NBER WORKING PAPER SERIES

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Working Paper 31220
http://www.nber.org/papers/w31220

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
May 2023

We thank Ougni Chakraborty for extremely useful research assistance. We acknowledge research support from the Commonwealth Fund. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

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JEL No. H29,I13,J33

ABSTRACT

Economic theory and empirical studies conclude that the cost of voluntary employer-sponsored health insurance falls on employees. However, the distribution of incidence and the mechanism through which incidence occurs have not been well-established. We provide new evidence about incidence by examining the dependent coverage mandate in the ACA, which requires group insurance to allow adult children to age 26 to remain on their parents' policies. We establish that the incidence of the mandate fell on covered employees as a group. We then consider three situations in which the benefits of this new coverage to an employee differ from the costs to an employer. First, we compare incidence where the young adult dependent is the youngest child in the family to the situation where the child is not the youngest (so the family could add a dependent to existing family coverage). We find that incidence falls mainly on households where the newly-eligible child is the youngest in the household. Second, higher-income households face a lower tax price of coverage than do lower-income households. We find that the incidence of the mandate falls mainly on the highest income households. Finally, we find that the mandate leads to increased commuting time for parents of newly-eligible dependents.

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Abstract

Economic theory and a robust empirical literature examining the incidence of employer-sponsored health insurance conclude that the cost of voluntary coverage falls on employees. However, the distribution of incidence among employees and the mechanism through which incidence occurs have not been well-established. Existing studies of incidence examine situations, such as the extension of maternity benefits or a new health insurance mandate, in which benefits to individual employees correspond (more or less) to costs to employers.

In this study, we take advantage of key features of the health insurance market to provide new evidence about the incidence of voluntary health insurance. The dependent coverage mandate in the 2010 Affordable Care Act (ACA) requires private group insurance policies to allow adult children under age 26 to remain on their parents' policies. We establish that the incidence of the mandate did, as expected, fall on covered employees as a group. We then consider three situations in which the benefits of this new coverage to an employee differ from the costs of the same coverage to an employer.

First, we compare the incidence of the mandate in situations where the young adult dependent newly covered under a parent's policy is the youngest child in the family (so that the policyholder would need to newly obtain family coverage to cover the young adult dependent) to the situation where the child is not the youngest (so the family could add a dependent to existing coverage). The cost of insuring the same adult dependent child should not depend on the child's position in the family, but the employee's out-of-pocket costs for coverage are much higher in the situation where the child is the youngest. We find that the incidence of the mandate falls mainly on households where the newly-eligible child is the youngest in the household.

Second, we compare the incidence of the mandate for workers who fall into different income tax brackets. The cost of insuring an adult dependent child should not depend on the child's household's income, but the benefit of providing dependent coverage will depend on the household's tax bracket. Higher income households gain more from the same employer-sponsored coverage than do lower-income households because they face a lower tax price. We find that the incidence of the mandate falls mainly on the highest income households.

Finally, we examine journey to work – a dimension of job choice that affects worker costs but not employer benefits – to see whether workers select into firms with more generous coverage. We find that the mandate leads to increased commuting time for parents of newly-eligible dependents.

Keywords: Employer-sponsored insurance, compensating differentials, dependent coverage mandate

Introduction

Economists have long been interested in the question of who pays the cost of employer-sponsored insurance (ESI). The theory of compensating differentials states that the cost of voluntary benefits is borne by workers. Theory also suggests that workers will bear most of the cost of mandated benefits that they value, implying that mandated benefits will not generate employment effects (Summers, 1989). Policymakers and employers, however, have long argued that employers bear at least part of this burden of employer-provided benefits (Pauly, 1999).

Several recent studies have examined the economy-wide incidence of ESI. Clemens (2021) finds that increases in minimum wages reduce benefits, implying incidence on workers because employers stop offering benefits when they face limits on the ability to pass along costs. Likewise, analysis of the Massachusetts health reform finds that the incidence of the State's ESI mandate fell entirely on workers (Kolstad and Kowalski, 2016).

While the evidence of incidence on workers is compelling, it is much less clear whether and how mandates that affect different workers differently translate into wages. The institutional characteristics of ESI complicate this issue. Because of adverse selection, insurers offer more favorable terms (and sometimes only offer coverage at all) in firms where a large share of the eligible population participates in coverage. Because of the favorable tax treatment of health insurance, high income workers should be willing to pay a larger wage cost for such coverage than lower income workers are. As Goldstein and Pauly (1976) argued, ESI has elements of a local public good and it is theoretically unclear how employers adjust individual employee's wages given heterogeneous preferences within the group.

Several studies have examined the extent of individual incidence (Bhattacharya and Bundorf, 2009; Gruber, 1994; Levine, Gustafson, and Velenchik, 1997; Levy and Feldman, 2001;

Sheiner, 1999). Sheiner (1999) found some evidence that increases in costs because of age, marital status and family status are fully shifted to workers. Gruber (1994) examined the incidence of a new mandate for maternity benefits and found that it was fully shifted to workers. There is some evidence that the costs of obesity (Bhattacharya and Bundorf, 2009) and smoking (Levine, Gustafson, and Velenchik, 1997) are at least partially shifted to workers, although since these are highly stigmatized conditions, it is difficult to be confident of this result.

The standard language used by economists to describe the incidence of benefits is that these costs are "shifted" to employees. This term is often taken to imply that employers consciously adjust individual wages to reflect the employer costs of offering a specific benefit. However, this interpretation stands in contrast to the human resources literature, which does not contemplate variation in wages according to individual workplace costs (Dencker, 2007). This is particularly true in the union context, where collective bargaining ensures that wages vary only with a set of factors that are largely orthogonal to healthcare costs (Binotto, 2007).

An alternative mechanism through which the cost of benefits could be shifted to individual workers is through employee sorting among firms. The literature suggests that some of the variation across firms' health insurance plans can be explained by the characteristics of their employees (Bundorf, 2002; Dranove, Spier, and Baker, 2000). Employers also differ considerably in the share of the cost of health insurance that must be borne directly by employees. Firms with more heterogenous workforces may choose higher employee shares so that workers can self-select into coverage based on their preferences (Gruber and McKnight, 2003).

In this paper, we take advantage of a policy change – the Affordable Care Act's (ACA) dependent coverage mandate – to address this question. We assess whether the cost of the mandate was shifted onto affected workers in aggregate, whether it was shifted to individual workers, and

what the mechanism for this shift was. The ACA mandate required employers who offered ESI to extend dependent coverage to the adult children under age 26 of their employees.

We use a large, nationally representative sample from the American Community Survey (ACS) for this analysis. Since the ACS data do not contain information on the policyholder of ESI, we use the Current Population Survey (CPS) Annual Social and Economic Supplement data to train an end-to-end tree learning system to identify the ESI policyholder within a household. The results from our instrumental variable (IV) analysis reveal that the incidence of the mandate did, as expected, fall on covered employees as a group. We then explore the mechanism for this shift by taking advantage of key features of the ESI market. Specifically, we consider three situations in which the benefits of this new coverage to an employee differ from the costs of the same coverage to an employer.

First, we compare the incidence of the mandate in situations where the young adult dependent newly covered under a parent's policy is the youngest child in a family compared to the situation where the child is not the youngest. The cost of insuring a given adult dependent child should not depend on the child's position in the family, but only on the child's health status and expected healthcare costs. However, because of the typical premium structure of ESI, an employee's out-of-pocket costs for coverage are much higher in the situation where the child is the youngest. If a newly-eligible dependent child is the youngest in a family, the policyholder would need to switch from single coverage to family coverage to cover that young adult dependent, while if the newly eligible child has a younger sibling, the policyholder may already have selected family coverage and will face no incremental cost of adding another child to the existing policy. There is considerable variation across employers in the differential employee premium cost of family policies. We find that the annual wage reduction effects of the dependent coverage mandate

are much larger for families with a newly eligible child who is youngest (-$2,460) than for households with a young adult child who is not youngest (-$606). In particular, the estimated wage reduction effect for a dependent child who is youngest is very similar to the estimated annual cost of coverage per dependent covered to employers ($2,467), indicating a full shift of the increased costs of insurance to this group of employees.

Second, we compare the incidence of the mandate for workers who fall into different income tax brackets. The cost of insuring an adult dependent child should not depend on the household's income, but the benefit of providing dependent coverage through ESI will depend on the household's tax bracket. Because employer contributions to the cost of health insurance are excluded from taxable income, households in higher tax brackets face a lower tax price of ESI and benefit more from obtaining coverage through employment. We find that the wage reduction effects of the dependent coverage mandate are concentrated among the two lowest tax price quintile groups, with the biggest effect at the lowest tax price (highest tax rate) quintile.

Finally, we examine travel time to work. If ESI coverage becomes more valuable to employees, this increased value should be manifest not only in lower wages but in other dimensions of job quality. Longer commutes are a cost incurred by employees but provide no direct benefit to employers. We find that policyholders with newly-eligible dependents travel farther to work after the mandate takes effect.

As a further check on our results, we examine a situation similar to those in prior studies – comparing impacts for those whose newly-eligible dependents are less healthy and those who are healthier. Here, the greater benefits of coverage to an employee with a less healthy dependent are matched by increases in the costs of that coverage. We find that the wage reduction impacts of the mandate are substantially larger when a newly eligible child 22–25 has a disability.

Taken together, our findings support the hypotheses that the incidence of employer health insurance on workers occurs through employee's self-selection into coverage based on their preferences and that the incidence of coverage varies among workers within the firm for reasons unrelated to their healthcare needs.

Institutional Background

Most Americans with health insurance obtain it through their jobs. Employers generally offer employees two types of coverage contracts: single and family contracts (a few offer separate coverage excluding spouses who are covered through another employer). The annual total cost of family coverage averages about 2.9 times the cost of single coverage. While almost all employers who offer any coverage offer family coverage, they usually require employees to pay a substantially larger share of the premium for family coverage than for single coverage. Employee contributions to the cost of family coverage do not vary with the number of dependents in a family.

The differential between single and family contributions varies considerably among firms. The 2013 KFF Employer Health Benefits Survey reports that among firms offering ESI plans, 42% required an employee contribution of less than 25% of the cost of coverage, while 14% required an employee contribution of more than 50% of the cost of coverage.[1] Since the average ESI premium for family coverage in that year was $16,351, moving from a firm requiring a 50% employee contribution to one requiring only a 25% of the cost of coverage would be worth some $4,000 to the employee.

Prior to the ACA, most employer plans defined an eligible dependent as a child who was under age 19 or was a full-time student. A consequence of this definition was that young adults

[1] In addition, 5% required no employee contribution for family coverage, and 38% required an employee contribution of 25-50% of the cost of coverage (KFF, 2013).

aged 18–24 had the highest uninsurance rate among all age groups under 65. To address this high uninsurance rate, the ACA mandated, as of September 2010, that employer plans extend any ESI that included dependent coverage to dependents under the age of 26.

The dependent coverage mandate came on the heels of a set of state mandates beginning in 1974 that had required fully insured employers to extend the same coverage to all or some dependents aged 18 or older. These state mandates, however, only affected fully insured firms, which employ about 40% of ESI plans enrollees, because self-insured employers are exempt from such state regulations under the 1974 Employee Retirement Income Security Act (Antwi et al., 2013). These state coverage mandates had a range of eligibility limits (varying by age, marital status, college enrollment, or whether living with parents) (Barkowski et al., 2020), while the ACA mandate applies to all dependent young children. Barkowski et al. (2020) found that state mandates generated modest coverage gains concentrated among those aged 19–23. By contrast, estimates suggest that the ACA dependent coverage mandate increased dependent coverage by 3–5%, and led to a significant reduction in uninsurance rates (Antwi et al., 2013; Sommers et al., 2013).

As part of the issuance of regulations around the mandate, the Department of Health and Human Services estimated that the incremental premium cost per newly covered dependent child in the relevant age range would be about $3,500 per year, leading to increases in group insurance premiums of 0.7% in 2011 and 1.0% in 2012 (Table 1).[2] We use this estimate to get a sense of how large an effect on wages we might expect to see. Given the employer share of family coverage as 73% (KFF, 2013), the increased cost to an employer per covered dependent would be around $2,500. For full time workers, if incidence fell exclusively on those providing ESI to dependents,

[2] 75 Fed. Reg. at 27127-28 (https://www.govinfo.gov/link/fr/75/27138). Federal agencies estimated the incremental premium costs using expenditure data from Medical Expenditure Panel Survey (MEPS). We use mid-range estimates. Low estimates of the incremental costs are 0.5% in 2011 & 0.7% in 2012, while high estimates are 1.2% in 2011 and 1.2% in 2012.

the reduction in wages would be $1.38 per hour, or about 5%. If the cost were spread among all workers aged 40–64, the cost would be about $0.18 per hour given that 13% of workers had a young adult dependent covered post-ACA.

One way that employers might have responded to the dependent coverage mandate would have been to increase the share of premium that employees had to contribute for dependent coverage. Depew and Bailey (2015) used data from the Medical Expenditure Panel Survey – Insurance Component (MEPS-IC) and estimated the impacts on premiums of ESI plans comparing family plans to single plans. They found that the ACA mandate increased total premiums for plans that cover children by about 2.5%, but did not alter the employee share of ESI premiums.

Prior research suggests, by contrast, that the mandate did lead to reductions in the wages of parents with employer-sponsored coverage. Kim and Koh (2022) used the 2006–2016 ACS and found that parents' annual wages fell by $2600 after the ACA mandate took effect. They specified a difference-in-differences framework comparing wages of parents of eligible young adults 19–26 to wages of parents of ineligible young adults younger or older than the affected group.

Methods

We use annual sociodemographic and wage information from 2008 through 2013 from the ACS for our analysis. As the ACS does not document who in the family is the actual holder of ESI, we run a machine learning model to identify a policyholder in a family using the Current Population Survey (CPS) Annual Social and Economic Supplement, which is a much smaller sample (about 1/20th the size of the ACS), but does identify ESI policyholders.[3] We use the CPS

[3] The ACS data contain family roster information, while the CPS Annual Social and Economic Supplement data provide family record, plan type, and policyholder information ("was this health insurance plan coverage in …'s own name?", "was this health insurance plan offered through …'s current or former employer or union?").

data to train a decision tree algorithm to identify the policyholder of ESI within a household, using an end-to-end tree learning system, eXtreme Gradient Boosting (XGBoost) (Chen & Guestrin, 2016).[4] This algorithm minimizes errors by building sequential subtrees (Schalck & Yankol-Schalck, 2021) and has been widely used in clinical literature to predict a patient's health outcomes (Mortazavi et al., 2019; Khera et al., 2021; Sundrani & Lu, 2021). We then use this algorithm to identify those in the ACS who are likely to own ESI plans (person of interest (POI)) and those who are covered in the POI's name.

Our study sample consists of American adults aged 35–64 (since adults below this age are unlikely to be policyholders for dependents 19-26). Questions in the ACS about wage information reference the prior year, while information on the age of dependents and their health insurance coverage are measured at the time of the survey. Thus, we treat lagged wages values for our analysis as applying to the prior year in the ACS 2009–2014.[5] We further assume that if a young adult child is covered in year t, that child was also covered in year $t-1$ (the year of wage data). We exclude year 2010 as a transition year given that the mandate took effect in September 2010. Our sample also excludes workers earning hourly wages of more than $100 or less than $1 following literature (Gruber, 1994). Our final sample includes 1,747,745 individuals identified as POI.

We acknowledge a limitation in using the ACS data (and the CPS) in that we only have information on dependents who live in a household. During the study period, about 50% of young adults lived in a household with a POI who held ESI. We show in Appendix Figure 1 that there is no substantial change in that pattern over time, though there is a slight upward trend. The mandate would be unlikely to have an effect on the share of dependents living in such households as it

[4] We choose the best prediction model that yields a cross-validation score of 0.97.
[5] For instance, wage information in year 2012 is obtained from the 2013 ACS (Kim & Koh, 2022).

requires plans to cover dependent children regardless of whether the child lives with their parent. Because we only observe POIs for dependent children living with their parents, we are missing some dependents and some incidence.

We specify the following linear regression of annual wages on ESI covering young adult children:

$$Y_{it} = \beta_1 + \beta_2 ESI\_YA_{it} + X_{it} + \mu_t + \varepsilon_{it} \quad (1)$$

where Y indicates an annual (before-tax) or hourly wage of an individual i at time t. We convert $ values using Consumer Price Index to dollars of 2013. β_2 is the estimated effect of having ESI plans that cover young adult child(ren). X is a vector of covariates including the number of children under 22, the number of children 22–25, the POI's age, age squared, experience, experience squared, race (White/Black/other), educational attainment, marital status, an indicator for living with a spouse, post-ACA period interacted with education and experience, and state-by-year fixed effects.

Isolating the effect of health insurance on wages is challenging because there are many mechanisms through which health might affect wages. For example, workers might value health insurance more because they or their family members anticipate higher healthcare costs. Such workers might be willing to accept lower wages in return for more generous insurance coverage. At the same time, however, workers who are in worse health or whose family members are in worse health might also have lower productivity, generating lower wages.

Relying on variations in access to young adult children coverage of ESI caused by the mandate, we specify a two-stage least square regression with the following first stage estimation:

$$ESI\_YA_{it} = \beta_1 + \beta_2 (YA_i \; X \; PostACA_t) + X_{it} + \mu_t + \varepsilon_{it} \quad (2)$$

Here we regress the variable of interest in equation (1) (ESI_YA; having ESI plans that cover young adult child(ren)) on an interaction between the number of children aged 22–25 in the household (YA)[6] and the post-ACA mandate indicator ($PostACA$). Our identification strategy exploits the variation in access to young adult children coverage of ESI caused by the mandate based on an intuition that the relationship between having young adult children 22+ and the probability of having ESI plans covering young adult dependent should be positive and significant only after the ACA dependent coverage reform. As a sensitivity check, we estimate a triple-differences (DDD) model using an alternative instrument in the first stage ($YA\ X\ PostACA\ X\ EarlyAdopter$) that takes account of the differential impacts of preexisting state-level mandates (NCSL, 2016; Barkowski et al., 2020). We report Kleibergen–Paap Wald F-statistic from a test for excluded instruments.

To uncover the mechanisms through which dependent coverage affects the policyholder's wages, we first exploit the institutional characteristic of the ESI market that virtually all coverage is sold as single coverage or family coverage, but no plans require employers to separately enroll each dependent. This means that there are two relevant situations we can look at. In the first, the young adult who is newly eligible for the parent's ESI coverage has a younger sibling. In that situation, it is highly likely that the POI has already purchased family coverage and the young adult can be added to the policy without requiring any additional employee contribution. Moreover, this change would not be directly observable to anyone setting wages in a business in most circumstances.

The second situation is one where the newly eligible young adult child has no younger siblings. To take advantage of the mandate in this case, the POI will have to purchase a family

[6] We focus on young adult children 22 years or older given that children were generally able to stay on their parent's ESI coverage if enrolled in college even before the dependent coverage reforms (Dillender, 2014).

plan to cover dependents. Here, the POI will need to pay a larger employee contribution. While it is conceivable that the person making salary determinations in the firm would be aware of a change in an individual moving from single to family status and adjust wages accordingly, this is unlikely since ESI plan years and salary determination do not generally occur simultaneously (Kim & Koh, 2022).

We repeat the analyses looking at two margins; those where the youngest child is 22–25 and those where there are younger children. As mentioned above, if the increased cost of the ESI coverage were mostly passed on to an individual worker in the form of lower wage incomes, we expect to find this wage pass-through only when the young adult child is the youngest because the POI has an incentive to seek out their preferred family plan to cover their child.

Second, we run IV regressions separately by the tax price of ESI plan quintile groups. Specifically, we apply Gruber's (2011) micro-simulation approach to the CPS data set and match the estimated marginal ESI tax price to our data based on year, state, age, sex, and educational attainment. As higher marginal tax price (lower level of ESI tax exclusion) leads to a reduction in the demand for generous ESI plans, we expect to see wage reductions primarily driven by those workers facing lower tax price of ESI.

Third, we regress commuting-related outcomes that would be jointly determined by workplaces and insurance choices. In addition, we conduct IV quantile regressions to see the distributional impacts of the dependent coverage mandate.

Finally, we run the main specification with an alternative instrument; an interaction between an indicator of any disability (any difficulties in hearing, vision, independent living, ambulatory, cognitive, or self-care) children in the household aged 22–25 with the post-ACA indicator. We expect to find larger wage reductions for POIs with disabled young adult children

since their demand for generous coverage is expected to be higher and because the dependent's disabilities will also increase the cost of that coverage.

Results

Table 2 reports summary statistics of our study sample. The sample is 41% female, 82% White, 9% Black, 9% Hispanic, 63% married, and 40% college educated. The mean age of the sample is 48 years, and 40% of the POIs have any dependent covered by ESI. Average yearly wage is about $64,000 ($ in 2013).

We report results from first stage regressions in Table 3. Coefficients in the first column indicate that the probability that any dependent is covered by ESI increases by 30 percentage points for each additional child under 22, and by 33 percentage points for each additional child 22–25. Post-ACA, each additional young adult child aged 22–25 increases the POI's propensity to hold dependent coverage by 11 percentage points. Similarly, there is about 1/5 of an additional child covered under ESI for every child 22–25 in the household in the post-mandate period (second column). The Kleibergen–Paap Wald F-statistic reported at the bottom of the table far exceeds the Stock-Yogo weak ID test critical values for 10% maximal IV size (19.93), indicating that our first stage is strong and not under-identified.

Table 4 shows our estimated effects of the ACA dependent coverage mandate on wages. Overall, we find that adding an additional dependent child to an ESI plan reduces the policyholder's annual wages by $685. This figure is about 28% of the estimated employer cost of the mandate that we report in Table 1. Hourly wages decline by $0.4 (1.3% of the mean hourly wages) for each additional dependent child newly covered. Having any (at least one) dependent child covered by ESI leads to a reduction in annual wages of about $1,100, or a reduction in hourly

wages of $0.6 (2% of the average hourly wages). All estimates are significant at a significance level of 1%.

We now turn to the (not) youngest IV approach – we use an indicator for whether a newly eligible dependent child is (not) youngest as our instrument (Table 5). First, we look at the effects on the probability that the family holds dependent coverage at all (Panel A). First stage coefficients show, as expected, that coverage gains primarily come from families where the child 22–25 is the youngest in the household (+20.1 percentage points) because these families have to purchase new family coverage. The first stage effect of the mandate is much smaller where that child is not the youngest (3.9 percentage points), though statistically significant. These may be cases where the value of family coverage with an additional child covered induces the POI to purchase family coverage for all their dependent children post-ACA.[7] When we look at coefficients on the wage reduction effect of having any dependent coverage on wages, we see an impact that is more similar across the two groups – adding coverage for any child dependent is associated with a reduction in wages of $1,300–$1,800, though the coefficient is insignificant when the newly eligible child has a younger sibling.

In Panel B of Table 5, we estimate the impact of the number of dependent children covered under a policy. There is about 1/5 of an additional child covered under ESI for every child 22–25 in the household in the post-mandate period – the first stage effect size is similar across the two situations. However, the effect on wages is larger for situations where the child is the youngest (-$2,460). The wage reduction effect of the mandate is much smaller and insignificant per child covered where that child is not the youngest (-$606). Hourly wages decrease by $1.4 when the

[7] Due to the lack of longitudinal information, we are not able to test within-household transition between single and family coverage over time.

child 22–25 does not have any younger sibling, while the effect on hourly wages is substantially smaller (-$0.3) for where the young adult child is not the youngest.

Table 6 reports the distribution of the effects of the ACA dependent coverage mandate on wages. We find that the effects are concentrated at the top of the distribution. Significant reductions in annual wage income occur at and above the median, with the biggest effects found at the top of the annual wage distribution. The estimated wage reduction effects of having any dependent child covered by ESI are $920 at the median, $1,550 at the 75th percentile, and $2,300 at the 90th percentile. We find similar distributional effects for hourly wage income (Panel B), where the impact size declines by about a fifth across the quantiles, with a null impact at the bottom of the wage distribution. These are consistent with shopping behavior that suggests heterogenous demands for comprehensive insurance coverage.

In Table 7, we compare the incidence of the mandate for workers who fall into different income tax brackets. As mentioned above, we match the estimated marginal ESI tax price to our study sample based on year, state, age, sex, and educational attainment. For ease of interpretation, we only use the number of dependent children covered by ESI as our regressor of interest. Consistent with our expectation, we find that lower marginal tax prices result in larger, significant reductions in wage incomes. Significant wage reduction effects are found only among the two lowest tax price quintile groups, with the biggest effect at the 1st tax price quintile; -$2,600 for adding any dependent child to the POI's ESI plan. Specifically, we do not see significant and meaningful reductions in wage income for those facing high or even moderate tax prices of ESI.

We examine commuting-related outcomes in Table 8. This is a dimension of job choice that affects worker costs but not employer benefits, thus we aim to see whether workers select into firms with more generous coverage even if it requires longer commutes. Our findings reveal that

having an additional dependent child covered by ESI is associated with longer commutes (+1.7%) and a lower probability of moving (-3 percentage points) over the past year.[8] Both the likelihoods of moving within- and between-states are significantly affected by the family decision to add a newly eligible dependent child to the ESI plan.

In Table 9, we further explore evidence of employee sorting with alternative instruments indicating whether a child 22–25 has any disability. The effects on coverage gain are significant and positive for all situations, with slightly smaller effects if a young adult child 22–25 was disabled.[9] Results show that the effects of adding any dependent child are substantially larger when a child 22–25 has a disability; annual wage declines by $7,480 for a household with a disabled young adult child vs. declines only by $960 for those with a non-disabled child, consistent with prior research in situations where costs vary among employees. This finding is consistent with our employee sorting argument given that, when setting wages, employers are generally not able to know whether an individual worker has a dependent child who demands comprehensive coverage (and whether this employee will purchase family coverage to add his/her disabled child).

We check the robustness of our findings by running the main IV specification with an alternative triple-differences (DDD) instrument that that takes account of the heterogenous effects by preexisting state-level young adult coverage mandates: the number of children 22–25 X Post-ACA X Pre-ACA expansion states. Appendix Table 1 presents the first stage regressions using this DDD instrument. As we would expect, the coverage gain effect of the ACA mandate is significantly smaller in the pre-ACA expansion states; in the early adopter states, the effect of the

[8] Due to the lack of information on employment history at the individual level, these results do not provide concrete evidence of job lock.

[9] Possible explanations are 1) their family has to demand more expensive health plans, thus some may choose not to add a disable child to the existing plan, or 2) the disabled child may be covered by other source of coverage such as Medicaid if meeting income eligibility.

mandate on the probability of having any dependent covered was lower by 2 percentage points. However, using the DDD instrument, IV regression results shown in Appendix Table 2 indicate that adding coverage for any dependent child to ESI coverage reduces annual wage by $1,040 and reduces hourly wage by $0.6. These results are qualitatively similar to the results from our main specification (Table 4).

Discussion and Conclusions

We find that the cost of the ACA dependent mandate was shifted to parents of dependents, consistent with prior evidence (Kim and Koh, 2022). We show that the mechanism for this shift is employee sorting across firms, rather than changes in firm wage-setting behavior. We do this in three ways. First, though the cost of insuring the same adult dependent child should not depend on the child's position in the family, we find that the incidence of the mandate falls entirely on households where the newly-eligible child is the youngest in the households because parents may have to newly purchase family coverage. Second, the cost of insuring an adult dependent child should not depend on the child's household's income, but our findings indicate that the incidence of the mandate falls mainly on employees benefiting from the highest level of tax subsidies. Finally, the mandate leads to increased commuting time for parents of newly-eligible dependents. Consistent with prior research, we also find that the incidence of the mandate is greater for parents with less healthy dependents. Taken together, our results point to family decision-making as a source of the incidence of the ACA dependent coverage mandate.

Through the extension of the dependent coverage mandate, millions of young adults gained coverage through their parents' ESI plans. In ACS survey year 2009, there were about 33.6 million POIs. Of them, 1.25 million POIs had a child 22-25 who is the youngest, and 770,000 POIs had a

child 22-25 with younger siblings. Multiplying those figures by our estimated impacts of the dependent coverage mandate suggests that 272,000 youngest young adults and 228,000 non-youngest young adults gained coverage by the ACA mandate (note that these figures only include young adult children living with their parents, thus actual numbers should be bigger). Why did this happen? If costs are completely shifted, why didn't these young adults have coverage before the ACA?

First, obtaining coverage through employers is administratively efficient. We find a larger take-up effect by parents of non-youngest children 22–25, since they just needed to add a newly-eligible child to existing family coverage without having to pay higher premiums or change their policies. Second, availability of tax exclusion lowers the costs of coverage. Because parents are likely to be in higher tax brackets than young adult dependents, allowing parents to claim the tax exclusion reduces the price of coverage. Our finding of the biggest effects coming from those with the greatest tax subsidies is consistent with this proposition. Third, young adults in poor health may have had limited availability of coverage prior to the ACA. For this group, accessing comprehensive coverage through their parents' ESI plans might have been particularly valuable. Finally, parental preferences may differ from young adult preferences. While young invincibles, particularly young men, may not have cared to buy coverage, the mandate allowed them to do so on their behalf. This is consistent with the finding that coverage increased much more for young men than for young women (Sommers, 2012). Whether the ACA dependent mandate increased social welfare is unclear. Across the mechanisms we explored, extension of the ESI tax exclusion may generate welfare losses, but improved access to coverage likely improves efficiency.

Our results have implications for other ESI-related policies. In particular, our finding that the incidence of the mandate was heterogenous across participating workers, with workers in high

tax brackets bearing more of the cost, is consistent with the Goldstein-Pauly (1976) public goods approach to ESI. It suggests that ESI may generate some redistribution across workers. If that is the case, approaches to reducing the tax subsidy should be designed accordingly.

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Table 1. Expected incremental cost of the ACA dependent coverage mandate

	Estimate	Source
Incremental cost of ESI per covered dependent child	$3,380 in 2011 & $3,500 in 2012	75 Fed. Reg. at 27127-28 RIA
Effect on overall cost of ESI	↑0.7% in 2011 & ↑1.0% in 2012	75 Fed. Reg. at 27127-28 RIA
Employer share of total premiums	73% for family coverage	KFF (2013)
Employer annual cost per dependent covered	$2,467	
Hourly cost per worker (% of average hourly wage of ESI workers)	$1.38 (5%)	https://data.oecd.org/emp/hours-worked.htm; bls hourly earnings
Average annual/hourly cost of young adult coverage per worker 40-64	$320/$0.18	13% of workers had a young adult dependent covered post ACA
Incremental annual/hourly cost of mandate per worker 40-64	$62/$0.03	2.5% increase in dependents covered

Source: Authors' calculations using published estimates indicated above.

Table 2. Summary statistics of the study sample

	Mean (standard deviation) / Proportion
Age	48.746 (7.898)
Male	0.593
Educational attainment	
High school diploma or less	0.343
Up to 2 years of college	0.254
4 years of college or more	0.403
Race	
White	0.816
Black	0.095
Other	0.089
Marital status	
Married	0.627
Single/Separated/Divorced/Widowed	0.373
Family size	2.410 (1.296)
# dependent children covered by ESI	0.711 (1.207)
Any dependent children covered by ESI	0.401
Annual wage income ($)	64230.910 (40976)
Hourly income ($, capped at $100)	29.380 (17.164)

N=1,747,428

ESI, employer-sponsored insurance.

Sample includes individuals aged 35–64 who are ESI policyholders and full-time workers (35+ weekly hours). $ values are converted using Consumer Price Index to dollars of 2013.

Table 3. First stage regression results

	Dependent variable	
	Any dependent children covered by ESI	# Dependent children covered by ESI
# children ages 22–25 X Post-ACA (instrument)	0.109*** (0.003)	0.211*** (0.004)
# children ages 22–25	0.325*** (0.002)	0.494*** (0.003)
# children under 22	0.299*** (0.0005)	0.850*** (0.0008)
Age	0.036*** (0.0006)	0.054*** (0.001)
Age^2	-0.0004*** (0.00001)	-0.0005*** (0.00001)
Female	0.018*** (0.0007)	-0.027*** (0.0007)
Race (reference=White)		
Black	-0.021*** (0.001)	-0.062*** (0.001)
Other	-0.003*** (0.001)	-0.063*** (0.002)
Educational attainment (reference= high school diploma or less)		
Up to 2 years of college	0.022*** (0.001)	0.042*** (0.001)
4 years of college or more	0.016*** (0.001)	0.036*** (0.002)
Experience (years)	-0.010*** (0.0003)	-0.031*** (0.0004)
$Experience^2$	0.0007*** (0.00006)	0.0003*** (0.00001)
F-statistic[&]	49084	55958
Outcome mean	0.401	0.711

N=1,747,428.

[&] Kleibergen–Paap Wald F-statistic from a test for excluded instruments.

ESI, employer-sponsored insurance; ACA, Affordable Care Act.

Unit of analysis is person of interest (ESI policyholders). Each column represents separate regression. Regressions also control for state dummies, year fixed effects, an indicator for living with a spouse, and post-ACA period interacted with education and experience. Robust standard errors are in parentheses.

*, **, ***: significant at 0.1, 0.05, 0.01.

Table 4. Impacts of young adult dependent coverage mandate on wage rates: Instrumental variable approach

Instrument	Regressor of interest	Outcome	
		Annual wage ($)	Hourly wage ($)
# children 22–25 X post-ACA	Any dependent children covered by ESI	-1105.953*** (236.510)	-0.600*** (0.101)
	# dependent children covered by ESI	-684.596*** (146.243)	-0.371*** (0.063)
Outcome mean		64231	29

N=1,747,428.
ESI, employer-sponsored insurance; ACA, Affordable Care Act.
Unit of analysis is person of interest (adults who are policyholders). Each cell represents separate regressions. Regressions also control for state dummies, year fixed effects, an indicator for living with a spouse, and post-ACA period interacted with education and experience. Robust standard errors are in parentheses. $ values are converted using Consumer Price Index to dollars of 2013.
*, **, ***: significant at 0.1, 0.05, 0.01.

Table 5. Impacts of young adult dependent coverage mandate on wage rates: (Not) Youngest IV approach.

Instrument	First stage coefficient	Outcome	
		Annual wage	Hourly wage
Panel A. Regressor of interest: Any dependent children covered by ESI			
A child 22–25 is the youngest X post-ACA	0.201*** (0.005)	-1831.283*** (453.364)	-0.982*** (0.195)
A child 22–25 is NOT the youngest X post-ACA	0.039*** (0.009)	-1336.849 (887.519)	-0.722* (0.377)
Panel B. Regressor of interest: # dependent children covered by ESI			
A child 22–25 is the youngest X post-ACA	0.218*** (0.005)	-2463.293*** (678.071)	-1.354*** (0.292)
A child 22–25 is NOT the youngest X post-ACA	0.296*** (0.026)	-606.027 (385.771)	-0.327** (0.164)
Outcome mean		64231	29

N=1,747,428.
ESI, employer-sponsored insurance; ACA, Affordable Care Act.
Unit of analysis is person of interest (adults who are policyholders). Each cell represents separate regressions. Regressions also control for the same covariates in Table 4. Robust standard errors are in parentheses. $ values are converted using Consumer Price Index to dollars of 2013.
*, **, ***: significant at 0.1, 0.05, 0.01.

Table 6. Distributional impacts of young adult dependent coverage mandate on wage rates: Instrumental-variable quantile regression approach.

Regressor of interest[#]	Percentile				
	10th	25th	50th	75th	90th
Panel A. Outcome: Annual wage					
Any dependent children covered by ESI	-79.273 (657.588)	-436.939 (512.488)	-917.855** (401.253)	-1546.192*** (497.068)	-2295.882*** (821.091)
# dependent children covered by ESI	-54.263 (409.015)	-273.622 (318.792)	-568.566** (249.504)	-953.930*** (308.781)	-1413.707*** (510.033)
Panel B. Hourly wage					
Any dependent children covered by ESI	-0.205 (0.145)	-0.343*** (0.109)	-0.531*** (0.098)	-0.776*** (0.157)	-1.061*** (0.260)
# dependent children covered by ESI	-0.127 (0.090)	-0.212*** (0.067)	-0.328*** (0.061)	-0.480*** (0.097)	-0.655*** (0.161)

[#] Instrumented by "#children 22–25 X post-ACA".
N=1,747,428.
ESI, employer-sponsored insurance.
Unit of analysis is person of interest (adults who are policyholders). Each cell represents separate regressions. Regressions also control for the same covariates in Table 4. Robust standard errors are in parentheses.
*, **, ***: significant at 0.1, 0.05, 0.01.

Table 7. Impacts of young adult dependent coverage mandate on wage rates by ESI tax price quintile groups: Instrumental-variable approach.

Regressor of interest[#]	ESI tax price quintile[&]				
	1st	2nd	3rd	4th	5th
Panel A. Annual wage income					
Any dependent children covered by ESI	-2592.408***	-1832.035***	18.744	21.538	198.512
	(782.620)	(589.742)	(468.334)	(409.339)	(43.678)
# of dependent children covered by ESI	-1727.348***	-1191.272***	99.638	1.057	45.990
	(430.063)	(362.557)	(297.964)	(267.413)	(275.722)
Panel B. Hourly wage income					
Any dependent children covered by ESI	-0.945***	-0.978***	-0.114	-0.058	-0.099
	(0.325)	(0.250)	(0.203)	(0.180)	(0.193)
# of dependent children covered by ESI	-0.698***	-0.647***	-0.047	-0.005	-0.094
	(0.179)	(0.154)	(0.129)	(0.117)	(0.123)

[#] Instrumented by "#children 22–25 X post-ACA".
N=1,747,428.
ESI, employer-sponsored insurance.
Unit of analysis is person of interest (adults who are policyholders). Each cell represents separate regressions. Regressions also control for the same covariates in Table 4. Robust standard errors are in parentheses.
*, **, ***: significant at 0.1, 0.05, 0.01.

Table 8. Impacts of young adult dependent coverage mandate on commute time and moving: Instrumental-variable approach.

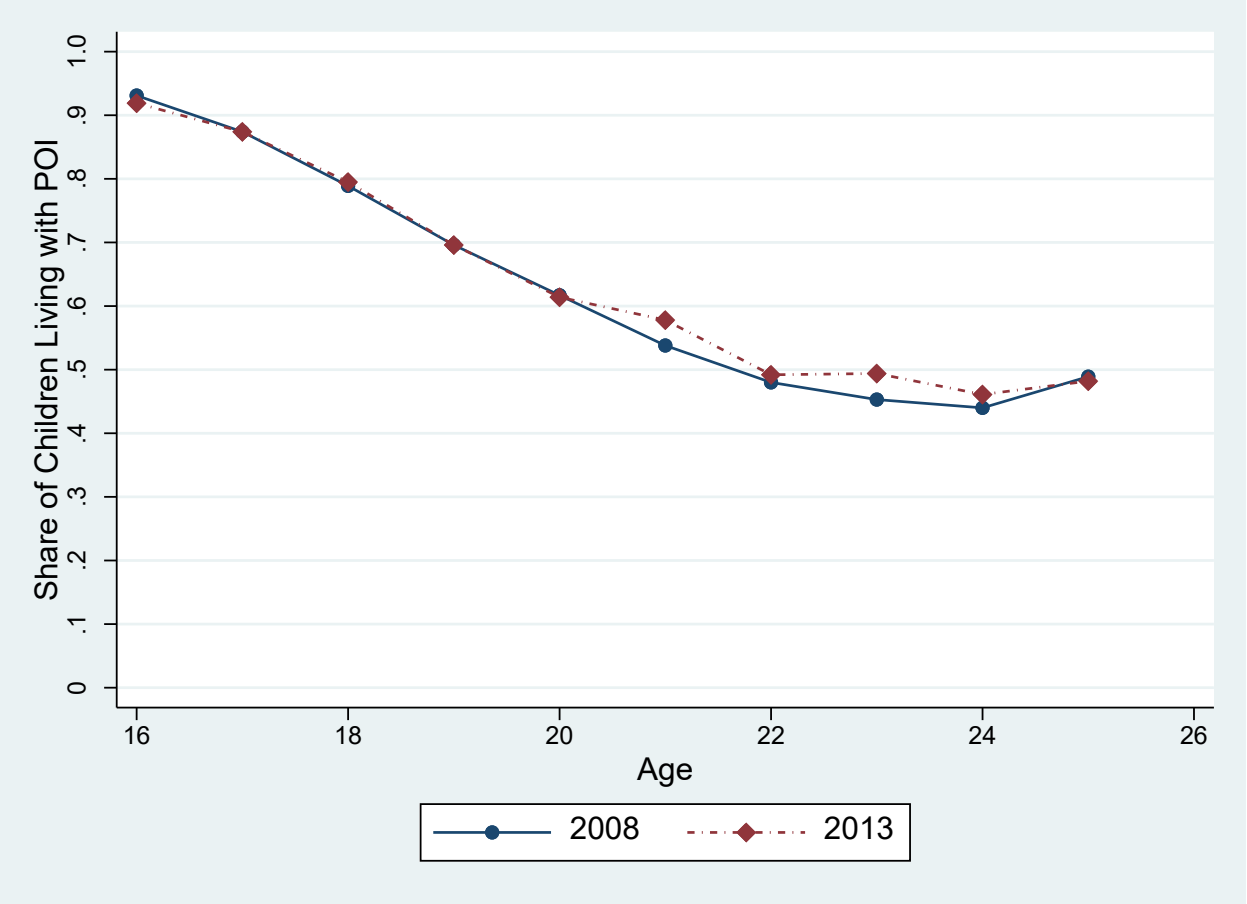
Instrument	Regressor of interest	Dependent variable				
		Commute time (minutes)	Logged commute time	Ever moved over the past year	Ever moved within-state over the past year	Ever moved between-state over past last year
# children 22–25 X post-ACA	Any dependent children covered by ESI	0.305* (0.166)	0.017*** (0.006)	-0.033*** (0.001)	-0.025*** (0.001)	-0.008*** (0.0004)
	# of dependent children covered by ESI	0.185* (0.103)	0.011*** (0.004)	-0.021*** (0.0009)	-0.016*** (0.0008)	-0.004*** (0.0003)
Outcome mean		25.601		0.070	0.059	0.011

N=1,747,428.
ESI, employer-sponsored insurance; ACA, Affordable Care Act.
Unit of analysis is person of interest (adults who are policyholders). Each cell represents separate regressions. Regressions also control for the same covariates in Table 4. Robust standard errors are in parentheses.
*, **, ***: significant at 0.1, 0.05, 0.01.

Table 9. Impacts of young adult dependent coverage mandate on wage rates by disability[#] status of young adult: Instrumental-variable approach.

Instrument	Regressor of interest	First stage coefficient	Outcome	
			Annual wage	Hourly wage
A child 22–25 is disabled[#] X post-ACA	Any dependent children covered by ESI	0.121*** (0.021)	-7482.951*** (2238.007)	-3.571*** (0.996)
	# dependent children covered by ESI	0.195*** (0.030)	-5092.991*** (1533.183)	-2.435*** (0.682)
A child 22–25 is NOT disabled X post-ACA	Any dependent children covered by ESI	0.148*** (0.003)	-960.808*** (242.170)	-0.546*** (0.104)
	# dependent children covered by ESI	0.265*** (0.005)	-619.720*** (156.061)	-0.352*** (0.067)
Outcome mean			64231	29

[#] =1 if a young adult child (ages 22–25) had any difficulties in hearing/vision/independent living/ambulatory/cognitive/self-care.
N=1,747,428.
ESI, employer-sponsored insurance; ACA, Affordable Care Act.
Unit of analysis is person of interest (adults who are policyholders). Each cell represents separate regressions. Regressions also control for the same covariates in Table 4. Robust standard errors are in parentheses.
*, **, ***: significant at 0.1, 0.05, 0.01.



Appendix Figure 1. Share of children living with POI, 2008 & 2013
Source: Authors' calculations using the ACS.

Appendix Table 1. First stage regression using DDD instrument.

	Outcome	
	Any dependent children covered by ESI	# Dependent children covered by ESI
# children 22–25	0.313*** (0.003)	0.480*** (0.004)
# children 22–25 X Post-ACA	0.117*** (0.003)	0.227*** (0.005)
# children 22–25 X Post-ACA X Pre-ACA expansion states (instrument)	-0.021*** (0.005)	-0.041*** (0.008)
# children under 22	0.304*** (0.001)	0.843*** (0.001)
# children under 22 X Post-ACA	-0.006*** (0.001)	-0.003 (0.002)
# children under 22 X Post-ACA X Pre-ACA expansion states	0.002 (0.001)	-0.002 (0.003)
Age	0.036*** (0.001)	0.050*** (0.001)
Age^2	-0.0004*** (0.00001)	-0.0004*** (0.00001)
Female	0.018*** (0.001)	-0.041*** (0.001)
Race (reference=White)		
Black	-0.021*** (0.001)	-0.055*** (0.001)
Other	-0.003*** (0.001)	-0.049*** (0.017)
Educational attainment (reference= high school diploma or less)		
Up to 2 years of college	0.020*** (0.001)	0.039*** (0.001)
4 years of college or more	0.013*** (0.001)	0.031*** (0.002)
Experience (years)	-0.007*** (0.0003)	-0.028*** (0.0004)
$Experience^2$	0.0006*** (0.00004)	0.0003*** (0.00001)
F statistics		
Outcome mean	0.401	0.711

N=1,747,428.

ESI, employer-sponsored insurance; ACA, Affordable Care Act.

Unit of analysis is person of interest (adults who are policyholders). Regressions also control for the same covariates in Table 4. Robust standard errors are in parentheses.

*, **, ***: significant at 0.1, 0.05, 0.01.

Appendix Table 2. Impacts of young adult dependent coverage mandate on wage rates: Instrumental variable approach

Instrument	Regressor of interest	Outcome	
		Annual wage ($)	Hourly wage ($)
# children 22–25 X post-ACA X Pre-ACA expansion states	Any dependent children covered by ESI	-1039.212*** (236.583)	-0.568*** (0.101)
	# dependent children covered by ESI	-659.522*** (146.363)	-0.359*** (0.063)
Outcome mean		64229	29

N=1,747,428.
ESI, employer-sponsored insurance; ACA, Affordable Care Act.
Unit of analysis is person of interest (adults who are policyholders). Each cell represents separate regressions. Regressions also control for state dummies, year fixed effects, an indicator for living with a spouse, and post-ACA period interacted with education and experience. Robust standard errors are in parentheses. $ values are converted using Consumer Price Index to dollars of 2013.
*, **, ***: significant at 0.1, 0.05, 0.01.