Resource Misallocation from Childcare Policies*

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Abstract

Governments often adopt policies to reduce the cost of childcare for working families but those can distort the allocation of resources. We develop and calibrate a general equilibrium model with firm and household heterogeneity and study the case of Chile, where firms with more than 19 female employees must provide childcare. We find that removing the mandate increases GDP by 3.25%: some households gain up to 14% of consumption units, others lose up to 7%. Financing childcare through labor taxes increases GDP by 3.48%, making every household better off, with gains of up to 36% for the poor.

JEL classification: E65, E24, E25, D15

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1 Introduction

In 2016, the OECD estimated that childcare costs were around 15 percent of net family income in its member countries, implying that it could seriously curtail low-income families' capacity to work (OECD, 2016). The COVID-19 crisis has further highlighted the importance of childcare provision for female labor force participation (Alon et al.,

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2020). For these reasons, many governments worldwide have elaborated policies to reduce the cost of childcare for families. While subsidies are a popular method to provide such cost reductions, in contexts where government resources are more limited, employer mandates are an often-used solution. Under these mandates, employers must provide free or low-cost daycare to their employees. However, as convenient as they are for some countries and as popular as they may be politically, one immediately questions the types of distortions and general equilibrium effects these mandates may have. In this paper, we tackle this question by measuring the aggregate and distributional impact of a childcare policy in Chile, emphasizing the welfare impacts on different individuals.

The policy in question aims to benefit women, who have traditionally borne most of the costs as reflected in the lower female labor force participation and wages (see Myck and Paull, 2001; Blau and Kahn, 1997; Kleven et al., 2019). Jaumotte (2004), in an OECD report, suggests that subsidizing childcare is one fundamental way in which the gap between female and male labor force participation rates can fall, particularly for low-income women. However, when governments rely on mandates rather than subsidies, employers may become less interested in hiring those covered by the policy or may lower their wages to finance the policy. This paper quantifies the overall impact of a policy under which a woman's work is incentivized through a mandate for firms to provide only their female employees with free daycare. We study the effects of this policy in Chile, where it is enacted for firms hiring more than 19 women and covering women with children below the age of 2.

We study the effects of this policy paying special attention to four channels: a misallocation channel, in the sense that its size-dependent nature may produce a lower amount of output per unit of input; a reallocation of resources away from females and towards males; a reallocation of resources away from young females, and towards older, non-fertile-age ones; and a reallocation of resources away from low-education females to higher education ones. The latter one may occur because childcare expenses, as a fraction of wages, are much larger for lower educated females.

To this end, we develop a general equilibrium framework with firm and household heterogeneity. Among the households in the economy, there are males and females that enter the productive process as imperfect substitutes, allowing us to model the allocation of resources between males and females. We introduce overlapping generations to distinguish between fertile-age and non-fertile-age females. To distinguish individuals by education, we model four educational types: less than primary, less than high school, less than college, and college or more. In addition, we allow males and females to differ

in their marital status, having single males, single females, and married couples in our economy. The two latter types can have children, who can come in the early periods in life, from 25 (when life starts in our model) to 40 years old. Non-fertile-age females range from 40 years old to 65 years old.

Children need parental care or childcare. If both parents (or a single mother) work full time, childcare expenses are required. Hence, we assume that both parents can take care of a child.[1] Each individual can have one of four types of education level, implying there are four types of single females, four types of single males, and sixteen types of couples.

On the technology side, we build on Ngai and Petrongolo (2017), who combine males and females in a production function with constant elasticity of substitution. We extend their framework in three key ways. First, we introduce several layers of skills and combine them in a nested CES function as in Katz and Murphy (1992). Second, the nested CES aggregate of labor is combined with capital via a Cobb-Douglas technology. Third, we introduce firm heterogeneity as in Hopenhayn (1992), where each production function exhibits decreasing returns to scale and has a total factor productivity (TFP) parameter that is heterogeneous across firms.

Information is asymmetric: firms cannot verify whether a female has or will have a child during the present period, but females do.[2] Similarly, females cannot verify whether their employer has or will have more than 19 female employees. Age and skills are observable, allowing firms to observe whether females are of fertile or non-fertile age and their education.

In this setting, nothing prevents a firm forced to pay for childcare ("large" firms henceforth) from hiring only non-fertile-age females, which is counterfactual because we observe many fertile-age females working in firms required to pay for childcare. To work around this, we develop a new equilibrium concept: a lawsuit-proof competitive equilibrium. If a fertile-age female does not get hired for a position, but an equally suited non-fertile-age female does, the foregone employee can sue the firm in a costly process that firms would like to prevent. In equilibrium, firms take into account this potential cost and set wages for fertile-age females in a way that, in equilibrium, both

[1] This assumption probably is not along the lines of what Chilean policymakers have in mind since only mothers are eligible for childcare subsidies. We (including the two fathers authoring this paper) believe that men can also take care of children.

[2] Without asymmetric information, the equilibrium would sort mothers into small firms that hire less than 19 females, and there would be no misallocation.

large and small firms are indifferent between hiring a fertile or a non-fertile-age female.[3] This results in higher wages for non-fertile-age females, and the difference is a function of childcare and lawsuit costs. The fixed nature of these costs implies that the difference in wages is decreasing in education, since the distortion is relatively larger where wages are lower.

To assess the effect of the policy quantitatively, we calibrate our model to the Chilean economy. In particular, we match the production sector to the Chilean manufacturing sector using data from the *Encuesta Nacional Industrial Anual* (ENIA), and the household sector uses data from the *Encuesta de Caracterización Socieconómica Nacional* (CASEN). There are two critical features of the calibration. The first is the childcare cost. We set this so that childcare costs relative to GDP are the same in the model as in the data; we estimate this value to be close to 0.19% of GDP. The second is the threshold of 19 women for the mandate to pay childcare to female workers. We calibrate this threshold to match the share of females hired in firms with 20 or more females.

Our main results can be summarized as follows. On the misallocation front, we do not find any evidence of a considerable impact of the policy. This is because the childcare cost is relatively low, and only applies to a limited number of females. As a consequence, the additional amount of output per unit of input when removing the size-distortion is negligible. This is consistent with existing studies that find empirically a very small effect on the distribution of firms. Prada et al. (2015) and Rojas et al. (2016) do not find evidence of bunching in their data. Escobar et al. (2016), who do find statistically significant evidence of bunching in the manufacturing sector find that only about 100 firms are "missing" out of the 2,000 firms around the threshold because of the childcare policy.

On the other hand, there is a considerable reallocation of resources away from females towards males, away from young females towards older females, and away from low education females towards higher educated ones. To see these channels, focus on wages. Removing the policy would have very little effect on male wages. It would have a small effect on the wages of non-fertile-age females, increasing them by less than 1 percent. The largest effect is on the wages of fertile-age females, with increases between 0.65% and 3%. In fact, the lower the education, the higher the increase. Together, these effects suggest that the childcare policy resources shift away from young females, in particular

[3]Several alternatives would generate the same type of equilibria. For example, if there is a cost to search for non-fertile-age females, firms would still hire fertile-age women when the cost of hiring them would be smaller than the cost of hiring non-fertile-age females plus the cost of searching for them.

those of lower education. To a lesser extent, it also shifts resources away from older females.

Removing the policy would have minor effects on GDP per capita. In fact, GDP per capita would mildly drop, by less than 0.1%. This is because some households would reduce their labor supply, either to take care of children or simply to enjoy more leisure. This suggests that welfare is a more relevant measure than GDP in this case. The problem with welfare is that our economy is populated by heterogeneous households, and not all levels of welfare change equally.

A way to deal with this problem is to compute whether removing the policy would increase the level of resources so that all households could in principle be better off. That is, if females with primary education are better off without the policy, but males with a college degree are worse off, is there a compensatory mechanism where females with primary education could transfer resources to college degree males in a way that leaves everyone better off than with the policy?

An alternative way to think about this is to assume that, prior to birth, all households have the same probability of being of a particular type, and compare the expected welfare under the two regimes. This comparison would reveal that, by removing the policy, an individual's ex-ante welfare would increase by slightly over 2% in consumption equivalent units over their lifetime.

This same exercise can be further broken down into different levels. For example, one could think of the aggregate female welfare as the expected welfare of an unborn individual conditional of being female. This welfare would increase by almost 3% of consumption equivalent units by removing the policy. Single females would gain 3.3%, while married females would gain 2.5%. In fact, even males would increase their welfare levels. Their wages are not really affected, and, in the case of married couples, the increase in female wages increase male welfare.

There are losers of the removal of the policy. These are mostly mothers, given that they lose their childcare subsidy. Notice that not all mothers receive the subsidy, only those hired by large firms. These would be better off without the policy. But the increase in welfare within this group is not large enough to overcome the losses of those mothers that lose coverage.

To better understand the reasons behind the impacts of removing the policy and to propose alternatives, we next evaluate 4 alternative ways to offer some childcare subsidy. First, we propose to maintain the "mandated" nature of the policy but expand it to all firms, irrespective of their size. This would remove the size-dependent consequences

of the policy, which we have previously argued are not large. However, it would also provide the benefits to many more women, not only those working for larger firms. We find substantial gains from this expansion of the policy. Take single females with primary incomplete education. Childcare constitutes a large expense among this group. In fact, conditional on working, a mother's preference can be thought of as preferences of the Gorman type, where consumption can only be increased by the amount of income in excess of childcare expenses. When income is close to these expenses, the marginal utility of an additional unit of resources is very large. Thus, by extending the coverage to all females, aggregate welfare increases beyond the increase observed under the removal of the policy, by over 4%. This implies that some type of childcare financing is desirable. In this case, the biggest winners are single females, whose welfare increases by 20%, when the aggregate effect of female welfare is of only 8%, mainly because married females hardly change their welfare levels. And among single females, the ones who benefit the most from the expansion of the mandate are females with primary incomplete, in particular those with children in the first period (the ones that are the most constrained by the childcare expenses). These females increase their lifetime welfare by over six times in consumption equivalent units. Mothers would enjoy large increases in welfare in this scenario, with an average increase of over 40% in consumption equivalent units.

We next propose to cover all childcare expenses as above but this time remove the "mandate" aspect of the existing policy, replacing it instead with an income tax. This policy is currently being discussed as an alternative to the childcare policy in Chile, further motivating this choice of counterfactual. We find that a tax on labor income of 0.31% would be required to finance all childcare needs. The advantage of this system is that it eliminates all biases against females by taking the financing responsibilities away from firms and shared equally amongst all workers. As a result, this is the most successful policy in terms of increasing aggregate welfare. Aggregate welfare would increase by over 13%, and the aggregate welfare of mothers would increase by over 60%. The only losers under this scenario would be single men, although their losses are small, equal to 1%.

The two proposed alternatives, as described, combine an expansion of the coverage compared to the current model. This is likely to be difficult politically as it would involve substantial resources. Furthermore, some of the criticisms that have been raised against the current model is its lack of targeting. We thus further explore two alternatives where we continue to remove the "mandate" aspect of the current law but now focus resources towards the poorest mothers in the economy. In our first alternative, we cover

childcare expenses of only the least educated group of females, those that gain the most from receiving childcare payments.[4] However, even this targeted policy would require additional resources compared to the current law. We thus further reduce the financing such that it equals the current policy. On aggregate, either one of these policies would increase aggregate welfare by more than removing the policy or extending it to all firms. The larger the coverage, the larger the aggregate welfare gains.

~~Interestingly, partially covering childcare expenses would yield larger gains than fully covering them. This is because there are two effects of the policy: an income effect, by which females with primary incomplete do not need to take into consideration their childcare costs, and a substitution effect, that lowers the demand of this type of workers. By reducing the percentage of childcare covered, the gains due to the income effect drop, but the gains due to the substitution effect increase. In aggregate, the second channel predominates.~~

*I DO NOT UNDERSTAND THIS ARGUMENT. It is wrong.

Ex-ante, mothers would gain relative to the current situation. But not all mothers would. On average, mothers with less than primary education that receive childcare payments under the current policy would gain about 14% in consumption equivalent units. This average includes mothers that both receive and do not receive childcare payments from their employers, and mothers of different age and marital status. Within this average, mothers with less than primary education that do not receive childcare payments from the firms are the heaviest winners, gaining up to 800% more in the case of single mothers with children in the first period. *THESE LAST TWO SENTENCES SEEM TO BE CONTRADICTORY Is this better now?

But more educated mothers lose when they lose coverage, as much as 70% in consumption equivalent units. These effects are similar under the fully funded or partially funded systems. On aggregate, while the partially funded system provides a higher increase in welfare than the fully funded system, ex-ante mothers gain more under the fully funded system.

We contribute to the series of articles that have tried to connect childcare availability to female labor force participation. Typically, this literature uses applied microeconometric techniques to estimate the overall program effect on female labor force participation. They usually find that having cheaper or more accessible childcare in-

[4]Single females are the ones that would gain the most out of childcare subsidies, not necessarily low education females. Since it is hard to enact a subsidy for single females, we do not contemplate this possibility.

creases female labor force participation (Blau and Currie, 2006; Cascio, 2009; Berlinski and Galiani, 2007; Baker et al., 2008; Gelbach, 2002). However, because of the methodology they employ, they cannot explore how providing childcare through a different policy tool may alter its impact or the channel through which the aggregate effects occur. We argue that by ignoring the general equilibrium effects, the results can be misleading. Comparing the behavior of mothers receiving offers from large and small firms, removing the policy would reduce the labor supply of mothers by 34%, according to our model. When considering general equilibrium effects the drop is much milder, of 13%.[5]

Our work is also related to the body of work estimating the impact of discontinuities in public policies on firms' decisions. Public policies that are dependent on firm size are called regulatory tiering, and Brock and Evans (1985) argue that when faced with administrative costs of collecting taxes, it could be optimal for the government to use size-dependent policies instead of a unique rule. However, the empirical evidence has suggested that these policies can generate considerable distortions in firm size. Becker and Henderson (2001) show that size-dependent environmental regulations cause distortions in terms of firm size. Gao et al. (2009) show the same for financial regulation. Leal Ordóñez (2014) shows that incomplete enforcement can have a similar effect, where firms may withhold on capital, creating inefficiencies. We believe to be the first paper to look at a childcare policy with these discontinuities in a general equilibrium setting and, more importantly, a policy where it is not income, capital or the total number of workers what generates the size dependency, but the number of workers of a given gender.

There is ample literature studying the costs of factor misallocation. Studies have shown that policies that generate misallocation of inputs lowers welfare and output per capita, as in Guner et al. (2008), Garicano et al. (2013), Gourio and Roys (2014), and Restuccia and Rogerson (2008), among others (see Restuccia and Rogerson, 2013, for a survey of the literature). In contrast, the substitutability between production factors and how they interact with misallocation has been largely unexplored. Most papers include only labor so that firms cannot substitute the source of misallocation for something else. Some of these papers include capital and labor, which allows for some degree of substitutability. Still, in our case, the substitutability is starker since males and females are potentially more substitutable than capital and (total) labor. We thus see our contribution as providing estimates that do take this substitution into account.

[5] A related paper that works in general equilibrium is Guner et al. (forthcoming), which analyzes in a framework very close to ours the effect of different policies to finance childcare. In a different context, Daruich (2018) shows that aggregate effects from an early childhood intervention are twice as large as the ones visible in a RCTs due to the general equilibrium effects.

This paper is organized as follows. Section 2 describes the Chilean regulation in detail, including the effects that other studies have found. Section 3 describes the model. Section 4 introduces the Chilean childcare policy into the model while the following section characterizes the equilibrium. Section 6 calibrates the economy to the Chilean case. Section **??** describes the effects of the policy on misallocating resources. Section **??** discusses the results, section 8 discusses alternative policies to finance childcare and section 9 concludes.

2 Policy

The policy we study in this paper was established when labor force participation of females was extremely low, in 1917. It was then denominated *Ley de Salas Cuna* and forced every factory, workshop, or industrial establishment that hired 50 females or more (above age 18) to provide childcare, specially conditioned to receive female employees' children under one year of age while the mother was working.[6] The use of a threshold number of female workers was most likely linked to a minimum size that made it worthwhile for the employer to open on-site childcare. Without enough women workers, a firm may have had only one or two babies in their dependency simultaneously, increasing the cost of such provision. Over time, the law reduced the required number of females from 50 to 20 in 1931[7] and then later in 1987 it required childcare to be provided until the child was two years of age.[8] In 1998, the law was made harder to evade by preventing multi-plant firms from avoiding the policy by keeping their establishments below the required number of females, now including all plants in the calculations. However, over the whole period it remained a privilege reserved to the children of female employees: male employees who have children cannot benefit from the subsidy. This is in line with the fact that new mothers (but not fathers) who return to work are also granted one hour per day as "feeding time" for their baby, linking baby care with the gender of the parent.

In order to comply with the normative, firms have three options. First, they can create and maintain childcare centers annexed to the workplace, as the law initially conceived. Alternatively, firms can share childcare facilities with other establishments in the same geographic region. Finally, firms can also pay directly to external daycare centers. According to the employees' survey *Encuesta Laboral de la Dirección del Trabajo*

[6] Ley 3186, (1917), Chile.
[7] Decreto con Fuerza de Ley 178, (1931), Chile.
[8] Decreto de Ley 2200, (1987), Chile.

(ENCLA), 69% of the establishments chose the latter in 2006. The remaining 31% was split between establishments that had their own daycare (5%), paid a bonus to the mother (15%), did not do anything (9%), or provided some alternative solution (2%). Because of these numbers, the model in the next section assumes that firms pay external providers for the cost of childcare.

The cost of providing childcare for two years is considerable for firms. According to Aedo (2007), the average cost of registering a child in a daycare was of CLP$100,000 per month in 2002, which is about US$200. As a comparison, the average wage (for males and females) in the manufacturing sector in that same year was about CLP$222,000 per month. This suggests that this cost is relatively high compared to wage levels. Rau (2010) report a similar value by measuring the cost of daycare in 2008 by calling 30 establishments and obtaining an average value of CLP$137.438 for a full-day daycare. We use this to estimate that total childcare expenditure was about CLP$178 Billion in 2007, or about US$ 300 Million, which is about 0.2% of GDP (see section 6 for details).

Why has such a law endured over the years? While there have been many calls to repeal it, alternatives have also faced considerable opposition. A subsidy would require increasing labor taxes, which is seen as potentially curtailing employment and fostering informality. Small businesses have also been resistant to becoming subject to this provision, fearing increases in their costs. A daycare voucher replacement has also been opposed by early childhood specialists who argue that it could decrease the quality of care. Because of this political opposition to alternatives, the law remains in place despite the fact that its potential for discriminating against the hiring of young women has been recognized.

What can a firm do to avoid being subject to the law? There is no distinction in terms of the type of contract (permanent or temporary, full- or part-time) for women to be counted towards the threshold of 20. It should also be noted that firms are not directly forced to pay day care to the children of their subcontracted workers, although they are considered when counting total employees. The obligation then lays on the subcontractor company, which in turn probably transfer the cost to the principal firm. Informal firms are clearly not subject to the law but informality is much smaller in Chile than in most of Latin America. Less than a third of Chilean workers are informal, implying that they do not contribute to social security.[9] However, half of these are self-employed who were not required by law to make such contributions at the time of our

[9] https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_725018.pdf

study. Less than a third of all informal workers in Chile actually work for a private-sector firm. Of those, more than half work for firms of less than 10 employees who would never be subject to the law in any case for their size. Thus, we see informality as a response to the law possible but unlikely to affect a large number of employees and firms.

More naturally, it appears that most firms avoid the law by restricting their hiring of female employees. The firms' distribution shows evidence of this suspected behavior. The data comes from the ENIA, a survey of manufacturing firms with more than ten employees carried out by the Chilean statistics office. Figure 1 shows the number of females hired by all firms that hire 10 females, 11 females, and so on. There is a clear drop in the number of firms that hire between 19 and 21 females. Theoretically, the drop should be between 19 and 20, which is slightly milder than the one from 19 to 21. We believe a reason for this is that survey takers round up, and if they hire 19 or 21 females, it is common for them to write down 20. Escobar et al. (2016) find that there between 30 and 40 extra firms at 19 female employees and between 50 and 90 missing firms above 19 women workers. A McCrary test for discontinuity finds that there is a jump in the distribution of firms around 19 female workers: such a discontinuity is not found at 15, 18 or 22 women; it is also not found at 19 men workers.

This behavior is not the same for all firms. Figure 2 shows firms' distribution by female employees for firms that hire less than 100 workers. In this case, we plot the number of firms (rather than females hired by firms) that hire different number of females. It is very hard to see a discontinuity among these firms. However, this discontinuity is very evident among firms hiring 100 or more employees, depicted in Figure 3. We observe that around 50 fewer firms hire exactly 20 women than those hiring 19. The difference may be due to the lower probability of detection among smaller firms: it is easier for small firms to "fly under the radar" and get away without full compliance with the law. In fact, Escobar et al. (2016) estimate that in the Chilean manufacturing sector, there is a fall of around 20 percent in the number of firms at exactly 20 females. The fraction increases to 36 percent when focusing on firms with more than 100 employees.

After showing evidence of the distortion generated by this law in terms of hiring, the rest of the paper quantifies the total and distributive costs of this law on the Chilean economy.

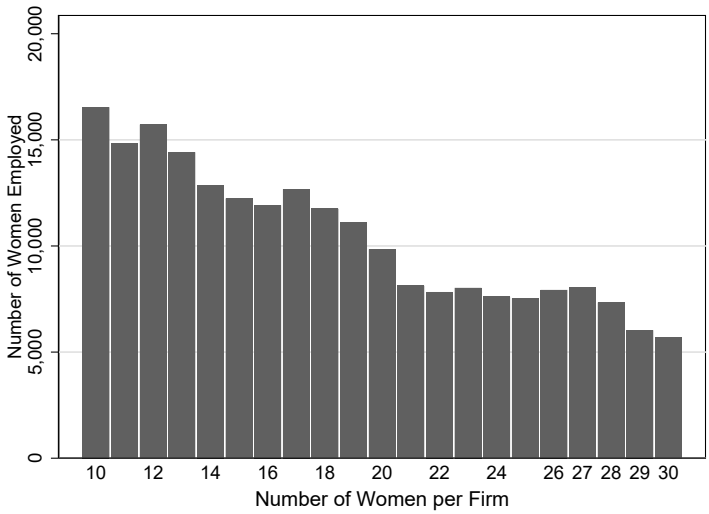

Figure 1. Number of firms by firms that hire x female employees.

3 Model

We begin by describing the model used in this study in the absence of distortions. Thus, this section abstracts from the law that forces firms with less than 20 females to pay for childcare expenses. Section 4 then introduces the law into the model and details how it affects the equilibrium.

3.1 Households

The model features overlapping generations with a continuum of males (m) and females (f), as in Guner et al. (2012). Individuals live for J periods, after which they exit the economy. Households are allowed to save but not borrow.

Population grows at rate n. There are three types of families: married couples, single females, and single males. In married couples, comprised of a male and a female, both individuals have the same age but not necessarily the same education. There are four possible education levels: primary or less, high school incomplete, college incomplete, and college or more.

Children are assigned exogenously at the start of life to single women and married couples. There are four types: *early* child bearers, *middle* child bearers, *late* child bearers, and those *without* children. Child bearers have two children for one period. Denote by $b = 0, 1, 2, 3$ individuals who have no children or that have children at age 1, 2, and 3, respectively. Denote by p the probability of having children in the current period of a

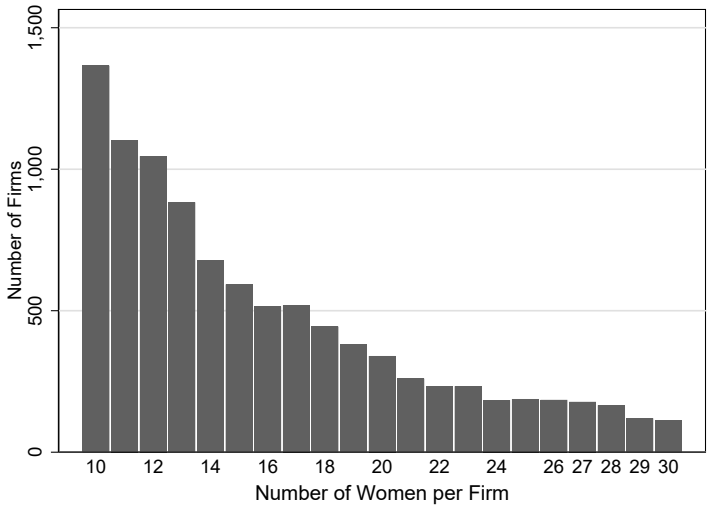

Figure 2. Number of firms with less than 100 employees that hire x female employees.

fertile-age female (equal for early, middle, and late child-bearers and across education levels).

Each period, individuals make labor supply, consumption, and savings decisions. Both males and females have an endowment of 1 unit of time each period. The labor decision is non-convex: they either work, or they do not.[10] If parents work, they must pay childcare costs. Both males and females differ in their level of education.

Let $\varphi_{c,j}(e_m, e_f, b)$ be the measure of married couples of age j with male education e_m, female education e_f, and children at age b. Similarly, let $\varphi_{m,j}(e_m)$ and $\varphi_{f,j}(e_f, b)$ denote the analogous for single males and single females.

Preferences. The within period utility function for a single female is

$$U_f^S(c, l, e) = \log(c) - \lambda_{f,e} l$$

where c is consumption, l is time devoted to work, and $\lambda_{f,e}$ is a parameter controlling the disutility of work and depends on gender and education level e.

Similarly, the male within period utility function is

$$U_m^S(c, l, e) = \log(c) - \lambda_{m,e} l$$

[10] We are stricter than Guner et al. (2013), who assume that the labor supply is convex. Our definition of equilibrium forces us to assume that the female labor supply is non-convex. In addition, this definition prevents us from introducing returns to age or experience. See Appendix A for details.

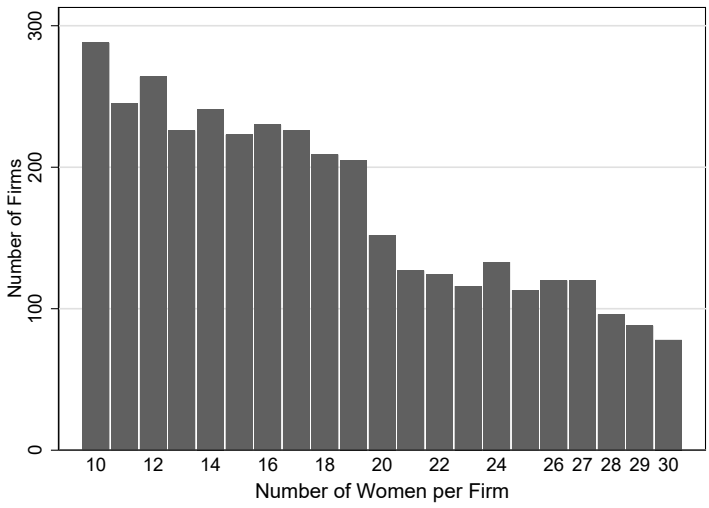

Figure 3. Number of firms with more than 100 employees that hire x female employees.

Married households treat household consumption as a public good, so that their utility function is:

$$U^M(c, l_f, l_m, e_m, e_f) = \log(c) - \lambda_{c,e_m,e_f} l_f - \lambda_{c,e_m,e_f} l_m$$

3.2 Firms

There is an endogenous mass N of firms with a technology that inputs males, females, and capital. These technologies are nested CES functions. First, they combine male and female workers of the same education level as in Ngai and Petrongolo (2017). Then they aggregate these across education levels as in Katz and Murphy (1992). Finally, this aggregate is combined with capital in a Cobb-Douglas way. Each firm has decreasing returns to scale and differ in their level of total factor productivity (TFP), as in Hopenhayn (1992). The production function is

$$y = AF(\{h_{fe}\}, \{h_{me}\}, k)$$

where

$$F(\{h_{fe}\}, \{h_{me}\}, k) = \left\{ \left[\sum_{e=1}^{4} \epsilon_e \left(\xi_e h_{fe}^{\frac{\mu-1}{\mu}} + (1-\xi_e) h_{me}^{\frac{\mu-1}{\mu}} \right)^{\frac{\mu}{\mu-1}\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}(1-\alpha)} k^{\alpha} \right\}^{\theta}$$

where $\mu > 0$ is the elasticity of substitution between males and females, $\xi_e \in [0,1]$ affects the female labor share, $\sigma \geq 0$ determines the elasticity of substitution across educations, $\epsilon_e \geq 0$ determines the share of output attributed to education level e, where $\sum_{e=1}^{4} \epsilon_e = 1$, $\alpha \in (0,1)$ affects the capital share, $\theta \in (0,1)$ determines the returns to scale, and $A > 0$ is TFP.

Firms are identical except for their productivity A. To operate, a firm spends κ units of the consumption good to draw a parameter A from a distribution with density $G(A)$. Firms last for one period, and there is a large (infinite) pool of potential entrants. They hire female labor, male labor, and capital services from the households. Capital depreciates every period at rate δ_k.

It is worth noting that the assumptions of free entry and firms lasting one period means that aggregate profits are zero. This assumption is very convenient since it implies that firm ownership is not important, as long as firm ownership is not correlated with productivity. In other words, there are no profits to rebate back to households.

3.3 Household Decision Problems

Let a denote assets, w_{fe} denote education level e female wages, and w_{me} denote education level e male wages, for $e = 1,2,3,4$. The maximization problems are, for each type, as follows.

Single females. The value function for a single female with assets a, education level e, age j and kids at time b is

$$V_f^S(a,e,j,b) = \max_{a',l} \{U_f^S(c,l) + \beta V_f^S(a',e,j+1,b)\}$$

subject to

$$c + a' = a(1+R) + w_{fe} l - \mathcal{I}_b \nu l$$

where if $b = j$ then $\mathcal{I}_b = 1$ otherwise $\mathcal{I}_b = 0$, $l \in \{0,1\}$ is labor supply, and $\nu > 0$ is the childcare cost. This childcare cost is only borne if the mother works, explaining why it is multiplied by l. $\beta \in (0,1)$ is the intertemporal discount factor. Notice that we have chosen the consumption good as the numeraire, and so its price is equal to 1.

Single males. The value function of a single male with assets a, education level e and age j is:

$$V_m^S(a,e,j) = \max_{a'}\{U_m^S(c) + \beta V_m^S(a',e,j+1)\}$$

subject to

$$c + a' = a(1+R) + w_{me}$$

where R is the market interest rate.

Married households. The problem of a couple with assets a, education levels e_m and e_f, age j and kids at time b is

$$V^M(a,e_m,e_f,j,b) = \max_{a',l_f,l_m}\{U^M(c,l_f,e_f) + \beta V^M(a',e_m,e_f,j+1,b)\}$$

subject to

$$c + a' = a(1+R) + w_{fe_f}l_f + w_{me_m}l_m - \mathcal{I}_b \nu \min\{l_f, l_m\}$$

where $l_f, l_m \in [0,1]$ and if $b = j, \mathcal{I}_b = 1$, otherwise $\mathcal{I}_b = 0$. The childcare cost is only borne if both parents work. If one of them does not, then $\min\{l_f, l_m\} = 0$ and the last term in the budget constraint vanishes.

3.4 Firm Decision Problems

Firms demand resources by maximizing profits. Their problem is

$$\pi(A) = \max_{\{h_{fe}\},\{h_{me}\},k} AF(\{h_{fe}\},\{h_{me}\},k) - rk - \sum_{e=1}^{4} w_{fe}h_{fe} - \sum_{e=1}^{4} w_{me}h_{me}$$

where $\pi(A)$ are the profits of a firm with TFP equal to A and $r = R - \delta$ is the rental rate. Let $h_{fe}(A)$ be the demand function for females of education e of a firm with productivity A, and define $h_{me}(A)$ and $k(A)$ accordingly. Aggregating, let H_{fe}, H_{me} and K be the total

demand of females, males, and capital, then the following must hold:

$$H_{fe} = N \int_A h_{fe}(A) G(A) dA \quad e = 1, 2, 3, 4$$
$$H_{me} = N \int_A h_{me}(A) G(A) dA \quad e = 1, 2, 3, 4$$
$$K = N \int_A k(A) G(A) dA$$

Firms enter whenever the profits of doing so exceed the cost. The entry cost is κ units of the consumption good. Let $\pi(A)$ denote the per period profit of a firm with productivity A. Then an equilibrium with positive entry exists when the following free entry condition holds:

$$\kappa = \int_A \pi(A) G(A) dA$$

3.5 Market Clearing

Factor markets clear. Aggregate capital (K), female labor efficiency units (H_f) and male labor efficiency units (H_m) market clearing conditions are

$$K = \sum_{j,e_m,e_f,b} \varphi_{c,j,b}(e_m, e_f) a_{c,j}(b, e_m, e_f) + \sum_{j,e_m} \varphi_{m,j}(e_m) a_{m,j}(e_m) + \sum_{j,e_f,b} \varphi_{f,j}(e_f, b) a_{f,j}(e_f, b)$$
$$H_{m,e_m} = \sum_{j,b,e_f} \varphi_{c,j,b}(e_m, e_f, b) l_{c,m,j}(e_m, b) + \sum_{j} \varphi_{m,j}(e) l_{m,j}(e_m)$$
$$H_{f,e_f} = \sum_{j,b,e_m} \varphi_{c,j,b}(e_m, e_f, b) l_{c,f,j}(e_f, b) + \sum_{j,b} \varphi_{f,j,b}(e) l_{f,j}(e_f, b)$$

where $a_{c,j}(b, e_m, e_f)$ are the assets of a married couple of age j, kids at age b, male education e_m and female education e_f, $a_{m,j}(e_m)$ are the assets of a single male of age j and education e_m and $a_{f,j}(b, e_f)$ are the assets of a single female of age j, kids at age b, and education e_f. Similarly, $l_{c,m,j}(e_m, b)$ is the labor supply of a married male, of age j, education e_m and kids at age b, $l_{m,j}(e_m)$ is the labor supply of a single male of age j, with education e_m, $l_{c,f,j}(e_f, b)$ is the labor supply of a married female of age j, education e_f, and kids at age b, and $l_{f,j}(e_f, b)$ is the labor supply of a single female of age j, education e_f and kids at age b.

4 Childcare Policy

This section introduces the Chilean childcare policy into the model, which specifies that any firm hiring $\hat{h}_f$ (20 in the data) or more females must pay for childcare expenses during the first two years of the child. The key assumptions are that we allow firms to observe the education of a female and her age, but not whether she needs (or will need) childcare support during the present period. This assumption is motivated by the fact that firms can verify skills by looking at a resume, and age can, in most cases, be inferred by appearances or by information on the resume, such as graduation year. However, the decision to have a child is private, and females do not need to disclose this information in job interviews. Similarly, females cannot observe whether their potential employer hires or will hire more than $\hat{h}_f$ females, and therefore whether it will cover childcare. While this assumption may be irrealistic with extremely large firms, these are very few and it is common not to know how many females a typical Chilean firm hires.

In equilibrium, if wages of fertile and non-fertile-age females are the same, firms that hire less than $\hat{h}_f$ females are indifferent between hiring a female of fertile age or one of non-fertile age. Larger firms strictly prefer females of non-fertile age. This would produce an allocation where all females earn the same wage, and all fertile-age females would work in small firms. The rest would split between large and small firms (if the demand from large firms is less than the supply of non-fertile-age females, which is the case in our calibration). This would result in the childcare policy being ineffective since no firm would pay for it, which is not the case in Chile.

To address this problem, we develop a new equilibrium concept, the **lawsuit-proof** competitive equilibrium. While lawsuits may be perceived as something particularly possible within the United States, the labor market in many civil law countries is also prone to legal demands. In Chile, there is an official tribunal, "Dirección del Trabajo" which receives complaints from workers who feel their rights have been violated and can sanction firms when they are found to be in opposition to the labor code. There is one complaint per 100 workers every year. In particular, in 2020, there were more women who made demands to the Ministry of Labor than men, despite women being a smaller fraction of the workforce. A large number of these complaints were related to gender issues: sexual harassments, lack of respect of maternity obligations, and discrimination (`https://www.dt.gob.cl/portal/1627/w3-article-119486.html`). Finally, a recent reform has made this court be much more likely to be pro-worker in their decisions (Bustos et al., 2020).

In our model if a fertile-age female has an interview with a large firm that decides not to hire her, but instead hires a non-fertile-age female with the same qualifications, the female who was not hired can sue at an expected cost of τ units of consumption to the firm.

The hiring process works as follows. A firm searches for a female employee with an education level e. The firm meets the applicant. If she is hired, the search stops. Otherwise, the search continues, in which case the applicant can sue for discrimination. The firm hires the employee when its expected cost does not exceed the lawsuit's cost plus the cost of hiring a non-fertile female.

Definition 1. *A lawsuit-proof competitive equilibrium is a competitive equilibrium where*

- *The expected cost of hiring a fertile-age female for a large firm does not exceed the cost of not hiring her, paying the lawsuit cost, and hiring a non-fertile-age female.*
- *The expected cost of hiring a non-fertile-age female for a small firm does not exceed the cost of not hiring her, paying the lawsuit cost, and hiring a fertile-age female.*
- *Absent the lawsuit threat small firms would hire all fertile-age females if demand exceeds supply. Otherwise, small firms would only hire fertile-age-females.*

The last condition in the definition makes sure the lawsuit threat is binding, which implies that the wage rate of fertile-age-females is lower than that of non-fertile-age females. In equilibrium, firms avoid the risk of a lawsuit by hiring the fertile-age female. In order to hire both fertile and non-fertile age females, firms adjust the wages of both types of females. By the law of large numbers, all firms hire the same proportion of fertile and non-fertile-age females.[11]

Proposition 1 *A lawsuit-proof competitive equilibrium where both small and large firms are indifferent between hiring females of all ages exists if and only if the following holds:*

$$\frac{\tau}{P_o} \leq pv \leq \frac{\tau}{(1-P_o)P_o} \tag{1}$$

where P_o is the proportion of females of non-fertile age.

Proof. See Appendix Appendix A. ■

[11] This ignores problems associated with non-convexities, that is, firms can hire fractions of a female. Otherwise, the law of large numbers would not apply, and the equilibrium would be highly intractable.

Notice that τ has both lower and upper bounds. This is key to narrow the scope of our quantitative results, as we detail in section 6.

While we suggest that a lawsuit is a likely justification for this equilibrium, other alternatives such as search costs that make it costly to keep looking for a non-fertile-age female would also generate similar patterns.

5 Equilibrium Characterization

We next describe a lawsuit-proof competitive equilibrium for this economy where firms hiring $\hat{h}$ females or more pay for childcare expenses.

5.1 Effects on Households

Appendix Appendix A shows the conditions that female wages need to follow in equilibrium. In particular, we work with the case in which negotiation between females and firms makes large firms indifferent between hiring a fertile-age or a non-fertile-age female.[12] This implies

$$w_{f,e,y} + pv = \frac{\tau}{P_o} + w_{f,e,o}$$

where $w_{f,e,o}$ is the wage of a non-fertile-age female with education e and $w_{f,e,y}$ is the wage of a fertile-age female with education e. Equation (1) guarantees that $w_{f,e,y} < w_{f,e,o}$, so that resources are shifted away from fertile-age females to non-fertile age females. Moreover, since equilibrium wages are increasing in education, the distortion is greater for low education levels. Finally, by targeting females, the policy shifts resources towards males.

On the other hand, under this policy families no longer need to pay for childcare, which can in principle benefit families with children. This benefit is relatively larger for lower education levels.

[12] This is without loss of generality given τ. The relevant statistic is $w_{f,e,o} - w_{f,e,y}$. Changing the value of τ would change this statistic in similar ways as imposing that small firms are indifferent between hiring a fertile-age or non-fertile-age female. We show the results under different specifications of τ in the Online Appendix.

5.2 Effects on Firms

Firms solve the following maximization problem:

$$\pi(A) = \max \left\{ \begin{array}{l} \max\limits_{\{h_{fe}\},\{h_{me}\},k} \left\{ AF(\{h_{fe}\},\{h_{me}\},k) - \sum\limits_e w_{me}h_{me} - P_o \sum\limits_e w_{f,e,o}h_{fe} - (1-P_o)\sum\limits_e w_{f,e,y}h_{fe} - \right. \\ \left. rk - (1-P_o)p\nu \sum\limits_e h_{fe} \right\}, \\ \max\limits_{\{h_{fe}\},\{h_{me}\},k} \left\{ AF(\{h_{fe}\},\{h_{me}\},k) - \sum\limits_e w_{me}h_{me} - P_{ot} \sum\limits_e w_{fe}h_{fe} - (1-P_o)\sum\limits_e w_{f,e,y}h_{fe} - rk \right\} \\ \text{s.t. } \sum\limits_e h_{fe} \leq \hat{h}_f \end{array} \right\} \quad (2)$$

Intuitively, a firm compares two levels of profits: those if it hires more than $\hat{h}_f$ females understanding that some of them require childcare expenses (the top two lines in equation (2)), with that of hiring less than $\hat{h}_f$ females (the bottom 2 lines). They choose the maximum of those two profit levels.

The solution implies the existence of two productivity thresholds, A_1 and A_2, where $A_1 < A_2$. Firms with productivity $A < A_1$ demand less than $\hat{h}_f$ females, so the restriction is non-binding. Firms with productivity $A \in [A_1, A_2]$ would, absent the childcare policy, hire more than $\hat{h}_f$ females. The policy induces them to hire $\hat{h}_f$ females, thereby avoiding the childcare expense at the cost of setting marginal productivity above marginal cost. Firms with productivity A_2 are indifferent between hiring $\hat{h}_f$ avoiding childcare costs, or hiring a larger (optimal) number and paying for it. Firms with $A > A_2$ hire more than $\hat{h}_f$ females, incurring childcare payments. These firms are better off paying this additional cost than restricting the number of females.

6 Calibration

A period in the model corresponds to five years. We set $J = 8$, understanding that individuals start their working life at age 25 and finish it at age 64. This implies that women can have children from age 25 to 40 in our model. We set $\beta = 0.974$ following Guner et al. (2012). We set δ, the depreciation rate for capital, so that annual depreciation is 5%.

To calibrate the cost of childcare ν, we match the ratio of childcare costs to GDP in

Chile. We do not have a direct measure of childcare cost, so we build it as follows. Between 2005 and 2007, an average of 234,261 children were born each year. The infant death rate is 0.0076, so around 232,481 of these survive. That implies a total of almost 465,000 children under the age of two in 2007 who would be covered by the policy. On average, the cost of childcare per child is $100,000 (Chilean Pesos) per month.

Both in the data and the model, not all children go to a childcare facility. On average, 52.2% of females between 25 and 40 years old work, so about this percentage of children need childcare. We reckon this may be an overestimation since some of these children may be taken care of by relatives.

Rosell et al. (2017) conduct a survey where they find that 29.3% of grandparents take care of their grandchildren in 2013. We make the conservative assumption that all children have grandparents. Accordingly, only 70.7% of children need childcare. This estimate is conservative: 29.3% of grandparents take care of their grandchildren is an upper bound of grandchildren being taken care of by grandparents. This is because many grandchildren do not have grandparents, and also because several children share grandparents. If these children do not live in the same house (think cousins), the grandparents are unlikely to be able to take care of all their grandchildren. For these reasons, we provide in the appendix the results of assuming that only 10% of children do not need childcare in Appendix XXX. Similarly, we provide estimates when 50% need childcare.

The GDP in Chile in 2007 was almost $86 trillion. Thus, total childcare cost relative to GDP is.

$$\frac{\text{Childcare Cost}}{\text{GDP}} = \frac{0.522 \times 0.71 \times 100,000 \times 12 \times 232,481 \times 2 \times 4/5}{86,000,000,000,000} = 0.0019$$

The terms in the numerator are the following. The share of hours worked by fertile-age females relative to total hours is 52.2%, and 90% of these need childcare.[13] The following two terms are the annual cost of childcare: $100,000 per month, times 12 months. The next term is the number of children born that year (and surviving), and the number 2 represents the fact that children born the year before are also attending. The last term in the numerator (4/5) incorporates the fact that a period is 5 years in our model and that females send children to daycare for 4 years (2 children, 2 years each). The term in the

[13]We use female hours worked as a proxy of how much time children spend in childcare. One important thing to mention is that we are not using males for this estimate. This is because we do not have data on hours worked within married couples. Even if we did, usually both parents work during the same time of day, which does not allow them to arrange hours so that one parent always takes care of the children. Most commonly, it is the female in the couple that works less in Chile, justifying our reasoning.

denominator is GDP in Chile in 2007. While 0.2% of GDP may seem small, the entire childcare market in the United States represents 0.3% of the national GDP and employs 0.6% of workers and this includes a wider age range than those subject to the policy.[14]

We calibrate the measures φ to match the shares of each type of married couples, single females and single males directly from the CASEN. Appendix Appendix B shows the number of observations for each type of household. We use these numbers divided by the total number of households. We calibrate the different λ's to match the employment rates for different groups as close as possible. We target rates of labor participation for married females. We leave single females out because we cannot generate employment rates as low as in the data. The reason for these low employment rates is that many single females in Chile receive subsidies that complement their income. Some of these are government subsidies, but most of these come from alternative sources, like family members. Since these subsidies are not in the model, we choose not to target the unemployment rates for this group. Thus, we set $\lambda_{f,e}$ as the average of $\lambda_{c,e_f,e}$ across e. We proceed similarly with males.

The key threshold $\hat{h}_f$ is calibrated so that the ratio of females in large firms relative to total females employed is as in the data. To compute this, the CASEN shows that 53.69% of all females work in firms with less than 10 employees. Next, the ENIA shows that of the females working in firms with 10 or more employees, 73.10% work in firms with 20 or more female employees. Thus, we compute the fraction of females working in firms with 20 or more females as the product of these two, that is, 39.24%. Using this, we assume that 39.24% of females receive offers from large firms, independently of their education, and the rest receive offers from small firms.

Population grows at an annual rate of 1%. We set the probability of having children equal to 10%, which is roughly the proportion of females that have children between ages 25-40. More precisely, this ratio is 14% for females between 25 and 34 years old and 6% for females between 35 and 40 years old. Less than 5 percent of all births are to women above the age of 40 in Chile, which makes our assumption that fertility stops at age 40 fitting with the data.

On the firm side, we first choose a functional form for $G(A)$, the distribution from which entrant firms draw their productivity. Following a literature that finds that the upper tail of firms' size distribution closely follows a Pareto distribution, we choose a

[14] https://www.stlouisfed.org/publications/regional-economist/2022/jan/pandemic-rising-costs-challenge-child-care-industry#:~:text=The%20Child%20Care%20Sector%3A%20An%20Overview&text=In%202019%2C%20the%20gross%20output,produc%20(GDP)%20that%20year.

Pareto distribution, so that $G(A) = \chi A^{-\chi-1}$. Accordingly, we calibrate χ to match the slope of the firm size distribution for large manufacturing firms, since we do not have data for other sectors.

As a measure of size we focus on male employees, since this market is less distorted than that of females. We restrict our sample to those firms that hire 20 or more females. Within male employees, we focus on the highest skilled ones, which we map to our top education category. In the data, this corresponds to male employees in the board of directors, firm owners, and specialized workers.

Our approach starts by noting that, for large firms, a firm with productivity A hires $h_0 A^{\frac{1}{1-\theta}}$ males, where h_0 is a constant. Take an arbitrary level of males h^* hired by a large firm. The productivity parameter of that firm is $A^* = \left(\frac{h^*}{h_0}\right)^{1-\theta}$. Adding up all the males employed by firms that hire more than h^* males,

$$D_{h>h^*} = \int_{A^*}^{\infty} h_0 A^{\frac{1}{1-\theta}} G(A) dA = \int_{A^*}^{\infty} h_0 A^{\frac{1}{1-\theta}} \chi A^{-\chi-1} dA = \frac{\chi}{\chi - \frac{1}{1-\theta}} h^{*\frac{1}{1-\theta}-\chi}$$

Taking logs,

$$\log D_{h>h^*} = constant - \left(\frac{1}{1-\theta} - \chi\right) \log h^*$$

We infer the value of $\frac{1}{1-\theta} - \chi$ by regressing the logarithm of the share of firms larger than h^* on the logarithm of h^*, for h^*. Given the value of θ, we obtain χ. We use the distribution of firms that hire 20 or more females.

We follow Ngai and Petrongolo (2017) and set $\mu = 2.27$ to capture the degree of substitutability between males and females. This number matches the change in the ratio of labor participation of males to females from 1970 to 2006 in the United States, given the change in wages ratio. We use their numbers because we lack the data to estimate this consistently for Chile.[15] In Appendix XXX, we show how alternative measures of μ affect our results. Need to do all appendix stuff.

We set $\theta = 0.92$ so that profits are about 8% of revenues as is the average among firms in the ENIA, which implies $\chi = 14.67$.

We were not able to find reliable estimates on the expected cost of a lawsuit. Rather than this, to determine the lawsuit's cost, we note that according to Proposition 1 this

[15] Another study focusing on this substitution is Rendall (2018). Unfortunately, it is not easy to map her results to ours, since she focuses on "units of brain or brawn", not on actual individuals.

value is bounded. The bounds, given the other parameters, are 0.0131 and 0.035. We take the mid-point. We show how using the lower or upper bounds does affects our results in Appendix XXX.

The remaining parameters are the ones that determine the factor shares $\{\epsilon_e, \xi_e\}_{e=1}^4$ and α and the entry cost κ. These are nine parameters since $\sum_{e=1}^4 \epsilon_e = 1$. We set $\{\epsilon_e, \xi_e\}_{e=1}^4$ so that all wages relative to the wage of the lowest skilled males are as in the data, the annual interest rate is 4%, and set κ, the entry cost, so that the wage of the lowest skilled males is 1.[16] We obtain average wages by education from the CASEN in 2006. The computed wages are

	Males	Females
Primary or less	1.00	0.65
Less than high school	1.29	0.77
Less than college	1.62	1.06
College or more	4.43	2.48

Table 1. Wages by gender and education relative to lowest education men.

7 Results

Our main results can be divided into four main points. First, we measure the degree to which the size dependent nature of the childcare policy lowers aggregate output per unit of input. This channel is small, but it is interesting to note that the misallocation affects females with different education levels differently. Second, we measure the extent to which this policy shifts resources away from females and towards males. Third, we measure the shift from younger females to older ones. Finally, we measure the shift from low education females to high education ones.

7.1 The misallocation channel

Since the policy is size-dependent, triggering changes once a firm hires more than 20 females, it creates incentives to induce firms to hire less females than otherwise, and to pay wages that differ from marginal productivities, making the equilibrium allocation sub-optimal, thereby reducing the amount of output per unit of input.

[16] In other words, this is how we normalize wages. Other normalizations would change the calibration for κ, with no quantitative differences.

Parameter	Target	Value
β	Guner et al. (2012)	0.9740
ν	Childcare expenses relative to GDP of 0.24%	0.4713
$\hat{h}$	39% of women work in firms with more than 19 women	2.97×10^{-10}
δ	Annual depreciation rate of 5%	0.2500
n	Annual population growth of 1%	0.0500
p	Proportion of fertile age women with children by age of 10%	0.1000
μ	Ngai and Petrongolo (2017)	2.2700
σ	Katz and Murphy (1992)	1.4100
θ	Profits over sales ratio of 8%	0.9200
χ	Slope of the firm size distribution of -0.25	14.6732
α	Marginal productivities (see text)	0.4108
ξ_1	Marginal productivities (see text)	0.3492
ξ_2	Marginal productivities (see text)	0.3428
ξ_3	Marginal productivities (see text)	0.3912
ξ_4	Marginal productivities (see text)	0.3737
ϵ_1	Marginal productivities (see text)	0.2168
ϵ_2	Marginal productivities (see text)	0.1329
ϵ_3	Marginal productivities (see text)	0.3210
ϵ_4	Marginal productivities (see text)	0.3292
κ	Marginal productivities (see text)	8×10^{-11}
τ	Mid-point of possible values (see Proposition 1)	0.0203

Table 2. Parameter value for calibration and sources

Figure 4 shows graphically how marginal cost (wages) differs from marginal productivity for the average female wage paid by a firm.[17] Small firms, with productivity levels $A \leq 1.4934$, are unconstrained, and therefore set marginal cost equal to marginal productivity. As firms grow past this threshold, they halt the hiring of females, so that marginal productivity becomes larger than wages. Hiring more females would reduce the marginal productivity, but this would trigger childcare payments, which would make marginal cost jump above marginal productivity. These firms produce a lower level of output per unit of input, since the marginal productivity of females exceeds their marginal cost. Quantitatively, very few firms are in this segment, less than 0.03%, and as such this has hardly any aggregate consequences.

When productivity exceeds 1.5033, firms start paying for childcare expenses. The figure shows that this jump is inversely proportional to education, that is, the lower the education, the larger the jump. The reason is that childcare expenses are a much larger

[17] This is a weighted average between the fertile-age and non-fertile-age wage.

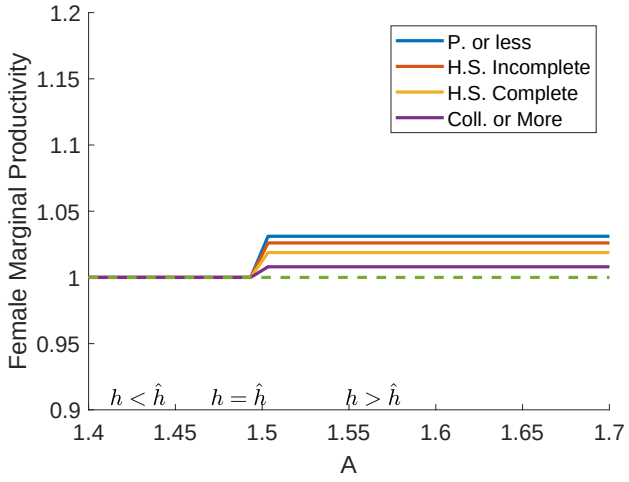

Figure 4. Under the distorted economy, marginal productivities across firms do not equalize, and, for constrained firms, marginal productivity exceeds marginal cost.

proportion of wages for low education females.

Quantitatively, this misallocation does not have any considerable effect on output. In fact, holding the inputs constant, eliminating this misallocation would increase output by less than 0.002%. We compute this as follows. We keep constant all different types of labor supply (i.e., the levels by gender and education), the level of capital, and the mass of firms, at the equilibrium level. We then remove the childcare policy and allow firms to re-optimize their hiring and production decisions, and compare the total output with the total output in equilibrium. The increase in output would be of 0.002%, implying that the size dependent nature of the policy does not play a considerable role.

As a consequence, removing the distortion does not increase output per capita. In fact, GDP drops mildly, by less than 0.1% (see Table 3). Changes in labor supply may be the reason for the drop in GDP, although these changes do not exhibit a clear pattern: females with high school incomplete increase their labor supply by about 0.16%, while all the other categories mildly reduce the labor supply. In the case of males, all educational types but high school incomplete increase the labor supply by very small fractions, less than a quarter of a percent.

The changes in labor supply imply that households change how much leisure they enjoy, and this measure does not affect GDP. For this reason, in the rest of the analysis

we focus on welfare rather than income, which provides a better grasp on the effects of the policy across different households.

7.2 Resources Shift from Females to Males

The childcare laws increase the cost of hiring a female employee, given the risk of her having a child and needing childcare expenses. For this reason, firms reduce their demand for females, especially fertile-age ones. Since these are perfect substitutes with non-fertile-age females, all female wages drop. Consequently, removing the childcare policy increases female wages, while that of males roughly stays constant. Table 3 shows how wages change when removing the childcare policy in column (1). Removing this policy increases wages for females of all educational types. The effects are larger for females without primary complete, equal to almost 2%, while the lowest increase is among females with college complete, who increase their wages by 0.23%. Male wages, on the other hand, do not vary much, dropping the most for college educated ones, by 0.11%.

Table 4 shows the welfare consequences of eliminating the childcare policy in column 1. The units are consumption equivalent units, that is, the percentage increase in consumption needed with the childcare policy to achieve the same level of utility as in the case with no policy. The changes displayed are lifetime changes, that is, the increase in consumption equivalent units over a lifetime.

A problem is that the high degree of heterogeneity in the economy does not allow for a clean result in terms of who the policy benefits. To address this, we compute the population-weighted average change of utility under different types of households. An interpretation of this average is that, if before life all individuals had the same probability of becoming a certain type, say a single male with college incomplete education, this average would indicate how the expected utility would change. For example, consider the aggregate welfare shown in Table 4 under the title "All". Removing the policy would increase the ex-ante utility of everyone by 2.18% over their lifetime. Similarly, the row below shows the expected change for "Females". We interpret this as, conditional on being a female, welfare before birth increases by 2.8% when removing the policy. Thus, the name of the household sub-type indicates the conditioning to derive the changes in utility.

From Table 4 we can see that the big winners from removing the policy are females, especially single ones, who would gain about 3.3% in consumption equivalent units. It

is interesting to see that males would also be better, albeit mildly. This is direct evidence of resources being shifted towards males via the childcare policy.

7.3 Resources Shift from Non-Mothers to Mothers

The gains for females are not universal. It is easy to imagine that the effect would be very different when comparing a mother whose childcare expenses are covered by a firm, with one where this is not the case. Figure 5 shows these effects for single females, based on their education, period in which they have children, and whether the firm pays for childcare. The numbers displayed are percentages plus one. Notice that childless females and females that pay for childcare from their income are better off without the policy. Females whose childcare expenses are covered by a firm would end up worse off, enjoying up to 73% less in consumption equivalent units for mothers with a child in the first period, with primary incomplete, and whose childcare expenses are covered by the firm. It is important to note that only a third of mothers receive the subsidies.

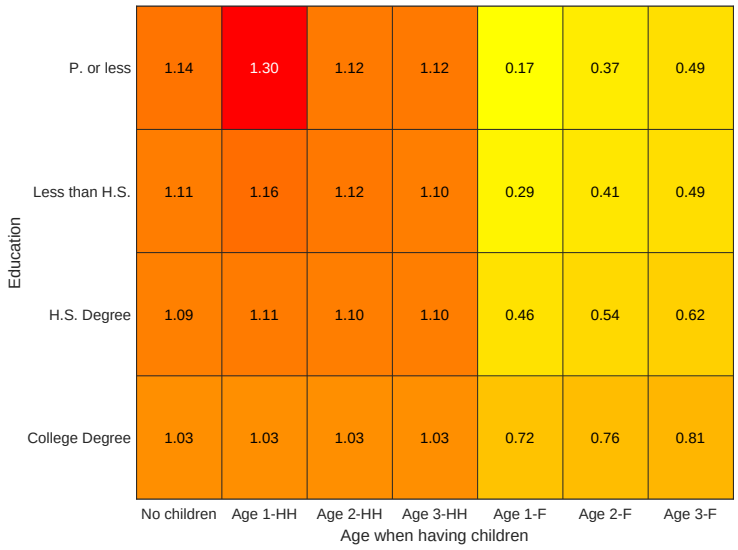

Figure 5. The increase in welfare from removing the childcare regulation for single females with different education levels based on the timing of children.

To understand effects of this magnitude, it is helpful to think of utility, conditional on working, as being of the Gorman type, with the childcare expenses acting as a subsistence level of consumption. Consider a single mother who spends all her in-

come w in current consumption and childcare expenses. Her current period utility is $\log(w-\nu), w > \nu$. To understand the effects of changing ν (for example going from 0 when the firm pays for it to a positive value if she has to pay herself), compute the marginal utility as $\frac{1}{w-\nu}$. As $w \to \nu$, this marginal utility approaches infinity. This implies that females that are very poor (single, with w close to ν) have a lot to gain from receiving childcare payments, or a lot to lose from dropping them. When children come in the first period, the loss is even greater, because they had no periods to accumulate assets to finance consumption or childcare. This is why single mothers with primary incomplete education and children in the first period are the most affected from losing their childcare coverage, and why the losses are so large.

While some mothers lose childcare coverage (and lose in terms of welfare) others never had coverage, and gain because of an increase in wages. Table 4 shows that the ex-ante utility conditional on being a mother drops when removing the policy. Married mothers lose on average 4% of lifetime consumption equivalent units, while single mothers lose 13%. Thus, if the policy's intention was solely to help mothers, it does indeed achieve its goal. However, and as we suggest later, there are more efficient ways of doing this.

7.4 Resources Shift from Fertile-Age Females to Non-Fertile-Age Ones

Another important consequence of the childcare policy is to increase relative demand for non-fertile-age females, that never require childcare payments, from fertile-age ones. Table 3 shows that removing the policy would have a much larger effect on the wage rates of fertile-age females than on non-fertile-age ones.

There are interesting patterns in terms of lifetime labor supply reallocations. Figure 6 shows the aggregate labor supply of females by age in panel (a), and the labor supply of mothers whose childcare is covered by a firm in panel (b). The blue circles represent the labor supply under the current policy, and the red stars are the estimated labor supplies when removing it. The changes are larger in panel (b), but qualitatively similar in both panels. In general, the red stars are below the blue dots under fertile ages, meaning that, absent the childcare policy, females would lower their labor supply when young. These drops would be compensated in older ages, when the red stars stand higher than the blue circles. Thus, the childcare policy affects the timing of mothers going to the market, increasing hours when young, and reducing them when old.

This reallocation across time reveals interesting features of the female labor supply.

The existing literature would normally estimate the labor supply elasticity by computing changes in labor supply associated with changes in cost: in this case, it would measure the change in labor supply of a mother who no longer receives childcare payment. These studies rarely consider changes that may come after having children, or even before. In addition, these studies do not consider the general equilibrium changes that come associated with a change in macroeconomic policy, that is, the change in wages. Both these effects are key to understand the response of female labor supply to changes in childcare payments. Next we describe how these static studies may be misleading with regards to the labor supply elasticity.

Most studies estimate the labor supply elasticity via the following equation:

$$\log(h_i) = a_0 + a_1 X_i + a_2 D_i + e_i$$

where h_i is hours worked by female i, X_i is a vector of controls, including wages, age, number of children and education, D_i is a dummy equal to 1 if the firm pays for childcare, zero otherwise, and e_i is an error term. This regression would consider females in one point in time.

Using our data, the estimate on a_2 is 0.3425, implying that removing childcare coverage would reduce the supply of labor by mothers by 34.25%. This number is large, and it is essentially a comparison of the labor supply of a mother whose children's care is paid for by a firm, with one who has to pay out of pocket.

Notes for Loris: This is not the right metric to look at. Remove the general equilibrium effects, compare lifetime changes, both with the policy and without it.

With general equilibrium effects, wages and other prices also change, and this affects the response of each female. Including all these changes, the labor supply by mothers considering only the period in which they become mothers suggests that removing the childcare payments would reduce their hours by 13.44%.

This estimate does not include labor reallocations through time. That is, a mother might choose to stay home while raising children, but this reduction in hours worked might be offset in the future by working more. In fact, when considering their lifetime labor supply, the total effect is a reduction in labor supply of 13.04%. While this number is very close to the "general equilibrium" number, the disaggregation by education is very different. The disaggregation shows that removing the childcare policy has very little effect on low educated mothers. While their labor supply drops by 15% while they are mothers, this is mostly compensated by working more in the future. Considering

their lifetime, losing childcare coverage only reduces their working hours by 4.4%. On the other hand, females with college degrees barely change their behavior based on having to pay the childcare expense while they are mothers, mostly because childcare is a very small fraction of household income. But these females increase their lifetime supply of labor by over 18%, mainly because of their increase in wages.

THIS SECTION NEEDS WORK. I WILL WORK ON IT.

Table 5 summarizes these results. Column 1 ("Micro-Estimates") compares the labor supply of females offered a job in a large firm with those offered one in a small firm, considering only the period in which they require childcare. Column 2 ("Adding GE Effects") also considers only the period in which mothers need childcare, but adds the general equilibrium effects. Column 3 ("Lifetime Effects") compares their lifetime labor supply.

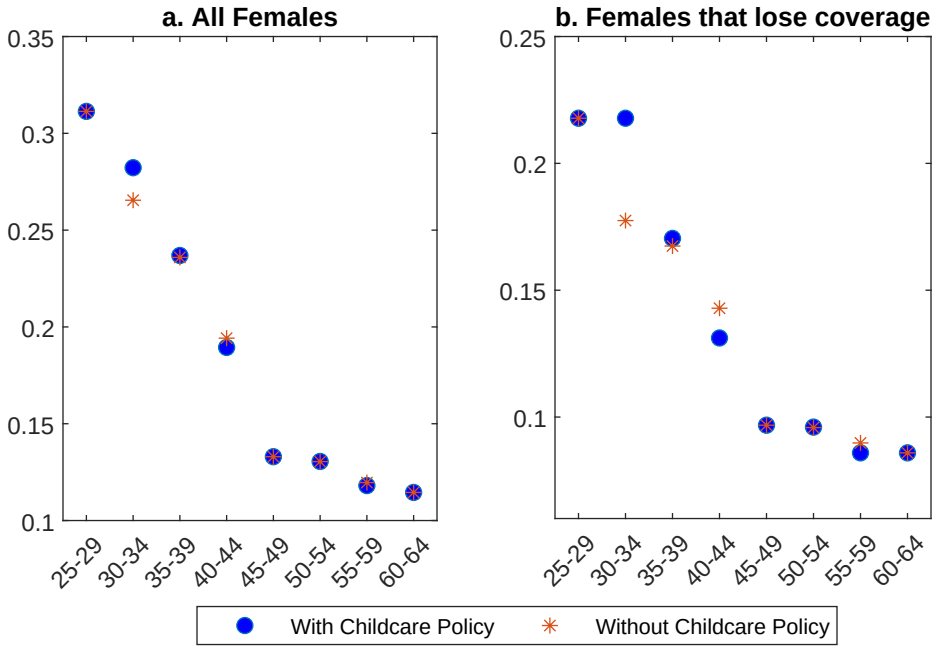

Figure 6. Removing the Policy Would Bias Labor Supply Towards Older Females.

7.5 Resources Shift from the Less Educated to the More Educated

Our last set of results concerns how the childcare policy shifts resources away from low education females, and towards more educated ones. This is because the childcare cost, as a fraction of wages, is much larger for low education types. Table 3 shows that removing the policy increases the wages of all fertile-age females, but the increase is inversely proportional to education. Females with less than primary education would observe a wage increase of almost 3%, those with incomplete high school would observe an increase of 2.4%, those with incomplete college 2%, and those with a college degree 0.65%.

These effects are ratified when focusing on welfare. Removing the policy would add 4.3% of consumption equivalent units to the ex-ante utility of females with less than primary education, 2.4% for those with high school incomplete, 0.8% for those with college incomplete, and it would reduce the welfare of college educated females by less than half a percent (mostly due to the reduction in the wage of their husbands).

These numbers are not representative of each type, in fact, there is a considerable amount of heterogeneity among each type, mostly depending on whether a firm covers their childcare needs. These effects are magnified among single females, but they are qualitatively similar for married ones as well. Figure 5 shows the effects for different types of single females. The poorer the female, the more extreme the response. For those not receiving childcare financing, the gains from removing the mandate are decreasing in education, with primary or less females with children in the first period of life increasing their lifetime welfare by about 30% in consumption equivalent units. If they had less than high school, the gain would be of 16%, for less than college, 11%, and with a college degree, 3%.

The opposite takes place when the female receives childcare payments. Single mothers, with less than primary education, and children in the first period observe reductions in utility of 83% of consumption equivalent units, those with less than a high school diploma observe losses of 71%, less than college 54%, and those with a college degree, 28%.

This is concerning if the policy is mostly directed at helping poor families. While it is true that receiving financing for childcare is much more valuable for the poorest families, it is also the case that the bias introduced by it affects these females the most. And only about a third of females with less than primary education receive these subsidies in our calibrated economy.

8 Alternative Policies

This section explores alternative policies to finance the cost of childcare. The first counterfactual forces all firms to pay for childcare, not only those that hire more than 19 females. There are reasons beyond the scope of this paper that make government subsidies hard to enforce, such as the risk of corruption, red tape, etc. Extending the policy to all employers would essentially increase the coverage to all females, since only about a third of them receive the subsidies in our baseline model.

The second counterfactual finances childcare via a tax on wages, applied to both females and males. The motivation for this policy is that the Chilean government is currently evaluating this option.

Our last exercise imposes the childcare mandate on all firms, but forces them to cover childcare expenses for only the least educated females, that is, those with primary education incomplete. One lesson that comes from our findings is that the subsidies are most important for the poor because of the large income effect in the presence of a non-homothetic component in childcare. Financing only the least educated increases the demand for all females with a primary education or more, still maintaining a reduced demand for females with less than a primary education. However, the fact that the income effect from the childcare policy is so large among these females implies that the substitution effect can easily be outweighed by the income effect. This is less so among more educated females, where income effects are not as large.

It is noteworthy that in our model females with primary incomplete are not necessarily the poorest of females. *Single* females without a primary education are the poorest, followed by single females with high school incomplete. Thus, our counterfactual provides subsidies for a couple where the husband has a college degree and the wife has less than a primary education, but does not provide them to a much poorer household, where the female is single but has a primary diploma. We do this because it is politically feasible to discriminate by education, but not by marital status, since this is usually not revealed to an employer.

8.1 Extending the Childcare Policy to All Firms

In this section we extend the mandate to all firms, irrespective of how many females are hired. By doing so, all working mothers receive childcare payments, an important feat since in our baseline exercise only about a third of females receive it. A problem

in this policy is that females, particularly young and low educated ones, suffer from a reduction in wages. But this bias is also present in the baseline model, so one can view this exercise as increasing the coverage of the childcare policy keeping the biases constant.

Table 6, column 1, shows the results on output, capital, labor and wages, while Table 7, column 1, shows the results on welfare measures. GDP drops by more than simply removing the policy, by about 0.2%. But this does not mean welfare drops. In fact, the expected lifetime welfare of a newborn to this economy increases by 4.4% consumption equivalent units. This is mostly due to the increase in welfare of mothers, that gain on average 42% in consumption equivalent units. Among these, single mothers almost double their welfare in consumption equivalent units. The reason is that they do not need to pay for childcare, and single mothers, especially those without a primary education, have a very high marginal utility of consumption. The counterpart is that non-mothers lose: single non-mothers lose about 10% in consumption equivalent units, while married non-mothers lose about 3%. This is because their wages drop. Extending the childcare costs to all firms biases labor demand even more against females in general, reducing their equilibrium wages by between 0.4% and 2%.

The fact that overall welfare increases, as in the case where we remove the policy, implies that some form of childcare financing is desirable, since it increases the welfare of those most sensitive to changes in income. In essence, the childcare policy provides a much needed income effect, especially for low income mothers, at the expense of a substitution effect that lowers their pre-childcare wages. As the two counterfactuals so far show, the current policy falls short of providing a decent income effect by covering only about a third of mothers, while generating too large of a substitution effect. Removing the policy increases overall welfare by increasing the demand for female labor and extending the policy to all firms increases the income effect by covering all mothers.

8.2 Financing Childcare with a Tax on Labor

This section uses a tax on income to finance childcare. In a way this policy picks the best of both worlds: it does not distort the demand for males versus females, or for young versus old, or from poor versus rich, and it provides a subsidy for those most sensitive to income effects. Interestingly, there is a constant push in Chile to replace the current policy with a one percentage point increase in the income tax.[18] As we suggest

[18] https://www.reddeproteccion.cl/fichas/ProyectoLey_ReformaSalaCuna.pdf

next, this is a good idea.

We find that a tax on wage income of 0.31% would cover the childcare needs of the population. This is larger than the increase of 0.1% the government is currently considering, although there are additional sources of revenues considered in the proposed reform.

In terms of welfare, this policy is superior in many ways to the other policies considered in this paper. It increases the unconditional ex ante welfare of the households by 13.27%, while increasing the ex-ante welfare of almost all conditional categories in Table 7, with sole exception of single males, in which case welfare drops by 1%. This is because of a slight reduction in male wages for males with less than a college degree and primary complete. In fact, the wages of only 3 types of workers fall in response to the policy : males with high school incomplete, males with college incomplete, and non-fertile age females with high school incomplete.

The gains are quite general. Single males are the only households that lose relative to the current policy, and single males of all educations lose. All other sub-types are better off, irrespective of gender, education, or timing of children.

Table 7 illustrates this with the case of single females. Notice that all numbers are above 1, meaning that everyone of these types are better off. Also, the gains can be quite large: as large as an 846% increase in consumption equivalent units.

The magnitude of these gains can be understood if one considers the extremely large marginal utility of consumption among these females. Not only is their income low, but the income in excess of childcare expenses (equal to consumption, given no savings) is extremely low, explaining the size of the marginal utility.

8.3 Covering Childcare for the Poorest Only

The largest gains from childcare financing comes from the poorest members. Accordingly, it makes sense to study the financing of this group only. In this section we explore the effects of covering childcare only for females with primary incomplete. Note that these are not necessarily the poorest: the poorest are single females with primary incomplete in the model. Financing the childcare needs of only this group would be unrealistic, since firms are not able to discriminate based on marital status, but they can discriminate based on education.

Financing comes from the firms themselves (all of them, not just large ones). This way, one need not inquire about the feasibility of this option, since this is what is already

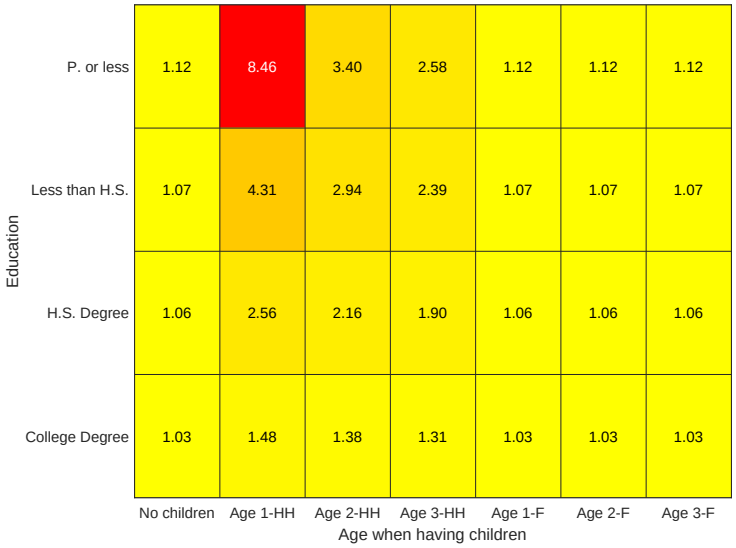

Figure 7. The increase in welfare from replacing the childcare regulation for a labor tax for single females with different education levels based on the timing of children.

taking place.

Aggregate welfare would increase relative to the present situation. Not every type prefers this system over the equilibrium. As one would expect, mothers that stop receiving childcare payments are worse off. In an ex-ante measure, females of all educations except college complete are better off. Females with college complete are slightly worse off: their present value welfare drops by about 1.4%. The reason is that, first, the increase in wages is the smallest across all types, equal to 0.56% for fertile age females, and a reduction of 0.01% for non-fertile age females (this is the only female wage that drops). Second, no mother receives childcare payment in this group. Third, college educated male wages fall relative to the current equilibrium, which include most husbands of college educated females. This drop further reduces this type's consumption.

The drop in male wages affects males negatively, especially single males, but the aggregate drop within this group is less than 1%. Married men in general are better, given that the increase in their spouses' wage more than compensates for the drop in own wages.

9 Conclusion

This paper provides a better understanding of the consequences of financing childcare. These policies often have the goal of fostering women's labor among poor families, which cannot easily afford childcare, forcing mothers to stay at home to take care of their children. However, in countries with limited fiscal capacities, mandates are often preferred to subsidies. In Chile, the solution has been to force relatively large firms to pay for childcare.

The policy introduces a severe bias against females. Within these, there is further bias against young, fertile-age females. Finally, there is a third layer of bias against the low-educated, where the cost of childcare as a percentage of wages is highest. These biases translate into lower wages, and these lower wages can really hurt households, particularly single mothers without a primary education degree. On the other hand, those low-educated single mothers derive the most increases when their expenses are covered, but these are less than a third of females. The fact that there are winners and losers does not allow for a clear ranking between having the current policy or not. It does not allow for a clear ranking of the alternative policies we study in this paper either. However, in one sense replacing the current policy with a childcare subsidy financed with a tax on wage income would go a long way. Almost all households would be better off, the exception being single males, whose lifetime welfare would only drop by 1%. And the gains can be quite large: the gains for the lowest educated single female, with at child at an age between 25 and 20 years old would increase her lifetime welfare by 846%.

Even when increasing income taxes is unfeasible for other reasons, we do find allocations that produce better results than the current situation. These policies affect the poor the most: a subsidy to the poor has a much larger welfare effect than a subsidy to the rich, and the drop in labor demand is larger for low educated females, where the childcare cost as a proportion of wages is the largest. But the first effect can be extremely large and outweigh the losses from the second effect. This is not so obvious for richer, more educated households. With this in mind, asking firms to cover the childcare costs only of low educated female workers would make things better: it would still provide the large income effects where they matter most, and remove biases on the demand for more educated females, where this channel gains more relevance.

Increase in	Remove Childcare Payments
GDP	-0.0803
Capital	0.0317
Return to capital	-0.0092
Female labor	
Primary incomplete	-0.0597
High school incomplete	0.1561
College incomplete	-0.3055
College or more	0.1568
Male labor	
Primary incomplete	0.0571
High school incomplete	-0.0126
College incomplete	0.0000
College or more	0.1985
Female wages - all ages	
Primary incomplete	0.9906
High school incomplete	0.9466
College incomplete	0.2312
College or more	NaN
Female wages - non-fertile-age	
Primary incomplete	0.1642
High school incomplete	0.3512
College incomplete	-0.0210
College or more	NaN
Female wages - fertile-age	
Primary incomplete	2.3678
High school incomplete	1.9390
College incomplete	0.6514
College or more	NaN
Male wages	
Primary incomplete	0.0195
High school incomplete	0.0524
College incomplete	-0.1121
College or more	-0.2048
121	

Table 3. Effects of removing the childcare policy on aggregate statistics

Increase in	Remove Childcare Payments
All	2.1807
Females	2.7995
Single Females	3.3002
Married Females	2.4734
Mothers	-7.2441
Single Mothers	-12.9784
Married Mothers	-3.5106
Non-Mothers	7.1827
Single Non-Mothers	10.2768
Married Non-Mothers	5.1681
Primary Incomplete	4.3075
High-School Incomplete	2.4080
College Incomplete	2.0409
College Complete	-0.5444
Males	1.5512
Single Males	0.0715
Married Males	2.4734
Primary Incomplete	2.5645
High School Incomplete	1.5947
College Incomplete	0.7552
College Complete	-0.6719

Table 4. Effects of removing the childcare policy on welfare

Household Type	Micro-Estimates (%)	Adding GE Effects (%)	Lifetime Effects (%)
Primary or less	38.32	15.04	4.39
Less than high school	43.57	17.10	20.57
Less than college	34.57	13.57	28.94
College or more	0.00	-0.00	-18.35
Total	34.25	13.44	13.04

Table 5. Different Estimates of the Effects of a Childcare Mandate on the Labor Supply of Mothers.

Increase in	Extend policy to all firms	Income tax to finance childcare	Cover primary incomplete only
GDP	-0.2048	0.0717	-0.1524
Capital	-0.1012	0.6765	0.2517
Return to capital	0.0610	-0.3789	-0.2097
Female labor			
Primary incomplete	0.0385	0.0385	0.0385
High school incomplete	0.1788	0.6598	0.1561
College incomplete	0.1973	0.1973	-0.3055
College or more	-0.1013	-0.1013	0.1568
Male labor			
Primary incomplete	-0.0369	-0.0369	0.0571
High school incomplete	0.0082	0.0082	-0.0126
College incomplete	0.0000	0.0000	0.0000
College or more	-0.1282	-0.1282	0.1985
Female wages - all ages			
Primary incomplete	-1.9345	1.2155	1.3169
High school incomplete	-1.7065	0.6862	1.0588
College incomplete	-1.2764	0.6351	0.9982
College or more	-0.4439	0.3862	0.2581
Female wages - non-fertile-age			
Primary incomplete	-1.9156	0.2260	0.2560
High school incomplete	-1.6926	-0.1376	0.1730
College incomplete	-1.2689	0.0414	0.3600
College or more	-0.4427	0.1337	-0.0122
Female wages - fertile-age			
Primary incomplete	-1.9660	2.8647	3.0851
High school incomplete	-1.7298	2.0593	2.5352
College incomplete	-1.2890	1.6244	2.0619
College or more	-0.4457	0.8072	0.7087
Male wages			
Primary incomplete	-0.0218	0.0034	-0.0080
High school incomplete	-0.0604	-0.0704	0.0283
College incomplete	-0.0603	-0.0351	0.0612
College or more	0.0474	0.0727	-0.1033

Table 6. Effects of different counterfactuals on aggregate statistics

Increase in	Extend policy to all firms	Income tax to finance childcare	Cover primary incomplete only
All	4.3983	13.2700	5.2141
Females	8.3932	22.3937	9.7808
Single Females	20.3236	45.8841	22.6654
Married Females	0.6256	7.0995	1.3918
Mothers	42.1212	63.3555	25.7829
Single Mothers	91.3601	134.3402	63.2031
Married Mothers	10.0625	17.1385	1.4192
Non-Mothers	-6.1001	4.9736	2.3945
Single Non-Mothers	-10.1206	7.9743	5.2922
Married Non-Mothers	-3.4824	3.0199	0.5079
Primary Incomplete	12.3463	31.3667	22.2953
High-School Incomplete	7.1072	19.7983	1.4700
College Incomplete	5.7305	16.8885	1.1529
College Complete	2.5046	6.5430	-1.3794
Males	0.3348	3.9895	0.5690
Single Males	-0.1318	-1.0007	-0.7514
Married Males	0.6256	7.0995	1.3918
Primary Incomplete	-0.5593	4.6431	1.4735
High School Incomplete	0.2393	4.0094	0.6692
College Incomplete	1.1966	3.3700	-0.1167
College Complete	1.4625	2.4334	-1.5281

Table 7. Effects of different counterfactuals on welfare

References

Aedo, Cristian, "Evaluación económica de la prolongación del postnatal," *Revista chilena de pediatría*, 2007, *78* (1), 10–50.

Alon, Titan, Matthias Doepke, Jane Olmstead-Rumsey, and Michèle Tertilt, "This Time It's Different: The Role of Women's Employment in a Pandemic Recession," Working Paper 27660, National Bureau of Economic Research August 2020.

Baker, Michael, Jonathan Gruber, and Kevin Milligan, "Universal Child Care, Maternal Labor Supply, and Family Well-Being," *Journal of Political Economy*, 08 2008, *116* (4), 709–745.

Becker, Randy A. and J. Vernon Henderson, "Costs of Air Quality Regulation," in Carlo Carraro and Gilbert E. Metcalf, eds., *Behavioral and Distributional Effects of Environmental Policy*, number 10608. In 'NBER Books.' National Bureau of Economic Research, Inc 2001, pp. 159 – 186.

Berlinski, Samuel and Sebastian Galiani, "The effect of a large expansion of pre-primary school facilities on preschool attendance and maternal employment," *Labour Economics*, 2007, *14* (3), 665 – 680.

Blau, David and Janet Currie, "Pre-School, Day Care, and After-School Care: Who's Minding the Kids?," *Handbook of the Economics of Education*, 2006, *2*, 1163–1278.

Blau, Francine D and Lawrence M Kahn, "Swimming Upstream: Trends in the Gender Wage Differential in 1980s," *Journal of Labor Economics*, January 1997, *15* (1), 1–42.

Brock, W. A. and D. S. Evans, "The economics of regulatory tiering. Growth Theory, Nonlinear Dynamics, and Economic Modelling: Scientific Essays," *The RAND Journal of Economics*, Autumn 1985, *16* (3), 398–409.

Cascio, Elizabeth U., "Maternal Labor Supply and the Introduction of Kindergartens into American Public Schools," *Journal of Human Resources*, 2009, *44* (1).

Daruich, Diego, "The Macroeconomic Consequences of Early Childhood Development Policies," Working Papers 2018-29, Federal Reserve Bank of St. Louis October 2018.

Escobar, Diego, Jeanne Lafortune, and José Tessada, "Men, women and capital: Estimating substitution patterns using a size and gender-dependent childcare policy in Chile," January 2016. Mimeo, Pontificia Universidad Catolica de Chile.

Gao, Feng, Joanna Shuang Wu, and Jerold Zimmerman, "Unintended Consequences of Granting Small Firms Exemptions from Securities Regulation: Evidence from the Sarbanes-Oxley Act," *Journal of Accounting Research*, 2009, *47* (2), 459–506.

Garicano, Luis, Claire LeLarge, and John Van Reenen, "Firm Size Distortions and the Productivity Distribution: Evidence from France," Working Paper 18841, National Bureau of Economic Research February 2013.

Gelbach, Jonah B., "Public Schooling for Young Children and Maternal Labor Supply," *The American Economic Review*, 2002, *92* (1), 307–322.

Gourio, François and Nicolas Roys, "Size-dependent regulations, firm size distribution, and reallocation," *Quantitative Economics*, 2014, *5* (2), 377–416.

Guner, Nezih, Gustavo Ventura, and Yi Xu, "Macroeconomic implications of size-dependent policies," *Review of Economic Dynamics*, October 2008, *11* (4), 721–744.

_ , Remzi Kaygusuz, and Gustavo Ventura, "Taxation and Household Labour Supply," *Review of Economic Studies*, 2012, *79* (3), 1113–1149.

_ , _ , and _ , "Childcare Subsidies and Household Labor Supply," Working Papers 738, Barcelona Graduate School of Economics November 2013.

_ , _ , and _ , "Child-Related Transfers, Household Labor Supply and Welfare," *Review of Economic Studies*, forthcoming.

Hopenhayn, Hugo A, "Entry, Exit, and Firm Dynamics in Long Run Equilibrium," *Econometrica*, September 1992, *60* (5), 1127–1150.

Jaumotte, Florence, "Female Labour Force Participation: Past Trends and Main Determinants in OECD Countries," Technical Report 2004.

Katz, Lawrence F. and Kevin M. Murphy, "Changes in Relative Wages, 1963–1987: Supply and Demand Factors," *The Quarterly Journal of Economics*, 1992, *107* (1), 35–78.

Kleven, Henrik, Camille Landais, and Jakob Egholt Søgaard, "Children and Gender Inequality: Evidence from Denmark," *American Economic Journal: Applied Economics*, October 2019, *11* (4), 181–209.

Leal Ordóñez, Julio César, "Tax collection, the informal sector, and productivity," *Review of Economic Dynamics*, 2014, *17* (2), 262 – 286.

Myck, Michal and Gillian Paull, "The role of employment experience in explaining the gender wage gap," IFS Working Papers W01/18, Institute for Fiscal Studies 2001.

Ngai, L. Rachel and Barbara Petrongolo, "Gender Gaps and the Rise of the Service Economy," *American Economic Journal: Macroeconomics*, October 2017, *9* (4), 1–44.

OECD, *Society at a Glance 2016* 2016.

Prada, Maria F, Graciana Rucci, and Sergio Urzúa, "The Effect of Mandated Child Care on Female Wages in Chile," April 2015. NBER Working Paper No. 21080.

Rau, Tomas, "El trabajo a tiempo parcial en Chile," *Economía Chilena*, April 2010, *13* (1), 39–59.

Rendall, Michelle, "Female Market Work, Tax Regimes, and the Rise of the Service Sector," *Review of Economic Dynamics*, April 2018, *28*, 269–289.

Restuccia, Diego and Richard Rogerson, "Policy Distortions and Aggregate Productivity with Heterogeneous Plants," *Review of Economic Dynamics*, October 2008, *11* (4), 707–720.

_ **and** _ , "Misallocation and productivity," *Review of Economic Dynamics*, January 2013, *16* (1), 1–10.

Rojas, Eugenio, Rafael Sánchez, and Mauricio G. Villena, "THE UNINTENDED CONSEQUENCES OF CHILDCARE REGULATION: EVIDENCE FROM A REGRESSION DISCONTINUITY DESIGN," *Journal of Applied Economics*, 2016, *19* (1), 1 – 39.

Rosell, J., S. Herrera, B. Fernandez, and M Rojas, *Chile y sus mayores: 10 años de la Encuesta Calidad de Vida en la Vejez UC - Caja Los Andes. Resultados IV Encuesta Calidad de Vida en la Vejez*, Pontificia Universidad Católica de Chile, 2017.

Álvaro Bustos, Pablo Bravo-Hurtado, and Antonio Aninat, "The (Other) Effects of Restricting Access to Higher Courts: The Case of Wrongful Terminations in Labor Contracts in Chile," Documentos de Trabajo 534, Instituto de Economia. Pontificia Universidad Católica de Chile. 2020.

Appendix A Proof of Proposition 1

The cost of hiring a fertile-age female for a large firm is $w_{f,e,y} + p\nu$, where the y stands for fertile-age. Alternatively, the firm can move on and wait for a non-fertile-age candidate. The expected cost for the firm is the probability of meeting a non-fertile-age female times its wage $w_{f,e,o}$ plus the probability of meeting a fertile-age female and not hiring her, plus the cost of a lawsuit. That is, the expected cost of not hiring a fertile-age female is

$$\tau + P_o w_{f,e,o} + (1 - P_o)(\tau + P_o w_{f,e,o} + (1 - P_o)(\tau + \dots)) = \sum_{t=0}^{\infty} (\tau + P_o w_{f,e,o})(1 - P_o)^t = \frac{\tau}{P_o} + w_{f,e,o}$$

Thus, a large firm would hire a fertile-age female if

$$w_{f,e,y} + p\nu \leq \frac{\tau}{P_o} + w_{f,e,o} \tag{A.1}$$

Given the possibility of being sued, a small firm would hire a non-fertile-age female if the following holds:

$$w_{f,e,o} \leq \frac{\tau}{1 - P_o} + w_{f,e,y} \tag{A.2}$$

One final condition for this to be an equilibrium is

$$w_{f,e,y} \leq w_{f,e,o} \tag{A.3}$$

Otherwise, the risk of a lawsuit would not be relevant for small firms.

Combining equations (A.1) and (A.3) we obtain the left inequality in (1):

$$w_{f,e,y} \leq w_{f,e,o} \Rightarrow \frac{\tau}{P_o} + w_{f,e,o} - p\nu \leq w_{f,e,o} \Rightarrow \frac{\tau}{P_o} \leq p\nu$$

Combining equations (A.1) with (A.2) produces the right inequality in (1):

$$w_{f,e,y} + p\nu \leq \frac{\tau}{P_o} + w_{f,e,o} \Rightarrow w_{f,e,o} \leq \frac{\tau}{1 - P_o} + \frac{\tau}{P_o} + w_{f,e,o} - p\nu \Rightarrow p\nu \leq \frac{\tau}{P_o(1 - P_o)}$$

■

A key assumption for this equilibrium to hold is that the wage rate of non-fertile-age females is independent of age or tenure. Otherwise, equation (A.1) would not hold when comparing any fertile-age with any non-fertile-age females. This prevents us from adding returns to experience or returns to age into the model.

Appendix B Number of Households

We read directly from the CASEN the fraction of different types of households in 2006, normalizing the total amount to unity. Table B.1 shows the number of observations for each household type. We normalize these observations by dividing them by the sum of all observations.

	Primary or less	High school incomplete	Less than college	College complete
Married couples (male/female education)				
Primary or less	13,761	2,394	2,037	158
Less than high school	2,414	2,077	1,828	222
Less than college	1,612	1,700	6,277	1,079
College complete	111	212	1,272	1,758
Single females	8,895	3,174	10,487	2,779
Single males	9,310	3,108	10,090	1,742

Table B.1. Observations for each household type.