics

	NW	PT	FT0	FT1	NW	PT	FT0	FT1
	A.1 Children under four				A.2 No children under four			
Observed	0.402	0.181	0.219	0.199	0.267	0.151	0.191	0.391
	(0.00683)	(0.00537)	(0.00571)	(0.00540)	(0.00435)	(0.00361)	(0.00385)	(0.00467)
Simulated								
Current policies	0.388	0.164	0.200	0.248	0.276	0.141	0.218	0.366
	(0.00482)	(0.00225)	(0.00252)	(0.00340)	(0.00314)	(0.00147)	(0.00176)	(0.00320)
Medicaid only	0.409	0.167	0.191	0.233	0.287	0.139	0.231	0.343
	(0.00495)	(0.00206)	(0.00251)	(0.00320)	(0.00313)	(0.00130)	(0.00168)	(0.00310)
Subsidies only	0.401	0.145	0.277	0.177	0.249	0.108	0.435	0.209
	(0.00171)	(0.00244)	(0.00286)	(0.00273)	(0.00148)	(0.00170)	(0.00213)	(0.00271)
Complete PPACA	0.388	0.154	0.275	0.183	0.249	0.113	0.428	0.210
	(0.00187)	(0.00238)	(0.00252)	(0.00291)	(0.00158)	(0.00166)	(0.00212)	(0.00292)
	B.1 Mother has medical conditions				B.2 Mother has no medical conditions			
Observed	0.368	0.143	0.176	0.313	0.262	0.175	0.218	0.345
	(0.00625)	(0.00476)	(0.00488)	(0.00594)	(0.00459)	(0.00386)	(0.00418)	(0.00463)
Simulated								
Current policies	0.307	0.139	0.201	0.352	0.315	0.155	0.220	0.310
	(0.00441)	(0.00192)	(0.00225)	(0.00414)	(0.00337)	(0.00161)	(0.00187)	(0.00308)
Medicaid only	0.315	0.140	0.215	0.329	0.334	0.154	0.221	0.291
	(0.00443)	(0.00174)	(0.00224)	(0.00404)	(0.00342)	(0.00144)	(0.00179)	(0.00297)
Subsidies only	0.275	0.106	0.426	0.192	0.311	0.129	0.355	0.205
	(0.00198)	(0.00217)	(0.00267)	(0.00335)	(0.00142)	(0.00182)	(0.00224)	(0.00266)
Complete PPACA	0.274	0.113	0.418	0.195	0.307	0.136	0.349	0.207
	(0.00212)	(0.00213)	(0.00260)	(0.00361)	(0.00155)	(0.00178)	(0.00213)	(0.00284)
	C.1 Children have medical conditions				C.2 Children have no medical conditions			
Observed	0.364	0.149	0.179	0.308	0.287	0.165	0.208	0.34
	(0.00765)	(0.00586)	(0.00619)	(0.00713)	(0.00424)	(0.00349)	(0.00373)	(0.00425)
Simulated								
Current policies	0.313	0.145	0.202	0.340	0.311	0.149	0.216	0.324
	(0.00541)	(0.00246)	(0.00290)	(0.00475)	(0.00308)	(0.00143)	(0.00166)	(0.00289)
Medicaid only	0.324	0.146	0.213	0.317	0.326	0.149	0.221	0.304
	(0.00545)	(0.00227)	(0.00287)	(0.00462)	(0.00312)	(0.00127)	(0.00160)	(0.00279)
Subsidies only	0.293	0.118	0.380	0.209	0.296	0.119	0.391	0.195
	(0.00232)	(0.00276)	(0.00330)	(0.00390)	(0.00133)	(0.00162)	(0.00201)	(0.00245)
Complete PPACA	0.291	0.125	0.373	0.211	0.293	0.126	0.383	0.198
	(0.00254)	(0.00270)	(0.00315)	(0.00416)	(0.00144)	(0.00159)	(0.00193)	(0.00263)

Notes: Observed and simulated fractions choosing each employment alternative for the indicated subsamples. NW=not working; PT=part-time; FT0=full-time, no ESHI; FT1=full-time, ESHI. Block-bootstrap standard errors in parentheses. Source: Author's calculations.

reform policies. Third, the difference between the simulated employment choices of single mothers with children with and without medical conditions is very small (see panels C.1 and C.2 in Table 13).

Finally, I asses the welfare implications of these changes in single mothers' employment decisions due to health care reform. Given the distributional assumptions in equation (12) that lead to the multinomial logit estimation of the preference parameters, I calculate the change in consumer surplus between the baseline (current Medicaid policies) and one of the three simulated PPACA environments for individual i, time period t, and simulation draws r and s as

$$\Delta CS_{it}^{pol,(r,s)} = \frac{1}{\hat{\beta}^C} \left[\ln \left(\sum_{j=n,p,f_0,f_1} \exp \left(u_{itj}^{pol,(r,s)} \right) \right) - \ln \left(\sum_{j=n,p,f_0,f_1} \exp \left(u_{itj}^{current,(r,s)} \right) \right) \right] \quad (15)$$

and average over i, t, r, and s (Train, 2009, p. 55). $\hat{\beta}^C$ is the estimated preference parameter for monthly consumption (see Table 10), hence the change in consumer surplus is on the monthly level.

Table 14 shows average changes in consumer surplus for the three policies counterfactuals considered here. In the first column, I report averages over the whole sample. Under the Medicaid expansions, single mothers' consumer surplus does not change in an economically significant manner. Under health insurance subsidies and the combined policy, however, these women gain on average about \$200 per month. Splitting up the sample by mother's and children's medical conditions and presence of young children, Table 14 shows that single mothers with at least one condition and those with less healthy or young children gain about \$30 more per month from the reform than less disadvantaged women. The latter results show that single mothers who are especially vulnerable due to health reasons or young children benefit particularly from the subsidy component of PPACA.

Moreover, the welfare gains outweigh the increase in costs due to PPACA. I account for three types of costs: 1) government transfers (welfare, food stamps, and taxes), 2) Medicaid, and 3) health insurance subsidies.[59] On average, these costs increase by about \$150 per family per month under the policy counterfactual that includes both Medicaid expansions and health insurance subsidies. Assuming that higher taxes in this order of magnitude would not significantly alter single mothers' labor supply, the government could collect the required \$150 to make this reform revenue neutral while still increasing average welfare.

[59] Average transfers are shown in Table 8, panel A. For Medicaid costs, I use average yearly per-capita payments for adults and children from the CMS (https://www.cms.gov/Medicare-MedicaidStatSupp/09_2010.asp, Tables 13.13 and 13.14). The cost of health insurance subsidies is equal to average ESHI costs by year and state minus the maximum paid by individuals according to the sliding scale in Table 1.

Table 14: Change in Consumer Surplus Under Policy Counterfactuals by Observable Characteristics

	Overall	Mother's med. conditions		Children's med. conditions		Young Children	
		No	Yes	No	Yes	No	Yes
Medicaid only	-0.00945	-0.0101	-0.00841	-0.00968	-0.00878	-0.00626	-0.0159
	(0.000379)	(0.000498)	(0.000577)	(0.000423)	(0.000829)	(0.000367)	(0.000865)
Subsidies only	0.199	0.188	0.216	0.193	0.216	0.184	0.229
	(0.00197)	(0.00244)	(0.00334)	(0.00227)	(0.00396)	(0.00250)	(0.00314)
Complete PPACA	0.185	0.173	0.206	0.178	0.205	0.174	0.209
	(0.00198)	(0.00245)	(0.00334)	(0.00228)	(0.00398)	(0.00251)	(0.00316)

Notes: Changes in consumer surplus in 1000 dollars. Baseline is the simulated choice under existing policies. Young children refers to any children under four. Block-bootstrap standard errors in parentheses.
Source: Author's calculations.

8 Discussion and Conclusion

This paper assesses the employment effects of Medicaid expansions and health insurance subsidies under PPACA among single mothers. To this end, I estimate a structural model of labor supply on a sample of single mothers from the MEPS, exploiting variation in Medicaid eligibility thresholds across states and time.

The simulated employment choices show that Medicaid expansions and premium subsidies have two main effects. They increase labor force participation by six percent and raise labor supply at the intensive margin by five percent. In addition, I find crowding-out of ESHI amounting to 40 percent. The latter finding is consistent with the literature. For example, Cutler and Gruber (1996) find crowding-out of ESHI in response to Medicaid expansion for children and pregnant women of 31 and 49 percent, respectively.

My simulation results are also consistent with the predictions made by the Congressional Budget Office (2014). Although the CBO predicts an overall decline in employment due to health insurance subsidies and Medicaid expansions, the report argues that individuals who were eligible for Medicaid before reform (mostly low-income parents) will likely increase their labor supply. The present paper shows theoretically that health insurance subsidies are responsible for the increase in labor supply among single mothers by eliminating the Medicaid "notch" in the budget constraint. The policy simulations confirm this effect.

The six percent increase in labor supply at the extensive margin implies that 786,000 single mothers will enter the labor force, compared to the overall drop in employment by 2.0 million full-time equivalent workers predicted by the CBO. This result is important because single mothers constitute a particularly vulnerable population with limited access to health insurance. Health care reform is designed to reduce this lack of health insurance, but might be expected to lead to work disincentives. This would make the reform more expensive as women who are driven out of the labor force would rely on welfare. My simulation results show that this scenario will not occur under health care reform. Hence, health care reform achieves two policy goals: 1) reducing the number of uninsured single mothers and 2) providing incentives for increased labor supply in this population.

My simulation results reveal considerable heterogeneity in single mothers' employment choice under health care reform. In particular, women with a higher demand for health insurance due to medical conditions increase their labor supply more and are more likely to drop ESHI. This result shows that single mothers, whose need for health insurance coverage currently restricts their employment choice to not working or a full-time job with ESHI, can switch to a better employment option while retaining health insurance coverage.

A comparison of the costs and benefits of this reform reveals positive implications for average welfare. However, a definite answer to the question of whether health care reform is welfare improving would have to incorporate the taxes necessary to pay for Medicaid and health insurance subsidies. Since increased taxes would lead to lower labor supply, the estimates provided in Table 14 are an upper limit for the average welfare gain.

The results presented here only apply to single mothers and cannot easily be extended to other groups. In particular, the low average earnings even when working full-time imply that there is no work disincentive at the income cutoff when eligibility for health insurance subsidies ends. Hence, the simulated increase in full-time work among single mothers may not carry over to other groups. Kolstad and Kowalski (2012) find that the Massachusetts health care reform did not lead to a significant change in labor supply at the extensive margin, and hours worked and earnings decreased. However, their results apply to a broader population than the one considered in this paper. Garthwaite, Gross, and Notowidigdo (2013) argue that their finding of increased labor supply due to Medicaid disenrollment implies employment reductions caused by PPACA. Without an explicit model of labor supply and health insurance choice, it is difficult to make such a claim, however, due to the differences between Medicaid and health insurance subsidies. A main contribution of the present paper is its structural estimation approach that allows me to simulate the effects of health insurance subsidies without observing this type of policy in the data. I show that subsidies lead to increasing labor supply among single mothers who had access to Medicaid before the reform. Given that other existing studies do not present results on the labor supply of single mothers and this subpopulation depends particularly on public or subsidized health insurance, the findings presented here are policy relevant in their own right.

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