

The Effects of Co-worker Absence on Labour Market Outcomes: Evidence from Brazil

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Abstract

I estimate the effects of an increase in the amount of time a co-worker remains absent from the workplace on the labour market outcomes of workers who stayed at work. Leveraging a policy that allowed firms to offer two additional months of government-funded maternity leave in Brazil, I analyse how extending the length of leave in almost 55,000 workplaces affected workers and firms over time. I find significant positive effects of a co-worker's absence on wages, retention, and promotion probabilities. Consistent with models of workplace tournaments, I find considerable heterogeneity in effects across workplaces. My results also show heterogeneity in career trajectories of male and female workers, with the policy leading to a significant shift in workplace composition among high-skill positions in the workplace. These findings suggest that co-worker absenteeism, driven by the take-up of extended maternity leave, can positively influence the labour market trajectories of remaining employees, with significant implications for workplace dynamics and policy design.

Keywords: Workplace Absence, Co-workers, Maternity Leave, Gender

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1 Introduction

What is the effect of a worker’s absence on the labour market outcomes of co-workers who remain working? Interactions within the workplace are widely recognized as a critical factor influencing employee effort, productivity, and overall firm performance. Communication to transmit relevant information among co-workers (Battiston et al., 2021), physical proximity to enhance human capital development (Emanuel et al., 2023), and socialisation to catalyse knowledge spillovers in the workspace (Roche et al., 2024) are some examples of how such interactions can play a relevant role in determining economic output. However, defining, measuring, and estimating the effects of such interactions is not easy. The scarcity of data and the absence of consistent measures to quantify the intensity of co-worker interactions have limited the availability of empirical evidence on the topic. Existing studies in the literature often focus on evidence based on case studies from specific firms, industries, or occupations (Bandiera et al., 2005; Mas and Moretti, 2009). The limited evidence from such studies makes it difficult to extrapolate its conclusions to the general population. One factor that stands out in determining the intensity of workplace interactions is related to being present or visible in the workplace. Sometimes, being absent from work is necessary for health, personal, or professional reasons. A wealth of studies in the literature have analysed the impacts of job absence on workers’ outcomes¹. However, not much is known about how the absence of a worker can affect the co-workers who remain at the workplace. I empirically investigate this phenomenon by estimating the effects of an exogenous shock in the level of co-worker absence on the labour market outcomes of workers who stayed working.

I exploit a policy that allowed Brazilian firms to offer their employees two additional months of maternity leave. Since 1988, female workers in the country have been entitled to four months of (government-funded) paid leave. In 2010, *Programa Empresa Cidadã* (henceforth, PEC) encouraged firms to offer six months of leave to their employees. The adoption of the program is voluntary and can happen at any moment in time. I use the staggered implementation of the policy across almost 55,000 different workplaces coupled with the plausible exogeneity of such adoption from the worker’s perspective to estimate the effects of the absence of a worker for additional two months of maternity leave (I call these *target mothers*) on the labour market outcomes of co-workers who stayed working (I call them *target workers*) in the period. I call the effects of the take up of extended maternity leave from a target mother on the outcomes of a target worker *absence effects*.

¹Most of the literature focuses on the effects of workplace absences due to sick leave and documents significant wage penalties resulting from this type of illness-related absences. Markussen et al. (2011) and Markussen (2012) provide a comprehensive analysis of the determinants and consequences of sick leave absenteeism using Norwegian registry data. De Paola et al. (2014) provide evidence that financial losses are an important driver of absenteeism behaviour. Lohaus and Habermann (2019) present an extensive discussion about the opposite concept of sick absenteeism: presenteeism, defined as going to work while ill. Another part of the literature focuses on absences from specific occupations, especially from school teachers and health providers. Banerjee and Duflo (2006) offer a good review on the topic.

While the provision of additional parental leave by employers is an increasingly prevalent trend in the labour market, its empirical observation remains challenging. Leveraging comprehensive administrative records that cover the universe of formal employment in Brazil, I combine information on workers’ occupations with their unique establishment identifiers to construct a refined measure of co-worker status, specifically identifying individuals who belong to the same team within a given workplace. This allows me to measure the number of absent co-workers a given worker has due to extended maternity leave. I then compare the outcomes of workers who had at least one co-worker giving birth in the 18-month window around the date the program was implemented in their workplaces. I use the eligibility of a co-worker who mothered a child around the policy’s implementation as an instrument for their decision to use the two additional months of maternity leave provided by the program. With that, I am able to estimate the magnitude of *absence effects* in the five years after the target worker is initially exposed to the policy.

Understanding the effects of job absence in the workplace is important for at least three reasons. First, the economic impacts of a missed day of work are not negligible (Barnby et al., 2002; Markussen et al., 2011; Adhvaryu et al., 2024). Beyond the direct output loss coming from the absence itself, indirect effects may take place: (a) the firm’s response to the worker’s absence can result in output losses due to imperfect substitutability among workers within the workplace (Herrmann and Rockoff, 2012) or across the labour market (Friedrich and Hackmann, 2021; Jäger and Heining, 2022); (b) the absence may cause human capital loss which reduces current and future output (Dechter, 2014) and increases the likelihood of a future separation (Lalive and Zweimüller, 2009; Ginja et al., 2023). In addition to these indirect impacts, the absence of a worker can induce shirking from co-workers (Bradley et al., 2007) and the presence of peer effects (Hesselius et al., 2009) may increase the level of absenteeism from other workers in the firm.

Second, if different groups are subject to different propensities to be absent from work for either personal or health reasons (Ichino and Moretti, 2009), the firm may have an economic incentive to discriminate or invest less in workers from groups that are more likely to be absent (Lazear and Rosen, 1990).

Third, targeted job amenities or policy solutions that allow or increase job absence (increased number of holidays or vacations, parental/family or sick leave schemes, for instance.) may have unintended consequences for the workers aimed at these policies, their co-workers and, as a consequence, the workplace as a whole.

The setup analysed here is unique for two reasons. First, the literature on the topic argues the introduction of a gender-specific job amenity like extended maternity leave can generate compensating differentials due to three main channels: (a) direct pecuniary costs related to the provision of the amenity (Rosen, 1986), (b) indirect costs resulting from worker’s human capital depreciation and the cost of substituting the worker on leave (Brenøe et al., 2020),

and (c) behavioural responses stemming from the worker’s willingness to pay for additional benefits (Bonhomme and Jolivet, 2009). The rules of the policy offer an opportunity to shut down the cost channels and provide clear evidence of the behavioural responses from firms and workers. The government fully funded the additional two months of maternity leave, eliminating direct pecuniary costs to the firm. Additionally, the policy only applied to large firms², making it easier for these companies to replace workers on leave with existing co-workers. Moreover, the extension represents only two months to the original four months of mandatory leave, which may mitigate the impact of human capital depreciation. Second, the extension in maternity leave is voluntary, and firms must sign up for the program (at no cost) to be eligible for its benefits (a tax rebate that pays off the wages of the worker on leave). This allows me to exploit the staggered adoption of the program and compare firms that started offering extended maternity leave to their workers in one period with firms that do that in the future. I also compare workers exposed to the policy in one period with workers with similar characteristics who were exposed to the program later.

I document that around 13% of eligible firms signed up for this program 12 years after its introduction. These firms tend to be bigger, have more educated workers, and pay higher wages than other comparable firms. An average of 45% of eligible workers (those who mothered a child after the policy was implemented in their workplace) enjoy the extra two months of leave they are entitled to.

I estimate that a worker observes better wages and career trajectories (measured as a lower probability of separation and higher probability of being promoted) when a larger share of their co-workers are absent from the workplace for two additional months due to the extended maternity leave. More specifically, focusing on intent-to-treat (ITT) effects, I estimate that an increase of one standard deviation in the share of co-workers eligible for extended leave increases a target worker’s average hourly wages by 0.72% in the five years after the exposure to the policy. The same variation is also associated with a decrease in the probability of separations and layoffs of 1.1 and 0.7 percentage points, respectively.

Moreover, I find considerable heterogeneity in effects in terms of gender and workplace characteristics. I estimate that most of the *absence effects* are driven by firms with (a) higher dispersion in the pre-treatment wage growth distribution, (b) low growth rates measured in terms of number of workers, and (c) low share of high-skill jobs in the workplace. These results align with the predictions of the tournament theory (Lazear and Rosen, 1981) and suggest that competition among co-workers driven by workplace visibility/presenteeism is an important driver of the results. I also find evidence that the effects of the policy on wages are driven mainly by male workers, with female workers from all age groups unaffected by

²In section 2, I describe that the eligibility criteria to be part of the program is to be under the real-profits tax scheme. This scheme is meant for large firms with gross revenue above 80 million Brazilian Reais. I also show that the average firm under this tax scheme has an average of 124 workers per year, almost five times more than the average firm in the country.

their co-workers' policy-induced absenteeism. In terms of career trajectories, I find that both male and female workers benefit from the absence of a co-worker. However, the effects of co-worker absence on the probability of promotion up to five years after exposure to the policy is 38% smaller for female workers in comparison to their male counterparts. These results suggest that if, from one side, the provision of extended maternity leave can be rationalised as a gender-specific job amenity targeted to female workers, on the other side, it may cause unintended consequences for these workers in the long run.

I also estimate how exposure to the policy (i.e., being employed in a firm that offers extended maternity leave) can affect labour market outcomes over time. I perform a matching procedure to compare workers from firms that offered extended maternity leave to workers who were never exposed (or were exposed later) to the policy. I document that, conditional on not having children, exposure to the policy is associated with better wage trajectories and promotion prospects within two years after the firm adopted the program. Additionally, I document that the take-up of extended leave is bad for mothers, with the take-up of extended leave associated with a 12.7% increase in the probability of being separated from the firm within two years of birth. The increase in the probability of a layoff is 18.7% in the same period.

Finally, I analyse the effects of the policy at the workplace level and estimate an average reduction of female wages of around 3%. This effect is partially explained by a change in the gender and occupational composition in the workplace: I estimate an increase in the share of female workers working in these firms over time (around 1.7 percentage points, or 4.7% of the pre-treatment average). However, the proportion of women among workers in high-skill positions decreases by almost five percentage points (or 14% of the pre-treatment average). I find evidence of two channels explaining such compositional changes at the workplace. First, I show that a worker eligible for the policy who decides not to use extended maternity leave is 9.4% less likely to be separated from her job within two years after the end of maternity leave (in comparison to a worker in the same workplace who uses the additional two months of leave). Second, I document a significant decrease in the rate of promotions for female workers once the firm adopts the policy. These estimates are consistent with the findings from the worker-level analysis and suggest that the take-up of extended leave from a mother correlates with worse labour market outcomes for herself and better career prospects for the workers who worked with her in the year she mothered the child.

These results suggest that the *absence effects* induced by the introduction of extended maternity leave in the workplace positively affect co-workers who remain working, with stronger impacts for male workers. On the other hand, mothers who use the benefits of the program are harmed in the short and long run. This implies that the design of the policy - which allows (a) firms to decide whether or not to offer extended leave to their workers and (b) workers to decide whether or not to use the additional two months of leave to which they

are entitled - is not optimal either from the efficiency or from the redistributive perspective: conditional on having a child, all mothers would be better off if the take-up of extended leave was universal³. At the same time, the benefits of the policy - which was targeted at big firms in the country’s formal sector - had higher take-up among workers from the right tail of the wage distribution⁴.

This paper contributes to at least four strands of the literature. First, I add to the literature examining the impact of co-worker absence on the outcomes of those who remain at work (Hesselius et al., 2009; Johansson et al., 2019). Previous studies have found positive effects of having an absent co-worker on the outcomes of incumbent workers who stay working. These are attributed to at least two main channels: (a) Competition effects coming from implicit tournaments within the workplace have the potential to affect the relative ranking of absent workers relative to their co-workers (Johnsen et al., 2023), and (b) The challenges associated to labour market frictions - related to identifying and hiring a suitable replacement for an absent worker - can significantly influence a firm’s decision-making. In such scenarios, where the costs and time involved in external recruitment are high, the existing pool of employees may emerge as the most viable alternative to fill the void left by the absent worker (Jäger and Heining, 2022). This study contributes to this literature by empirically examining the impact of extended co-worker absences on incumbent workers’ outcomes. The findings reveal a causal relationship between the increased availability of longer leave periods for co-workers and positive effects on the wages and career progression of those remaining on the job. This suggests that when firms face prolonged absences, they may respond by investing in their incumbent workforce - potentially through increased compensation or enhanced opportunities for advancement - to mitigate the disruptions caused by labour market frictions. The literature has also investigated the possibility of peer effects influencing absence behaviour, suggesting that exposure to absent colleagues might increase the likelihood of an individual taking time off work (Hesselius et al., 2009). I do not find evidence to support such a phenomenon: Neither the estimates of effects related to co-worker eligibility for extended leave on target workers’ absence, nor the comparison of mothers from the same workplace who give birth around the policy’s adoption, given any indication of this contagion effect.

Second, I contribute to the literature on the provision of group-specific job amenities and policies designed to promote gender equality in the workplace. (Hersch, 1998; Felfe, 2012). The voluntary nature of the program was previously studied in the literature and has

³This argument is valid under the assumption that the firms’ efficiency gains coming from the information revealed through signalling are not large. Tô (2018) argues that a worker’s decision to forgo extended maternity leave is a costly signal to the employer of the future value of employing that worker. If the efficiency gains from the reduction in information asymmetries are larger than the social gains of the policy (coming from welfare gains for both mothers and children), the policy could be welfare-improving.

⁴Machado et al. (2024) document that although the policy entitles all workers from participant firms to use an additional two months of maternity leave, the take-up rates are larger for college-educated, non-disabled, and higher-paid workers.

found no causal effects of own take-up on labour market outcomes (Machado et al., 2024). However, since a maternity leave policy is focused on female workers at fertile age, I explore the possibility of heterogeneous effects of exposure to the policy on different subgroups of workers in the workplace. I find significant differences in the intensity of the *absence effects* when comparing male and female workers but no significant differences when comparing female workers from different age groups.

Third, I add to the literature studying the effects of maternity leave extensions on labour market outcomes (Lalive and Zweimüller, 2009; Lalive et al., 2014; Dahl et al., 2016). Existing research on the topic typically employs a quasi-experimental design by comparing the outcomes of workers who give birth immediately before and after implementing a policy that extends the length of maternity leave. However, the effects of an extension in maternity leave voluntarily offered by firms - as opposed to those mandated by national policies - remain under-explored in the literature. This is primarily due to two reasons: (a) data containing cross-sectional variation in the provision of maternity leave at the firm level is often unavailable, and (b) selection bias may arise from firms that offer such benefits on their own accord. The setup analysed here is well suited to deal with this issue because I can observe which firms provide extended leave to their workers over time. In addition, the staggered adoption of the program allows me to compare firms treated with firms exposed to treatment later. I also propose a matching procedure that matches firms selecting into treatment based on observables and finds similar results to the ones using not-yet-treated firms as the comparison group. This helps me mitigate concerns about selection into treatment. These results also contribute to the important discussion about family leave policies and their implications for the gender gap (Xiao, 2023; Blair and Posmanick, 2023).

Fourth, my results suggest the existence of implicit tournaments among co-workers in the same workplace, which provides empirical support for the predictions arising from the tournament theory (Lazear and Rosen, 1981). *Absence effects* are stronger in firms with a higher payoff (measured as the spread in the within-firm wage growth distribution), lower growth, and lower availability of high-rank positions (measured as the proportion of high-skill positions in the workforce). Finally, this paper also relates to the recent debate arising from the post-COVID shift in work arrangements (working from home, reduced work week, etc.) and how these can affect workers and co-workers over time (Aksoy et al., 2022).

Section 2 presents the institutional background in Brazil and describe the policy change I exploit to estimate the effects of co-worker absence on labour market outcomes. This Section also introduces the data and some motivating descriptive statistics related to the empirical framework, presented in Section 3. Section 4 presents the main results, validity exercises and robustness checks. It also analyses heterogeneous effects across different groups of workplaces and workers. The remainder of the paper analyses the effects of exposure to the policy and the analysis of own-take-up on mothers' labour market outcomes. The last part of the paper

discusses the main policy implications of co-worker absence leave for the equilibrium of the labour market.

2 Institutional background

In this section, I provide institutional details about the Brazilian maternity leave system⁵. Such benefits were introduced in 1943 and have been a constitutional right since 1988. All mothers employed in the formal sector are entitled to four months of fully paid leave⁶. The worker also has job protection from conception until five months after birth. The Brazilian Social Security System (INSS) funds the policy as follows: The firm pays the mothers' salaries as usual and receives the equivalent payment from INSS. Public employees are entitled to six months of paid maternity leave. The benefit is also extended to adoptions⁷. Fathers are entitled to five days of leave, and the firm is responsible for paternity payments in the period⁸.

2.1 The citizen company program

In 2008, the Brazilian Congress approved *Programa Empresa Cidadã* (Citizen Company Program, henceforth PEC) to level the rights of private and public workers. The program aimed to increase the number of months a working mother could spend with her infant and allowed workers to request an extension in the length of maternity leave by two additional months (increasing the total number of months on leave from four to six). Due to fiscal and law restrictions in the country, the program came into effect only on the 1st of January, 2010. To participate in the program, firms must opt into the policy by formally requesting to the federal government. The worker willing to enjoy the two extra months of leave must inform the firm at most one month after the start of the maternity leave period. The program also increased the period of paternity leave from five to 20 days⁹.

Unlike the initial four months of leave, the extra two months provided by PEC are not funded by INSS. The firm pays the mother's salary as usual, but is not refunded directly by

⁵The design of maternity leave policies varies considerably across countries (Moss, 2022). Table A1 briefly compares these policies for a selected sample of countries.

⁶The leave must start from any moment between four weeks before the due date and the date of birth. If justified for medical reasons, it can also be extended by two weeks.

⁷The duration of maternity leave for mothers of adopted children varies depending on the kid's age. The mother is entitled to the full 120 days of leave for the adoption of infants. For children between one and three years old, the mother has 60 days of leave. For adopted kids between four and eight years old, the leave period is 30 days. Adoptions of children older than nine are not entitled to any maternity leave. However, adoptions are uncommon in Brazil (Silva et al., 2010).

⁸Fathers can also use the remaining period of maternity leave if the mother of their children dies within 120 days after birth. In this case, the leave is funded by INSS.

⁹As in the original four months of leave, the extension also applies to mothers and fathers of adopted children. The same relationship is maintained between the child's age and the total entitlement share.

INSS. Instead, these firms receive a rebate in the income tax due at the end of the fiscal year. However, only firms taxed in their real profits can enjoy the tax incentive provided by the program. This creates two critical asymmetries in the incentives to adopt PEC. First, only firms taxed under a specific tax scheme (real profit) are entitled to the tax rebate provided by the program. Second, a firm at risk of incurring net losses in a fiscal year may not want to participate in the program (or allow its employees to enjoy the benefit) as it would have to incur the cost of the maternity payments themselves¹⁰.

2.2 Data, descriptives, and sample selection

My empirical analysis is based on the *Relação Anual de Informações Sociais* (RAIS). This administrative dataset links employers and employees in Brazil and covers the universe of formal employment in the country. It allows me to identify, track, and match workers and firms across time. It contains information about workers (sex, date of birth, education, race), firms (municipality, size, sector of activity), and each spell of employment (dates of hiring and dismissal, earnings, hours worked). The dataset also records the dates and reasons for leaves of absence. This includes information about maternity leave and allows me to track the exact day each working mother started and finished her maternity leave spell. My extract of this dataset covers all workers registered in RAIS between 2003 and 2019, but the information about maternity leave spells is only available from 2007.

Table 1 presents a set of descriptives using information from RAIS in 2015. Column (1) shows a baseline sample with no restrictions and highlights that almost 70 million employment spells were registered in Brazil that year. Among those, 42.6% were women, and over 1 million maternity leave spells were recorded. Over 2.7 million firms were registered in the dataset, and the average firm had 1.25 establishments¹¹. Column (2) restricts the sample to workers employed by the beginning of that year. The number of employment spells following these restrictions falls by almost 30%, which can be attributed to the country’s high turnover rate (Gonzaga, 1998; Beccaria and Maurizio, 2020).

Column (3) restricts the sample to workers from private-sector firms with at least five workers by the beginning of the year. This reduces the number of spells by 30% and the number of firms by 70%, which can be attributed to the considerable number of non-private

¹⁰In section 2.2, I show that only 3% of the Brazilian firms were under this scheme in 2015. However, these firms represent an average of 26.1% of all the employment spells in the country. I also provide evidence that the firms that adopt the program tend to be bigger, pay higher wages, and have a higher share of college-educated workers compared to firms under the same tax scheme that do not implement the policy.

¹¹I use the word *firm* to denote the set composed by a headquarters and all of its corresponding establishments. Following Jäger and Heining (2022), I use the words *firm* and *establishment* interchangeably across the text, making the distinction between the two whenever necessary. Most of my empirical analysis will compare workers within the same workplace, i.e., workers observed working at the same *establishment* in a given year.

firms in the Brazilian economy¹² and the fact that small firms correspond to a significant fraction of firms in the country¹³. Column (4) includes only spells from workers with a permanent contract working full-time (more than 35 hours per week) in the sample, and column (5) restricts the sample to firms eligible to receive the PEC’s fiscal rebate. As explained in Section 2, the fiscal incentive provided by PEC only covers firms taxed on their real profits, typically meant for firms with more than 80 million Brazilian Reais of revenue. This is reflected by the considerable increase in the average size of these firms (383% bigger than the baseline sample in terms of employment spells) and by the increase of almost 50% in the number of establishments these firms have on average.

Table A2 splits the sample of firms registered in RAIS in 2015 according to their respective tax scheme in the same year. The data about the tax scheme of each firm is provided by the Brazilian tax authority (*Receita Federal do Brazil*, henceforth RFB) between 2014 and 2020. Such information is only available for 82.3% of all firms registered in RAIS 2015. Among these, 3.9% were under the real profit tax scheme being, therefore, eligible to receive the tax rebate provided by PEC¹⁴. Real profit firms are bigger than any other type of firm: on average, a firm under this tax scheme is almost 24 times larger than firms under Simples, the tax scheme that covers most firms in the country¹⁵. At the same time, eligible firms have a proportion of female workers that is 28% smaller than firms in Simples and 21.3% smaller than firms taxed on their presumed profit¹⁶. Finally, eligible firms represent only 3.9% of firms but are responsible for 30.8% of all employment spells and 36.2% of the total wage bill registered in RAIS 2015.

The Brazilian tax authority also provides data about participation in PEC and contains information about every firm joining the program from January 2010 to March 2022. This data includes the date each firm joined and exited the program linked to its unique firm identifier (CNPJ). Moreover, a firm that joins PEC does that through its headquarters and that allows all of its establishments to offer extended maternity leave to their workers¹⁷. This allows me to link the PEC start dates to each firm (and its establishments) in RAIS

¹²These represented around 10% of all firms in the country in 2015.

¹³Tecnically self-employed workers must open a firm to pay taxes. For this reason, the data contains information from several firms with a single employee over time. In 2015, over 2.1 million private firms were registered with at least one employment spell. Among these, 29.3% had a single worker, and 68.7% had at most five workers. The firms with more than five workers were responsible for 89.8% of all formal employment spells recorded in the country. The sample selection described below guarantees that my estimates do not use this subset of small organizations.

¹⁴Figure A1 shows that this proportion is stable between 2014 and 2020.

¹⁵Simples is a simplified tax scheme targeted to small businesses with at most 4.8 Million Brazilian Reais of gross revenue per year.

¹⁶Presumed profit is a tax scheme for medium-sized firms. It is recommended to firms with revenues lying between the threshold of firms under Simples and the threshold of firms taxed in their real profits.

¹⁷In my empirical analysis, I present some evidence that both headquarters and establishments provide the benefits of PEC to their workers. However, there is significant variability in PEC’s take-up among different establishments of the same firm.

and identify which worker was entitled to use the additional two months of maternity leave provided by the program. Table 2 presents the results of this matching procedure. Among the 25,613 firms that joined PEC by March 2022, only 16,038 were matched to RAIS¹⁸. These firms compose the *baseline sample* and represent 90,380 different establishments in the country. Among these, 12,430 firms - with 64,829 establishments - were matched to the tax registry information, which allows me to assess their eligibility for the tax rebate provided by PEC¹⁹. The firms in this group compose the *tax registry sample*, a subset of the *baseline sample*.

Among the firms in the *tax registry sample*, only 35.2% were eligible for PEC's fiscal rebates. However, the eligibility rate jumps to 84.6% when considering the number of establishments these firms represent in the RAIS dataset. This indicates that a considerable mass of firms that joined the program without being eligible for its fiscal rebates are small firms composed of only one establishment²⁰. Finally, 6.8% of non-eligible firms became eligible at some point after joining the program²¹.

The solid line in Figure 1 shows the adoption behaviour of firms joining PEC over time (considering only the headquarters establishment in the sample). Almost 45% of these firms adopted the policy within one year after its implementation. The dashed line in the figure also shows that less than 1.5% of these firms decided to leave the program at some point in the future. Figure A3 replicates this image but weights each group in the sample according to different measures. Panel (a) repeats Figure 1 for comparison. Panel (b) shows the image weighting the firms joining the program by their respective number of establishments. The results show that firms with more establishments were more likely to join the program earlier. Half of these adopted the program in the first year after its introduction. Panels (c) and (d) do the same thing, but weighting the sample by the number of maternity leave spells each firm recorded between 2007-2019 and the number of years each firm appeared in RAIS,

¹⁸The remaining firms that joined PEC but were not in RAIS represent small firms that did not declare their taxes in the period. This can happen for two main reasons: (a) the firm did not comply with the law, which establishes that all firms - even those that did not operate, were in liquidation, or did not have any employee in a given tax year - must be registered in the system; or (b) the firm is in the subset of firms that are exempt from submitting a declaration. A quick view of the names of these firms shows that they typically represent small businesses that are likely to be owned by self-employed individuals, which already rules out their possibility of receiving PEC's tax rebates.

¹⁹Figure A2 shows that almost 90% of the firms in the *baseline sample* are from the State of São Paulo, the biggest in Brazil in terms of population and economy. Moreover, over 3/4 of these firms come from the services sector.

²⁰This is also a sign that small firms were more likely to join the program without being able to benefit from it, an indication of a lack of knowledge of the program's rules. It is important to mention that any firm could join PEC - even those not eligible for the tax rebate - and decide to offer extended maternity leave to their workers. Later in this section, I will show that this is a rare event, with non-eligible firms rarely offering their workers six months of maternity leave.

²¹For simplicity, I will drop these firms for most of the empirical analysis conducted here, so my final sample will be composed of workers working in either the *baseline sample* or the *tax registry sample*.

respectively. The results go in the same direction²².

Table A3 compares firms that never adopted PEC with firms that joined the program before and after its adoption using the *tax registry sample*. Firms that adopted PEC at some point between 2010 and 2022 have a share of female workers 2.8% bigger than other firms before the adoption of extended maternity leave. After the adoption, this proportion increases by two percentage points. These firms are four times bigger than the average of firms that never adopted the policy and increased their size by 18.6% within three years. The average salary for workers in PEC firms is also higher, with an average wage bill almost 8.5 times bigger than other firms. This is partially explained by the fact that these firms have a higher proportion of high-skill workers (defined as professional and managerial occupations) for both men and women²³.

The table also highlights two important features in the take-up of maternity leave in this subset of Brazilian firms. First, PEC firms had 15.5% fewer maternity leave spells per female worker compared to other firms before adopting the program. This quantity decreases by 16% after the adoption of the program. Such change, combined with the 5.5% increase in the proportion of female workers these firms observed on average, indicates that implementing the program does not necessarily increase the probability of a given female worker having a child. Second, the proportion of maternity leave spells that used extended maternity leave is seven times higher for firms adopting PEC three years before its adoption. After the program is implemented, this proportion is increased by 40 percentage points. This is evidence that the provision of extended leave does not imply that a worker will use the extra two months she is entitled to²⁴.

Table A4 shows which variables predict the adoption of PEC at the firm level. The results

²²Figure A4 presents the adoption behaviour of PEC firms over time, splitting the sample between eligible and non-eligible firms (the contained in the *tax registry sample*), and also highlights the non-defined firms (the ones for which that tax-scheme information was not recovered). Panel (a) shows the raw proportions, and panel (b) weights each firm using their importance in terms of maternity leave spells. Two-thirds of firms that adopted PEC in the *tax registry sample* were eligible for PEC, and less than 2% of these were non-eligible when considering the weighted figures. The remaining share is composed of non-defined firms. Panels (c) and (d) present the behaviour of firms leaving the program over time and highlight an interesting result: the firms leaving the program are almost always eligible. Firms that are not eligible for PEC do not even have the trouble of leaving the program because they do not enjoy its benefits due to: (i) being not able to receive tax rebates to pay for the additional maternity payments and (ii) they are very little in the universe of maternity leave spells. I also replicate this image using the average number of employment spells per year, the total number of employment spells recorded in the period, and the total number of female employment spells on average and across the years. Since all of these measures are a proxy for firm size, results align with the ones presented Figure A3. These results are available upon request.

²³I use the definition of skill level proposed by Colonnelli et al. (2020) to match each occupation in the sample. The set of occupations not defined by the authors is removed from this calculation. However, less than 3% of the occupations from workers in the *tax registry sample* are not defined. As robustness, I propose my own measure of skill using a modified version of the procedure described in Cortes and Pan (2019) to generate a more flexible measure of skill. Both measures are highly correlated, so I decided to use the first measure for the remainder of the paper.

²⁴Figure 2 shows the distribution of days in maternity leave at the individual level and reinforces this fact. It also shows two types of workers taking maternity leave after adopting PEC: the ones taking six months

show that size - measured in terms of the number of employment spells per year and the number of maternity leave spells in the years before the program’s adoption - is positively associated with the probability of adopting PEC. The results also show such probability is negatively related to the firm’s average proportion of female workers. Eligibility - measured by being in a real-profit tax scheme at any point after 2014 - is also important in explaining the adoption decision and the proportion of workers taking extended maternity leave before adopting the program. Table A5 shows the variables that predict the take-up of extended maternity leave at the worker level using a set of different OLS specifications. In my preferred specification, with year and establishment fixed effects, having a college degree, higher tenure and being in the right tail of the wage distribution are positively correlated with the take-up of extended maternity leave²⁵.

Taken together, these results highlight that the subset of firms adopting PEC during the period is not representative of the average firm in Brazil. The rules of PEC, which allow firms to adopt the policy at any moment, increase concerns about selection into treatment. This could introduce selection bias into the analysis since the firms who adopt the policy are - as the analysis in this Section has shown - better in terms of wages and quality of its workforce²⁶. This increases the concern about the external validity of my findings in the Brazilian context. However, the identification strategy presented in the next Section compares workers whose co-workers were absent due to extended leave using the date of PEC’s adoption as an instrument for their take-up decision. This alleviates concerns about selection into treatment since the strategy relies mainly on the plausibly exogenous date a co-worker gave birth relative to the introduction of PEC at the workplace.

3 Empirical strategy

This section presents the empirical framework used to estimate the effects of co-worker absence on labour market outcomes of those workers who stayed working. I rely on the random variation arising from the plausibly exogenous date of adoption of PEC across different firms to compare workers with high and low shares of co-workers eligible for extended maternity leave.

of leave and those taking four months of leave. Figure A5 shows that the policy has bite and increases the proportion of workers using extended leave immediately after its implementation at the workplace.

²⁵Machado et al. (2024), which analyse the same policy and performs a detailed heterogeneity analysis in the take-up of the policy. My findings are similar to their results and highlight that mothers with higher socioeconomic status are more likely to benefit from the entitlements of PEC.

²⁶Moreover, a firm that introduces a policy that increases the length of maternity leave offered to their workers should be, if anything, on the progressive side of family-friendliness. The literature has found that these firms are more productive and have better managers (Bloom et al., 2011). Better management practices

3.1 Causal effects of co-worker absence on labour market outcomes

The unit of observation is a worker i who is employed in a firm f by the end of the calendar year PEC was implemented in the firm. I call these *target workers*. I restrict these workers to be employed in the firm for at least two years. For each target worker in the sample, I define the set co-workers $\mathbb{C}_i$ composed of all workers from the same workplace who have the same four digits occupational code as i in the year PEC is introduced²⁷, excluding worker i .

I then construct a panel for each target worker in the sample, including observations from three years before and five years after the year of PEC’s adoption²⁸. Following [Johnsen et al. \(2023\)](#), I define the set of workers j who give birth in the 18-month window around the adoption of PEC in these firms (9 months before and after the date of adoption). I call these workers *target mothers*. With that, for each target worker i in the sample, I define the set $\mathbb{M}_i \subseteq \mathbb{C}_i$ composed of all co-workers i had in the year PEC was adopted in the firm who mothered a child in the 18-month window around the date the program was introduced.

The causal variable that measures the level of co-worker absence faced by each target worker i is a_i , defined as the share of co-workers who use extended maternity leave. Let $EML_{i'}$ be an indicator for workers who used the additional two months of maternity leave provided by PEC. Therefore:

$$a_i = \frac{\sum_{i' \in \mathbb{M}_i} \mathbb{1}[EML_{i'} = 1]}{|\mathbb{M}_i|} \quad (1)$$

The definition of a_i restricts the sample to target workers who have at least one co-worker²⁹ giving birth in the 18-month window around the date of PEC’s adoption³⁰ (i.e.,

are, in turn, associated with the provision of more family-friendly policies in the workplace. [Bloom et al. \(2014\)](#) provides a good review on the topic.

²⁷I use the Brazilian Classification of Occupations (CBO) to determine the occupation of each worker in the sample. Four digits are equivalent to compare workers from the same field. For example, occupations 203225 and 203230 are defined for materials engineering and chemistry engineering researchers, respectively. Occupations 251205, 251230, and 251235 are for an economist, environmental economist, and urban economist, respectively. Panel (a) in Figure A6 shows the distribution of team size (measured as the number the size of the set $\mathbb{C}_i$ for the target workers in the sample).

²⁸To have a balanced panel for my empirical analysis, I restrict the sample to target workers from firms that introduced PEC between January 2010 and December 2014. Using data of workers exposed to PEC until 2014 allows me to construct a balanced panel with at least five lags for all target workers in the sample. These represent 67% of all firms that adopted the program until March 2022 and 75% of all mothers ever exposed to the program (see Figure A3 for details).

²⁹I later use target-workers with no co-workers giving birth around PEC’s adoption comparison units for additional empirical exercises.

³⁰As I show in Section 4, the proportion of target workers with no co-workers in the sample is small. The average number of co-workers for a target worker with at least one target mother in the team is 12. The definition of a co-worker also relies on the number of occupational digits used to match each target worker to a given worker from the same workplace. Selecting more digits decreases the size of $|\mathbb{C}_i|$ by construction. The CBO classification assigns a six-digit code to every occupation in the dataset. The choice of four digits

$|\mathbb{M}_i| \geq 1$). I also removed those target workers from very large teams (above the 95th percentile of the team size distribution) from the sample. The equation to be estimated is:

$$y_{it} = \gamma_i + \theta_{k(it)} + \sum_{\substack{k=-3 \\ k \neq -1}}^5 \beta^k D_{it}^k \times a_i + X'_{it} \Gamma + \varepsilon_{it} \quad (2)$$

In this equation, y_{it} is the outcome for target worker i in year t . I define the event-time $k = 0$ as the calendar year PEC was adopted in firm f . The terms γ_i and $\theta_{k(it)}$ are individual and event-year fixed effects. The variables D_{it}^k are event-year indicators defined such that $D_{it}^k = \mathbb{1}[t = k]$. The vector X_{it} contains individual time-varying covariates (age polynomials, indicators for occupation, industry, and city). The omitted event-year is $k = -1$, so the parameters of interest, β^k , represent the change in the outcome y_{it} in year k (relative to one year before birth) of a target worker who faces a unit increase in the level of co-worker absence when PEC was adopted in his/her firm. All estimates cluster the standard errors at the establishment level where the worker was employed while initially exposed to PEC (i.e., the firm at $k = 0$).

I also estimate a variant of equation 2 that collapses the event-time indicators into a single dummy variable to denote post-birth periods.

$$y_{it} = \gamma_i + \theta_{k(it)} + \beta Post_{k(it)} \times a_i + X'_{it} \Gamma + \varepsilon_{it} \quad (3)$$

The variable $Post_{k(it)}$ is a dummy to indicate observations that happen after the adoption of PEC (i.e., $k \in \{0, \dots, 5\}$). The parameter of interest is β and denotes the change in post-birth earnings of a target worker who faces a unit increase in co-worker absence. Conditional on individual and event-year fixed effects, I estimate the impact on the target worker's wages depending on the share of their co-workers who were absent for additional two months of maternity leave. Equation's 3 OLS estimates of Equation 3 will be biased if a co-worker's leave take-up correlates with team characteristics (including those of the target worker). As argued by [Johnsen et al. \(2023\)](#), family-oriented individuals may sort themselves into specific teams within the workplace, which could create homophily among co-workers. In these situations, the effects of co-worker absence on wages may be less intense in teams composed of family-oriented workers than in other teams. Furthermore, the decision to take the two additional months of maternity leave may be more common in teams, workplaces, firms, or occupations where the substitutability among co-workers is higher or where the team size is large enough, which could reduce the firm's cost to replace the absent worker. In both cases, the OLS estimates would be biased downward.

Equation 3 is estimated first by OLS and then using an instrumental variable strategy. To

is motivated by an exercise that estimates the OLS effects of the share of co-workers absent due to maternity leave in calendar year t on target worker's wages in year $t + 1$.

instrument the measure of absence in the team a_i , I exploit the plausibly exogenous variation from the eligibility of i 's co-workers to PEC. I define this with the variable z_i , which measures the share of co-workers who are target mothers and are eligible for PEC's entitlements (i.e., those who started their maternity leave spells after the policy was implemented at the firm). The intuition behind this instrument comes from the idea that a target mother's eligibility is a good predictor of her take-up while orthogonal to the target worker's potential outcomes. It is important to highlight that the IV framework estimates local average treatment effects (LATE), representing the effects of having a higher level of absenteeism at the workplace due to the variation in the share of co-workers eligible for PEC, which is plausibly exogenous. The OLS results use variation in co-worker absence coming both from the policy implementation and their endogenous choice to use additional two months of maternity leave. Moreover, the effects estimated by OLS are related to the average target worker in the sample, while the IV effects concern the marginal target workers (i.e., those who had the level of co-worker absence shifted because of the adoption of PEC in their firms).

Defining the set of target mothers with workers who have children in the 18-month window around the date of PEC's adoption prevents any strategic timing from getting pregnant. Moreover, the date each co-worker gives birth should be orthogonal to a target worker's potential outcomes since one cannot manipulate the date of birth of a co-worker's child³¹. Figure 3 shows the earnings trajectories of target workers with a high and a low share of co-workers eligible for PEC. The results show the absence of pre-trends for the years before treatment, which reassures that the static strategy presented in equation 3 is adequate. The figure also highlights a clear divergence in earnings between the two groups, with those facing a lower share of eligible co-workers observing higher earnings trajectories one year after the birth event.

Panel (a) in Figure A11 shows that the share of co-workers eligible for PEC (z_i) is a good predictor for the share of co-workers using extended leave (a_i). Panels (b)-(d) follow the strategy proposed by Johnsen et al. (2023) and focus the analysis only on the target mothers in the sample. Panel (b) shows that the share of eligible target mothers in a workplace is a good predictor for the share of target mothers using extended leave in the same workplace. Panels (c) and (d) show that - regardless of own-eligibility status - the take-up of extended leave from a given target mother is orthogonal to the eligibility of all other target mothers in the workplace³².

Finally, Table 3 presents the characteristics of target workers measured in the year before

³¹Panel (a) in Figure A6 shows the distribution of number of co-workers for the target workers in the sample. The average individual in the sample has 2.4 co-workers giving birth around the date of PEC's adoption, one of which is eligible and one not eligible (see Panels b-c)

³²Figure A7 also shows no discontinuity in a set of characteristics for the target mothers in the sample observed one year before they give birth. Figure A8 shows the density of maternity leave spells starting around the date of PEC's implementation at the workplace and shows no evidence of bunching or strategic timing of births for the target mothers in the sample.

the adoption of PEC in their firms. Columns (1)-(2) show the characteristics of the whole sample, and columns (3)-(4) and (5)-(6) split the sample between workers with a low ($z_i < 0.5$, the median value in the sample) and high ($z_i \geq 0.5$) share of co-workers eligible for PEC, respectively. The results show a good balance between the two samples at the individual and workplace levels, which indicates that the share of co-workers eligible for PEC is exogenous to the target worker. Taken together, these results suggest that the IV strategy based on the eligibility of a co-worker is valid both in terms of relevance and exclusion.

4 Results

I start this section by presenting the effects of co-worker absence on labour market outcomes. Then, I show a set of robustness and heterogeneity exercises to validate these results. The remainder of the section focuses on the effects of exposure to the policy, the effects of take-up of extended maternity leave on mothers, and the impacts of the policy at the workplace level.

4.1 Effects of co-worker absence on labour market outcomes

Figure 4 shows the results from the reduced-form estimation of Equation 2 that uses the share of co-workers that are eligible to PEC (z_i) to explain variations in the log of average hourly wages. The results indicate that workers with a higher share of eligible co-workers experience greater wage growth over the five years following their initial exposure to a co-worker taking leave. This suggests that those assigned to teams with a higher proportion of co-workers eligible for paid parental leave see improved wage trajectories in the five years after a co-worker’s absence. Notably, the persistence of this effect over time indicates that the wage increase is not solely attributable to increased workload by those covering the responsibilities of absent co-workers.

The absence of pre-trends reinforces that the static version of the main specification is adequate for analysing the main results. For the remainder of the paper, I will focus on the results from this version of the econometric model. Table 4 presents estimates of Equation 3 using different specifications³³. Panel I shows the OLS estimates. In my preferred specification in column (3), I include individual and event-year-by-year of birth fixed effects to allow for heterogeneity in specific birth cohorts and use worker and firm-level time-varying covariates (second-order age polynomials, 1-digit industry and 4-digit occupation fixed ef-

³³Appendix Table A6 presents the same estimates with an alternative measure of co-worker absence that is defined with the number of co-workers who used extended maternity leave in the 18-month window around PEC’s adoption divided by the number of co-workers employed in the same workplace as the target worker by the end of the year of PEC’s adoption. Results are qualitatively similar to the ones presented in the main specification, although the interpretation of each estimand is not the same.

fects, firm size, and number of co-workers). However, the OLS estimates are biased if the take-up of extended leave from a target mother is affected by her own characteristics and the characteristics of her co-workers. For example, sorting workers who are more likely to use extended maternity leave into specific occupations that are more family-friendly can create homophily in take-up among co-workers. Moreover, if the substitutability of workers is costly to the firm (Brenøe et al., 2020), the take-up of extended leave from a co-worker might affect the target worker’s future decisions to take a temporary leave of absence³⁴. In this case, the OLS estimate would be biased downward.

With that in mind, I use the random variation arising from the co-workers’ eligibility for PEC. Panel II displays the Intent to Treat (ITT) effects coming from a regression that replaces the causal variable a_i (share of co-workers absent for two extra months due to extended maternity leave) with the variable z_i (share of co-workers eligible for PEC). The main specification in column (3) is in line with the dynamic specification from Equation 2, with an average increase in annual wages of 0.72% for a target worker who faces one standard deviation (0.45 units) increase in the share of co-workers eligible for PEC around the date of the program’s adoption. This is equivalent to an accumulated increase of 3.7% in wages over the five years after the target worker’s exposure to the policy³⁵ and represents 7% of the average annual wage increase of an individual employed as a bank clerk in 2010³⁶.

Panel III shows the IV effects of co-worker absence on the log of hourly wages. The preferred specification in column (3) shows that one standard deviation increase in the share of absent co-workers (0.25 units) increases post-birth wages by 1.1% on average in the five years after the target worker is initially exposed to PEC. This represents the LATE effect,

³⁴In Table A8, I show that the take-up of extended maternity leave from a co-worker is not associated with the probability of target worker record any leave of absence in the five years after the implementation of PEC in the workplace. Figure A9 shows a set of event-study regressions with maternity leave outcomes at the workplace level. Panels (a) and (b) document an increase in the number of maternity leave spells and the proportion of female workers on maternity leave, respectively. This increase is small and disappears after the first year, even with the average length of a maternity leave spell and the proportion of workers using extended maternity leave being persistently higher after the adoption of the program (panels (c) and (d), respectively). Finally, Table A9 replicates the procedure proposed by Hesselius et al. (2009) to test if there are spillover effects of co-worker’s eligibility on the take-up of extended maternity leave for the subset of target mothers in the sample. The results show that the indirect effects of co-worker’s eligibility on the target mother’s take-up are sizeable but insignificant.

³⁵This result has similar magnitude as the estimates from (Johnsen et al., 2023), which studies how the take-up of extended paternity leave in Norway affects other fathers from the same workplace. Their comparison focuses on contests where fathers compete against fathers from the same workplace but not necessarily from the same occupation. My definition of teams allows me to measure workplace interactions within occupations more precisely. While comparing fathers within a firm provides valuable insights, it may not fully capture the specific dynamics within teams where individuals share more direct responsibilities and collaborations. My approach allows a more focused analysis of how peer influence operates within these more closely-knit occupational groups.

³⁶This is the most common occupation in the sample, representing 5.2% of all target workers used in the analysis. The calculation is based on the average wage increase of a bank clerk employed in the same workplace between 2010 and 2011, discounted by the accumulated inflation observed in 2010 using the Brazilian National Consumer Price Index (IPCA) as the inflation indicator.

showing the expected increase in wages coming from variation in co-worker absence induced by their plausible exogenous eligibility to PEC.

4.2 Robustness, heterogeneities, and mechanisms

Table 5 provides the results for different robustness specifications. Column (1) replicates the main specification from Table 4. Column (2) adds fixed effects for interactions between event-year and demographic groups (defined as cells of education by age group) to account for distinct wage trajectories of target workers with different observable characteristics. Column (3) adds linear trends in event time by month-year of birth to control for potential seasonalities across the calendar year. As suggested by [Johnsen et al. \(2023\)](#), the size of each team in the workplace could potentially mitigate the effects of an absent co-worker in larger teams. To address this issue, column (4) adds linear trends for the number of co-workers in each team using the quartiles of the team’s size to split the sample (1-4, 5-10, 11-24, and 25+ co-workers)³⁷. Column (5) also allows for differential trends depending on the number of target mothers in each team (1, 2, 3, 4, 5+). Finally, appendix Figure A10 indicates that some target mothers who were already on maternity leave when PEC was implemented in their workplace were more likely to benefit from the extended maternity leave³⁸. Column (6) removes from the sample target mothers already on maternity leave when PEC was implemented in their workplace. Results are qualitatively unchanged for all of these different specifications.

To check whether the findings presented so far are being driven by the introduction of PEC itself (and not other factors changing the proportion of eligible co-workers in the workplace), I estimate two placebo exercises. I define two new subsamples of target workers based on a placebo adoption date one or two years before the real date PEC was implemented in the firm. I then define the set of target workers, co-workers, and target mothers as before. Table 6 suggests that PEC’s adoption is indeed driving the main estimated effects on wages.

The potential impact of co-worker absence on wages may be mediated by the intensity of within-workplace competition. If (a) firms employ rank-based contracts ([Lazear and Rosen, 1981](#)) to structure worker remuneration and career advancements within the workplace, and (b) a colleague’s absence due to extended leave elevates the relative ranking of a present employee, then the anticipated effects of absence that employee’s wages should be positive. In such situations, this effect will be amplified in settings where such rankings carry greater weight. Conversely, in jobs where productivity is readily observable and independent of co-

³⁷Appendix Table A7 performs a heterogeneity exercise splitting the sample by team size and firm’s industry. Although the effects are slightly stronger in smaller teams, the results indicate no significant heterogeneity in the effects for these two dimensions.

³⁸The rules of the program allow the worker to request additional maternity leave at most one month after the start of her regular maternity leave period. This result indicates that some firms might have been lenient in allowing workers to enjoy extended maternity leave even if they were not eligible to

worker output, the influence of the competition channel may be attenuated. To test for this possibility, Table 7 splits the sample using three criteria. First, as proposed by Lazear and Rosen (1981), contests that have a higher dispersion in expected prizes (i.e., a higher distance between the payoff of winners and losers) should expect higher rank effects coming from the absence of a co-worker. Columns (1) and (2) split the sample between target workers with low and high dispersion of expected prizes. I follow Johnsen et al. (2023) and define the prize as the within-establishment wage growth of all workers (aged 25-36) between two years before and the year of birth. Then, for each establishment in the sample, I calculate the standard deviation of wage growth to generate a measure of dispersion. A worker will face a low (high) dispersion in expected prizes if the standard deviation of wage growth in her workplace is below (above or equal) the median in the sample. The results indicate that workers with higher dispersion in expected prizes indeed observe stronger effects coming from the eligibility of co-workers to extended maternity leave, with a one-standard-deviation increase in the share of eligible co-workers leading to an increase of 1.37% in post-birth earnings. Second, I consider firm size growth as an alternative measure of competition intensity. Firms that grow less may face higher levels of competition because new vacancies in higher positions in the firm’s wage ladder are less likely to become available. To test this possibility, I split the sample between target workers working in firms with low or high levels of firm size growth between $k = -2$ and $k = 0$. I define firm size as the number of active employment spells in each establishment by the end of the calendar year. A workplace is defined as having low (high) growth if it is below (above or equal) the sample median. Columns (3) and (4) present the results splitting the sample between low and high-growth firms, respectively. The estimates suggest that target workers from firms with low growth experience higher competition effects. Third, I split the sample using the availability of high-rank jobs at the workplace. I split the sample between target workers in establishments with a low or high share of high-skill occupations (as defined by Colonnelli et al. (2020)) in the year before birth. Once again, what determines a low (high) share is the position of the target mother’s establishment relative to the median in the sample. Columns (5) and (6) present these results and highlight that workers from firms with low availability of high-skill jobs observe stronger competition effects. These findings are in line with the predictions of the tournament theory and suggest that competition within the workplace is a potential channel to explain the positive effects of co-worker absence on earnings.

In addition, the impact of co-worker eligibility on wages extends beyond the direct wage effects discussed so far. I also consider potential indirect effects through changes in employment outcomes. To explore this possibility, Table 8 presents estimates from a regression of the reduced-form effects of the share of co-workers eligible for extended leave (z) on three key outcomes: the probability of separation from the original firm within five years after PEC adoption (columns 1-2), the probability of separation due to a layoff (columns 3-4), and the

probability of being promoted at least once within five years after PEC adoption (columns 5-6). The results reveal that a one standard deviation increase in the share of leave-eligible co-workers is associated with a 1.6 percentage point decrease in the probability of separation for male workers. While the point estimate for female workers is 25% smaller, it is not statistically different from the effect for men. In terms of layoffs, a male worker facing a one standard deviation increase in z is one percentage point less likely to be laid off within five years after policy adoption. In contrast, female workers are unaffected by their co-workers' eligibility. Finally, the results indicate that male workers experience greater benefits than female workers in terms of promotion when facing a higher share of co-workers eligible for extended maternity leave. A one standard deviation increase in z is associated with a 1.89 percentage point increase in the probability of at least one promotion within five years after PEC adoption for male workers. While female workers also benefit from co-worker eligibility, the effect is 62% smaller³⁹.

A potential channel to rationalize these findings is related to the fact that extended maternity leave can be taken as a job amenity targeted to female workers in fertile age. The introduction of such an amenity in the workplace could generate differential wage effects due to (a) statistical discrimination from employers who take the two months of extended maternity leave as a potential cost and start to invest less in female workers and Lazear and Rosen (1990), and (b) a potential disamenity to male workers who could demand higher wages to compensate for the amenity their female peers received (Rosen, 1986). In both scenarios, a logical prediction is that the impact of co-worker absence on wages should be more pronounced for male workers or female workers beyond childbearing age. Table 9 presents the estimates of Equation 3 splitting the sample among different demographic groups. Columns (2)-(3) restrict the sample to female workers of all age groups, and female workers who are at least 40 years old in the year PEC was introduced in their firms, respectively. Columns (4)-(5) do the same for male workers. The estimates highlight that the reduced form effects of co-workers' eligibility for extended leave on wages are mainly driven by male workers under 40 years old. These results suggest that absence effects from the exogenous eligibility of co-workers to extended maternity leave benefit male workers and, in terms of wages, do not affect (non-mother) female workers of any age group.

4.3 Exposure and take-up effects

Another two instances in which the introduction of extended maternity leave could affect workers come from (a) behavioural responses from employers that might start treating workers differently because of the policy (exposure effects) and (b) the direct effect of taking up extended maternity leave on workers.

³⁹The average probability of promotion for a male worker and a female worker in the sample 2010 is 3.35% and 3.64%, respectively.

To further investigate the potential gender differences in behavioural responses from firms that introduced PEC, I propose a difference in differences (DiD) procedure that compares labour market outcomes of workers exposed to PEC in their workplaces with a set of comparison workers who were never (or not yet) exposed to the program. The equation to be estimated is:

$$y_{it}^M = \alpha + \beta_1 T_i + \beta_2 Post_t^k + \beta_3 (T \times Post^k)_{it} + \varepsilon_{it} \quad (4)$$

In the this equation, y_{it}^M is the outcome of the target worker i measured in year t . T_i is a treatment indicator to denote target workers in the main sample (i.e., workers who were exposed to PEC in the year the program was implemented in their workplace and who had at least one co-worker giving birth in the 18-month window around its adoption). For this exercise, I restrict the pool of target workers to have at least one female co-worker (a worker from the same workplace with the same four-digit occupation) in the year of PEC's introduction. The comparison group is composed of workers with similar lagged observable characteristics (measured two calendar years before each treated worker was exposed to PEC) who were not exposed to the program. The main comparison group comprises the set of workers coming from firms that never adopted PEC. Appendix C.1 provides a detailed description of the matching procedure and presents alternative comparison groups⁴⁰. The variables used to perform the matching are sex, age group, occupation, monthly earnings, hours worked per week, tenure, firm size, firm industry, and city.

The variable $Post_{it}^M$ is an indicator to denote observations $M = 2$ years after the introduction of PEC in i 's workplace. The baseline period is measured in the calendar year prior to PEC's adoption. The parameter of interest is β_3 , which measures the average effects of exposure to PEC on the outcome of target workers who were exposed to the policy. This parameter is identified under the assumption of parallel trends.

Table 10 shows a set of descriptive statistics of workers from the treated and comparison groups measured one calendar year before the year of exposure to PEC. Column (1) shows the baseline characteristics of treated workers. Column (2) presents the same characteristics for the subgroup of target workers matched to at least one comparison unit and for the comparison group itself. Columns (3)-(6) do the same for the alternative comparison groups. The results indicate a good balance among samples. Since the matching uses observable characteristics from two years before the exposure to PEC, this result can also be taken as evidence in favour of the parallel trends assumption.

Table 11 presents the estimates of Equation 4 for each set of comparison units. Column (1) establishes the baseline results, utilizing workers never exposed to PEC as the control group and matching based on the full six-digit occupation code. These baseline estimates indicate that exposure to PEC is associated with a 1.4% increase in average wages and a

⁴⁰To keep the analysis simple, I will focus the analysis on the main comparison group of never-treated workers.

0.85 percentage point increase in the probability of promotion. To refine the comparison group further, column (2) focuses on workers not yet treated as the control group. These workers are employed in firms that adopted PEC exactly three calendar years after the target worker’s initial exposure to the policy. The results for this subsample also show positive effects of PEC exposure on wages and promotion prospects, although the estimates are less precise due to the reduced sample sizes. Columns (3) and (4) aim to isolate the effects of PEC exposure from between-firm differences and exposure to female co-workers at the workplace. This is achieved by matching each target worker to a comparison worker from a different workplace from the same firm but in a team with no female co-workers in the year of exposure. The matching is conducted using four-digit and six-digit occupation codes, respectively. Both estimates indicate positive but statistically insignificant effects of exposure. Finally, columns (5) and (6) further refine the comparison groups to address potential workplace-level differentials in exposure. Column (5) compares each target worker to a comparison worker from the same workplace who had no co-worker on maternity leave in the two years following their initial exposure to PEC. Column (6) expands the pool of potential donors to include those with co-workers on maternity leave, but restricts these co-workers to using only the original four months of leave. The results for both subsamples are stronger than the baseline specification, though less precisely estimated.

Table 12 presents additional heterogeneity exercises on the baseline estimates that use never-treated workers in the pool of donor comparison units. Column (1) replicates the first column of Table 11 for comparison. Column (2) adds a set of covariates and shows that the estimates are barely affected. Column (3) allows for gender-specific effects and indicates no evidence of differential effects between male and female workers. Columns (4) and (5) perform a heterogeneity analysis by splitting the sample based on the intensity of co-worker absence faced by each target worker within two years after their initial exposure to PEC. Column (4) uses the subsample of workers who faced a low reduction in the level of co-worker absence in the period, defined as having a below-median share of co-workers using extended maternity leave within two calendar years after their initial exposure to the program⁴¹. Column (5) uses the part of the sample exposed to an above-median share of co-workers using extended leave. The estimated effects of exposure are larger for male target workers with a higher share of co-workers absent for six months in the period, suggesting that the nature of the program (which exclusively increases the level of co-worker absence of women in the workplace) may generate indirect benefits for men in detriment of female workers.

To analyse the effects of own take-up on labour market outcomes, I focus on presenting a set of descriptive statistics relating to the take-up of extended maternity leave and labour

⁴¹The median number of co-workers on maternity leave in the period is 28% and, among those, 38.9% benefit from the additional two months of leave provided by PEC.

market outcomes⁴². The birth of a child and potential take-up of maternity leave is a major life event with important career implications. The literature on the topic has documented the presence and persistent magnitude of child penalties worldwide (Kleven et al., 2019, 2023; Andresen and Nix, 2022). One explanation for such penalties lies in the career interruptions induced by the length and generosity of maternity leave mandates (Adams et al., 2024), reducing the accumulation (or increasing the depreciation) of human capital for working mothers, increasing the likelihood of separation post-birth, and affecting the intensive margin of fertility (Golightly and Meyerhofer, 2022) in the medium run.

Figure A12 uses the sample of mothers giving birth in all firms that adopted PEC and plots the probability these mothers are separated from the firm within two years after birth. Panel (a) compares mothers who give birth before and after the adoption of PEC in their workplaces (a proxy for eligibility). The figure shows a spike in the probability of separations around the 6th month after the start of the maternity leave spell⁴³. The results also show a small decrease in the average probability of separation for the mothers eligible for extended leave. Panel (b) shows that among those eligible for PEC, mothers who do not use the additional two months of leave are 12.7% less likely to be separated from the firm within two years of birth. Most of this difference is concentrated right after job protection ends (between the 6th and 8th month after birth). Panel (c) analyses separations originating from a layoff and shows an increase of 15% in the probability of eligible mothers being laid off within two years from birth. This suggests that, although total separations of mothers decreased after the implementation of the policy, separations coming from the firm side increased considerably. Panel (d) shows that the layoff probability of mothers using extended leave is 18.7% higher than mothers staying at home for four months.

Figure A13 analyses the same events but focuses on the reemployment probabilities of mothers separated from their firms after their maternity leave spell ends. I focus on reemployment events that happened within six months of the separation. Panel (a) splits the sample between mothers by eligibility status. It shows that mothers who had children after the introduction of PEC in the workplace are 1.9 times more likely to get a new job within six months after separation. Such increase in short-term reemployment probabilities could be interpreted as (i) voluntary switches given the increased time mothers have for job search (as suggested by Lalive et al. (2014) and Ginja et al. (2023)), or (ii) involuntary separations coming from the firm side that would increase the search effort of mothers not willing to leave the labour force after birth. Panel (b) restricts the sample to mothers eligible for PEC's

⁴²It is out of the scope of this paper to analyse the causal effects of the two months of maternity leave provided by PEC on mother's labour market outcomes.

⁴³Remember that the Brazilian legislation guarantees five months of job protection post birth to all formal-sector mothers in the country. Although I use a different sample of firms (focusing only on firms under the real-profit tax scheme) and workers (target workers, as defined in Section 3), these results are consistent with the findings from Machado et al. (2024) that document firms and workers defer job separations to extra rents from the government and enjoy the additional two months of wages provided by the entitlements of PEC.

entitlements and shows that taking extended leave is not associated with differential probabilities of reemployment, which would rule out the voluntary switch channel. Panels (c) and (d) focus on the subsample of mothers laid off from their original firm. The results for these workers are similar to those for separations, suggesting that involuntary separations explain at least 70% of the difference in short-term reemployment probabilities after the policy⁴⁴.

4.4 Effects of extended maternity leave in the workplace

PEC was implemented in 2010, and firms can adopt (and leave) the policy anytime. This generates a staggered structure that I exploit to understand the impact of PEC across workplaces. I begin by estimating a dynamic DiD model, comparing establishments that joined PEC with a carefully matched set of establishments that never joined, using a two-way fixed effects (2WFE) specification to control for unobserved time-invariant establishment and year effects. The analysis happens at the establishment level⁴⁵.

I define the comparison group using a matching procedure based on establishments' observables. For each treated workplace exposed to PEC in year t , I select a workplace from the pool of never-treated firms with similar lagged observables in $t - 3$. The matching is performed using the following dimensions: city, firm size (measured as the number of employment spells by the end of each calendar year, in bins of 5 workers), sector of activity (first digit of the Brazilian classification of economic activities), the proportion of female and college-educated workers (divided into bins of 10 percentage points), and the pay structure within the workplace⁴⁶. If a workplace in the treatment group is matched to more than one workplace from the pool of never-treated firms, I randomly select one workplace to compose the comparison group⁴⁷. As the analysis at the worker level, I restrict the sample of treated units to firms that adopted PEC between 2010 and 2014 in order to have a balanced panel of treated and comparison in the sample. The equation to be estimated is:

$$Y_{ft} = \alpha_f + \alpha_t + \mu \times treat_f + \sum_{\substack{k=-P \\ k \neq -1}}^K \lambda_k \times D_{ft}^k + \sum_{\substack{k=-P \\ k \neq -1}}^K \delta_k (treat_f \times D_{ft}^k) + \epsilon_{ft} \quad (5)$$

In this equation, Y_{ft} represents the outcome of firm f in year t . Firm and year fixed effects are represented by α_f and α_t , respectively. The variable $treat_f$ is an indicator equal

⁴⁴Figure A14 the reemployment probabilities within three years after separation and reinforces this evidence with a decreasing gap in reemployment probabilities over time. It also suggests that even medium-run reemployment is not affected by the take-up of extended maternity leave.

⁴⁵All of the analysis in this Section happens at the establishment level. For the remainder of this section, I will use the words firms, establishments and workplaces interchangeably.

⁴⁶The pay structure is defined as the 10th, 50th, and 90th percentiles of average female wages within the establishment divided in bins of 200 Brazilian Reais (40 US Dollars).

⁴⁷The main results presented in this Section are robust to changing the selected random firm. Appendix C provides more details about the matching procedure.

to one for firms adopting PEC between January 2010 and December 2014 and zero if the firm is in the matched comparison group. Let T_f^{PEC} represent the year firm f adopted PEC. Then $D_{ft}^k = 1\{t - T_f^{PEC} = k\}$ is an indicator to identify the year relative to the year the firm joined the program. For firms in the comparison group, this value is inputted based on the adoption year of the matched firm in the treatment group. The subscript k represents the relative year from the period the firm joins PEC, P is the number of leads, and K is the number of lags used in the estimates. The parameter of interest here is δ_k , identified under parallel trends, no anticipation, and homogeneous treatment effects.

Figure 5 presents the estimates of Equation 5 for a set of different outcomes at the workplace level. Panel (a) indicates that the adoption of the policy is associated with a 3.5% decrease in average female wages in the five years following the adoption of PEC. Panel (b) displays the effects on the female wage bill - measured as the log of the sum of all wages paid to female workers by the firm by December of each calendar year - and shows a smaller decrease in this outcome over time. Panel (c) shows an average increase in the proportion of female workers of 1.7 percentage points. The results in Panel (d) provide an explanation for these findings: the share of female workers in high-skill occupations fall by almost five percentage points in the five years following the introduction of PEC in the workplace. This result suggests that average female wages fall at the firm level (Panel a) due to compositional effects and that this effect offsets the potential increase in wage bills due to a higher proportion of female workers in the firm (Panels b and c, respectively)⁴⁸.

To further investigate the margins of adjustment that could explain these results, Figure 6 presents the effects of PEC's introduction on a set of additional outcomes. Panel (a) shows a small increase in the share of female workers among workers who are hired each year, a result that is in line with the overall increase in the total fraction of women in the firm. Panel (b) shows no effects on female separations (i.e. workers who started their employment spells in the firm by the 1st of January but were no longer employed in the same firm by the 31st of December of the same calendar year). However, Panel (c) shows an average increase of 3.1 percentage points in the overall share of female workers among workers who are laid off by the firm⁴⁹. Panel (d) shows an average decrease of 3.8 percentage points in

⁴⁸Concerns about heterogeneous treatment effects in contexts with staggered adoption raised in recent advances in the DiD literature (Goodman-Bacon, 2021; Sun and Abraham, 2021) may undermine the results from a traditional 2WFE specification. With that in mind, I also estimate the effects of PEC at the establishment level using the method proposed by Callaway and Sant'Anna (2021) (henceforth, CSDID). This method also leverages the time-varying date of the program's adoption but eliminates potential biases in the presence of heterogeneous effects by cohort or different dynamics across different groups of firms. Figure A15 shows the results for the same set of outcomes presented in Figure 5 using the set of matched firms described in Appendix C and also the subset of not yet treated firms who later adopted PEC between 2015 and 2022). The results for both comparison groups are similar to the ones estimated using the 2WFE specification. This suggests homogeneity of treatment effects, ruling out the potential biases that could undermine the 2WFE specification from Equation 5. Given this result, I will focus the remainder of this Section on the results using 2WFE.

⁴⁹Among the 22,678,947 separations registered in RAIS 2010, around 36.5% were from female workers.

the probability of a female worker being in the subset of promoted workers within the firm over the years. These results suggest that the overall increase in the proportion of female workers comes from a higher increase in the number of women among new hires despite the increase in female layoffs. The strong decrease in the proportion of female workers among those who are promoted explains the lower share of women in high-skill occupations. Figure A17 focuses on the same outcomes but considers only the subset of high-skill workers in each establishment. The results show that neither the hire nor separation results come from this subgroup. However, the effect on the proportion of female workers in promotions is twice as large as the ones from the whole sample.

Figure A18 shows the effects on a set of labour demand outcomes. Panels (a) and (b) focus on the extensive margin for the subset of new hires recorded in each calendar year around the year of PEC's adoption in each workplace. No significant effect is detected on the extensive margin of labour demand, neither in terms of firms hiring new workers (permanent or temporary) to replace the workers absent of an additional two months of leave. Panels (c) and (d) analyse the effects on the intensive margin and detect an increase in hours worked that is particularly strong for workers who had at least one worker on maternity leave. However, these effects are statistically insignificant. Finally, Figure A19 analyses a final set of outcomes. Panels (a) and (b) show significant increases in the average male wages and total wage bill with male workers in the firm. Panel (c) shows an increase of similar magnitude in the total wage bill in the firm. However, Panel (d) shows that, after discounting the annual wage bill by the presumed tax rebate provided by the entitlements of PEC, the firm's total wage bill decreases by an average of 2.6% in the five years after the adoption of the program in the workplace.

Two concerns arise under the proposed empirical strategy and the program's rules: (a) anticipation of treatment effects and (b) selection into treatment. These could threaten the assumption of parallel trends that is required for identification. In the remainder of this Section, I discuss these issues and provide evidence to alleviate identification concerns.

As described in Section 2.1, PEC was approved by the Brazilian Congress in 2008 but was introduced only in 2010. This could allow workers from firms joining the program to postpone their pregnancies to enjoy the benefits of PEC. At the same time, firms that decided to adopt the policy and observed a significant fraction of their workers getting pregnant could strategically change the timing of adoption. The rules of PEC allow the worker to enjoy extended leave if requested at most one month after the birth. This would give a 10-month window (between conception and the 1-month post-birth) for such behaviour to occur. This is possible given the two-year delay between the program's approval and implementation, especially for the first wave of firms introducing extended maternity leave (see Figure 1). Figure A8 presents the density of maternity leave spells around the date of the adoption

The proportion of layoffs among these separations was 22.7% (21.4% for male, and 25% for female workers).

of PEC. Panel (a) shows a uniform pattern of spells around the adoption, evidence of no strategic behaviour from the worker’s side. Panel (b) replicates the same figure, but only for the subsample of workers more likely to delay their pregnancies: workers giving birth while working in firms adopting PEC right after its implementation in 2010. Once more, a uniform pattern around the time of adoption is evident. Panels (c) and (d) do the same analysis but collapse the maternity leave spells at the firm level to check for any strategic behaviour from the firm perspective. No pattern of anticipation arises. However, this figure also shows a considerable fall in the density of births starting six months after the implementation of PEC.

Moreover, the voluntary nature of PEC raises the concern of selection into the treatment. Unobserved characteristics affecting the firm’s potential outcomes could also affect their decision to adopt the program. Using the not-yet-treated firms as a comparison group helps to alleviate these concerns. Finally, the anticipation of treatment effects could undermine the assumption of parallel trends required for identification. To rule this concern out, I start by presenting the results of an event-study specification using an OLS regression of the outcomes of interest on a series of event time dummies and fixed effects. Figure A9 shows no pre-trends for outcomes related to maternity leave take-up within each establishment. Panels (a) and (b) indicate a small increase in the number of maternity leave spells and the proportion of workers on leave right after the adoption of the program. However, this increase in take-up decreases a few years after that. Panels (c) and (d) show a more substantial and sustained increase in the length of maternity leave, which is in line with the results presented in Table A3.

5 Conclusion

This paper analyses the impact of co-worker absence on the labour market outcomes of employees who remain at work. By leveraging the staggered adoption of a policy in Brazil that extended the length of paid maternity leave from four to six months, I found evidence that the absence of a co-worker for two additional months can positively influence wages, retention, and promotion probabilities for the workers who stay on the job. These findings suggest that workplace dynamics are influenced by the visibility and presence of employees, aligning with theories of workplace tournaments where competition among co-workers drives performance and career advancements. However, the benefits of having a co-worker absent from the workplace are not evenly distributed, with male workers experiencing higher gains, thereby highlighting gender-specific disparities in the labour market.

I also provide evidence supporting the presence of unintended consequences of additional maternity leave not only for the workers who are using the entitlements of the policy (mothers) but also for those targeted to the program (women of fertile age). While the policy

provided additional leave benefits, the long-term effects on mothers who took extended leave were detrimental, leading to lower wages, reduced promotion prospects, and a shift in occupational composition, favouring men to reach high-skill positions. These results underscore a critical tension in the design of workplace policies: while well-intentioned, such policies can inadvertently exacerbate existing gender inequalities in the firm. The findings point to the need for careful consideration of how targeted job amenities, such as extended maternity leave, are structured and implemented to avoid adverse impacts on the intended beneficiaries.

In conclusion, this paper contributes to the literature on workplace absenteeism, gender equality, and labour market dynamics by providing empirical evidence of the complex effects of extended maternity leave on co-workers and firms. The results have significant implications for policymakers and firms, suggesting that while co-worker absence due to maternity leave can affect the career prospects of some employees, it may also widen gender disparities in the labour market. These have practical implications for firms and workers regarding human resources management, workplace culture, work-life balance, and gender norms within the workplace.

Future research should explore alternative policy designs that better balance extended leave benefits with the need to support equitable outcomes for all workers, particularly with the recent shift in work arrangements and workplace dynamics post-COVID-19. These include information interventions that highlight the importance of maternity leave take-up for health and development outcomes of mothers and children, coordination in the workplace aiming to increase take-up among co-workers, boosting of paternity and parental leave mandates to equalize the gender disparities in leave entitlements in the labour market, and policy solutions that increase the intensity of job protection to workers absent from the workplace due to health or family reasons.

References

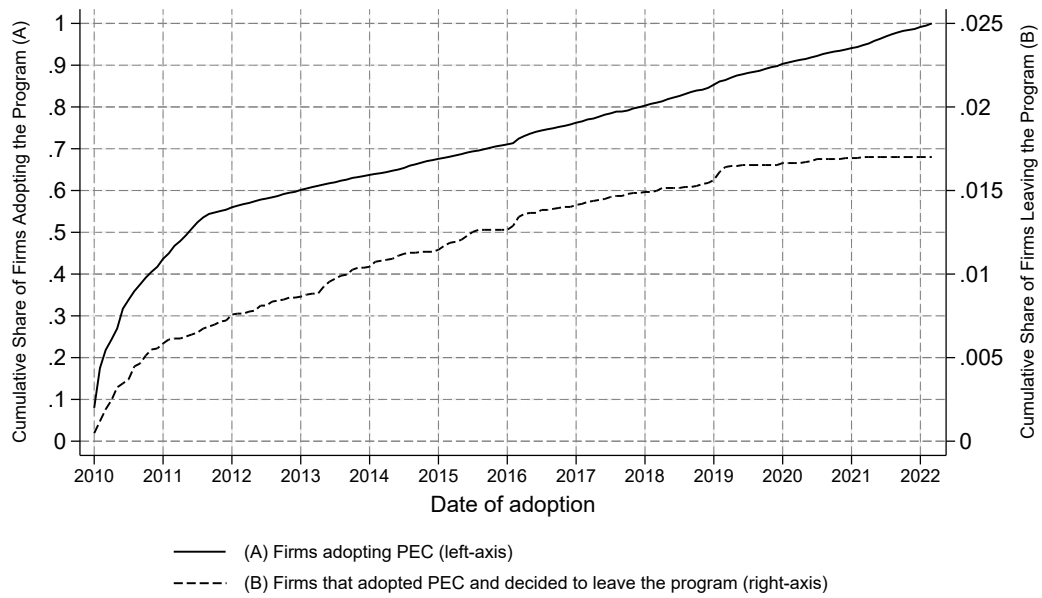
- Adams, A., Jensen, M. F., and Petrongolo, B. (2024). Birth timing and spacing: Implications for parental leave dynamics and child penalties. *Working paper*.
- Adhvaryu, A., Gauthier, J.-F., Nyshadham, A., and Tamayo, J. (2024). Absenteeism, productivity, and relational contracts inside the firm. *Journal of the European Economic Association*, page jvae026.
- Aksoy, C. G., Barrero, J. M., Bloom, N., Davis, S. J., Dolls, M., and Zarate, P. (2022). Working from home around the world. *Brookings Papers on Economic Activity*, 2022(2):281–360.
- Andresen, M. E. and Nix, E. (2022). What causes the child penalty? evidence from adopting and same-sex couples. *Journal of labor economics*, 40(4):971–1004.
- Azoulay, P., Graff Zivin, J. S., and Wang, J. (2010). Superstar extinction. *The Quarterly Journal of Economics*, 125(2):549–589.
- Baker, G., Gibbs, M., and Holmstrom, B. (1994). The wage policy of a firm. *The Quarterly Journal of Economics*, 109(4):921–955.
- Bandiera, O., Barankay, I., and Rasul, I. (2005). Social preferences and the response to incentives: Evidence from personnel data. *The Quarterly Journal of Economics*, 120(3):917–962.
- Banerjee, A. and Duflo, E. (2006). Addressing absence. *Journal of Economic perspectives*, 20(1):117–132.
- Barmby, T. A., Ercolani, M. G., and Treble, J. G. (2002). Sickiness absence: an international comparison. *The Economic Journal*, 112(480):F315–F331.
- Battiston, D., Blanes i Vidal, J., and Kirchmaier, T. (2021). Face-to-face communication in organizations. *The Review of Economic Studies*, 88(2):574–609.
- Beccaria, L. and Maurizio, R. (2020). Labour market turnover in latin america: How intensive is it and to what extent does it differ across countries? *International Labour Review*, 159(2):161–193.
- Blair, P. Q. and Posmanick, B. (2023). Why did gender wage convergence in the united states stall? Technical report, National Bureau of Economic Research.
- Bloom, N., Kretschmer, T., and Van Reenen, J. (2011). Are family-friendly workplace practices a valuable firm resource? *Strategic Management Journal*, 32(4):343–367.
- Bloom, N., Lemos, R., Sadun, R., Scur, D., and Van Reenen, J. (2014). Jeea-fbbva lecture 2013: The new empirical economics of management. *Journal of the European Economic Association*, 12(4):835–876.
- Bonhomme, S. and Jolivet, G. (2009). The pervasive absence of compensating differentials. *Journal of Applied Econometrics*, 24(5):763–795.
- Bradley, S., Green, C., and Leever, G. (2007). Worker absence and shirking: Evidence from matched teacher-school data. *Labour economics*, 14(3):319–334.
- Brenøe, A. A., Canaan, S. P., Harmon, N. A., and Royer, H. N. (2020). Is parental leave costly for firms and coworkers? Technical report, National Bureau of Economic Research.
- Callaway, B. and Sant’Anna, P. H. (2021). Difference-in-differences with multiple time periods. *Journal of Econometrics*, 225(2):200–230.
- Colonnelli, E., Prem, M., and Teso, E. (2020). Patronage and selection in public sector organizations. *American Economic Review*, 110(10):3071–99.
- Cortes, P. and Pan, J. (2019). Gender, occupational segregation, and automation. *Economics Studies at Brookings*, pages 1–32.
- Dahl, G. B., Løken, K. V., Mogstad, M., and Salvanes, K. V. (2016). What is the case for

- paid maternity leave? *Review of Economics and Statistics*, 98(4):655–670.
- De Paola, M., Scoppa, V., and Pupo, V. (2014). Absenteeism in the italian public sector: The effects of changes in sick leave policy. *Journal of Labor Economics*, 32(2):337–360.
- Dechter, E. K. (2014). Maternity leave, effort allocation, and postmotherhood earnings. *Journal of Human Capital*, 8(2):97–125.
- Emanuel, N., Harrington, E., and Pallais, A. (2023). The power of proximity to coworkers: training for tomorrow or productivity today? Technical report, National Bureau of Economic Research.
- Felfe, C. (2012). The willingness to pay for job amenities: Evidence from mothers’ return to work. *ILR Review*, 65(2):427–454.
- Friedrich, B. U. and Hackmann, M. B. (2021). The returns to nursing: Evidence from a parental-leave program. *The Review of Economic Studies*, 88(5):2308–2343.
- Ginja, R., Karimi, A., and Xiao, P. (2023). Employer responses to family leave programs. *American Economic Journal: Applied Economics*, 15(1):107–35.
- Golightly, E. and Meyerhofer, P. (2022). Does paid family leave cause mothers to have more children? evidence from california. *Journal of Labor Research*, pages 1–36.
- Gonzaga, G. (1998). Turnover and quality of employment in brazil. *Brazilian Journal of Political Economy*, 18(1):121–143.
- Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. *Journal of Econometrics*, 225(2):254–277.
- Herrmann, M. A. and Rockoff, J. E. (2012). Worker absence and productivity: Evidence from teaching. *Journal of Labor Economics*, 30(4):749–782.
- Hersch, J. (1998). Compensating differentials for gender-specific job injury risks. *The American Economic Review*, 88(3):598–607.
- Hesselius, P., Nilsson, J. P., and Johansson, P. (2009). Sick of your colleagues ‘absence’? *Journal of the European Economic Association*, 7(2-3):583–594.
- Ichino, A. and Moretti, E. (2009). Biological gender differences, absenteeism, and the earnings gap. *American economic journal: applied economics*, 1(1):183–218.
- Jäger, S. and Heining, J. (2022). How substitutable are workers? evidence from worker deaths. Technical report, National Bureau of Economic Research.
- Johansson, P., Karimi, A., and Peter Nilsson, J. (2019). Worker absenteeism: peer influences, monitoring and job flexibility. *Journal of the Royal Statistical Society Series A: Statistics in Society*, 182(2):605–621.
- Johnsen, J., Ku, H., and Salvanes, K. G. (2023). Competition and career advancement.
- Kleven, H., Landais, C., and Leite-Mariante, G. (2023). The child penalty atlas. Technical report, National Bureau of Economic Research.
- Kleven, H., Landais, C., and Søgaaard, J. E. (2019). Children and gender inequality: Evidence from denmark. *American Economic Journal: Applied Economics*, 11(4):181–209.
- Lalive, R., Schlosser, A., Steinhauer, A., and Zweimüller, J. (2014). Parental leave and mothers’ careers: the relative importance of job protection and cash benefits. *Review of Economic Studies*, 81(1):219–265.
- Lalive, R. and Zweimüller, J. (2009). How does parental leave affect fertility and return to work? evidence from two natural experiments. *The Quarterly Journal of Economics*, 124(3):1363–1402.
- Lazear, E. P. and Rosen, S. (1981). Rank-order tournaments as optimum labor contracts. *Journal of political Economy*, 89(5):841–864.
- Lazear, E. P. and Rosen, S. (1990). Male-female wage differentials in job ladders. *Journal*

- of *Labor Economics*, 8(1, Part 2):S106–S123.
- Lohaus, D. and Habermann, W. (2019). Presenteeism: A review and research directions. *Human Resource Management Review*, 29(1):43–58.
- Machado, C., Neto, V., and Szerman, C. (2024). Firm and worker responses to extensions in paid maternity leave. *Journal of Human Resources*.
- Markussen, S. (2012). The individual cost of sick leave. *Journal of Population Economics*, 25(4):1287–1306.
- Markussen, S., Røed, K., Røgeberg, O. J., and Gaure, S. (2011). The anatomy of absenteeism. *Journal of health economics*, 30(2):277–292.
- Mas, A. and Moretti, E. (2009). Peers at work. *American Economic Review*, 99(1):112–145.
- Moss, P. (2022). 18th international review of leave policies and related research 2022.
- Roche, M. P., Oettl, A., and Catalini, C. (2024). Proximate (co-) working: Knowledge spillovers and social interactions. *Management Science*.
- Rosen, S. (1986). The theory of equalizing differences. *Handbook of labor economics*, 1:641–692.
- Silva, L. A., de Mesquita, D. P., and Carvalho, B. G. E. (2010). Investigando o processo de adoção no brasil e o perfil dos adotantes. *Revista de Ciências Humanas*, 44(1):191–204.
- Sun, L. and Abraham, S. (2021). Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. *Journal of Econometrics*, 225(2):175–199.
- Tô, L. T. (2018). The signaling role of parental leave. *Mimeo*.
- Xiao, P. (2023). Equilibrium sorting and the gender wage gap. Technical report, Working Paper.

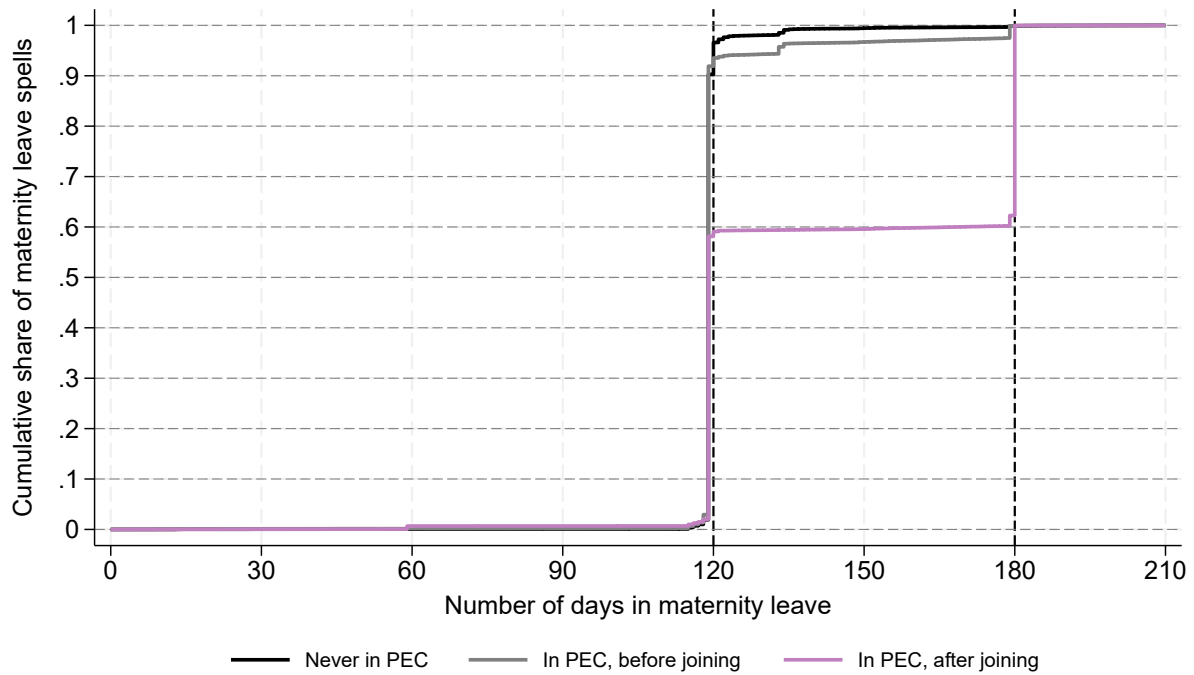
6 Figures and tables

Figure 1: Cumulative distribution of firms adopting and leaving PEC over time.



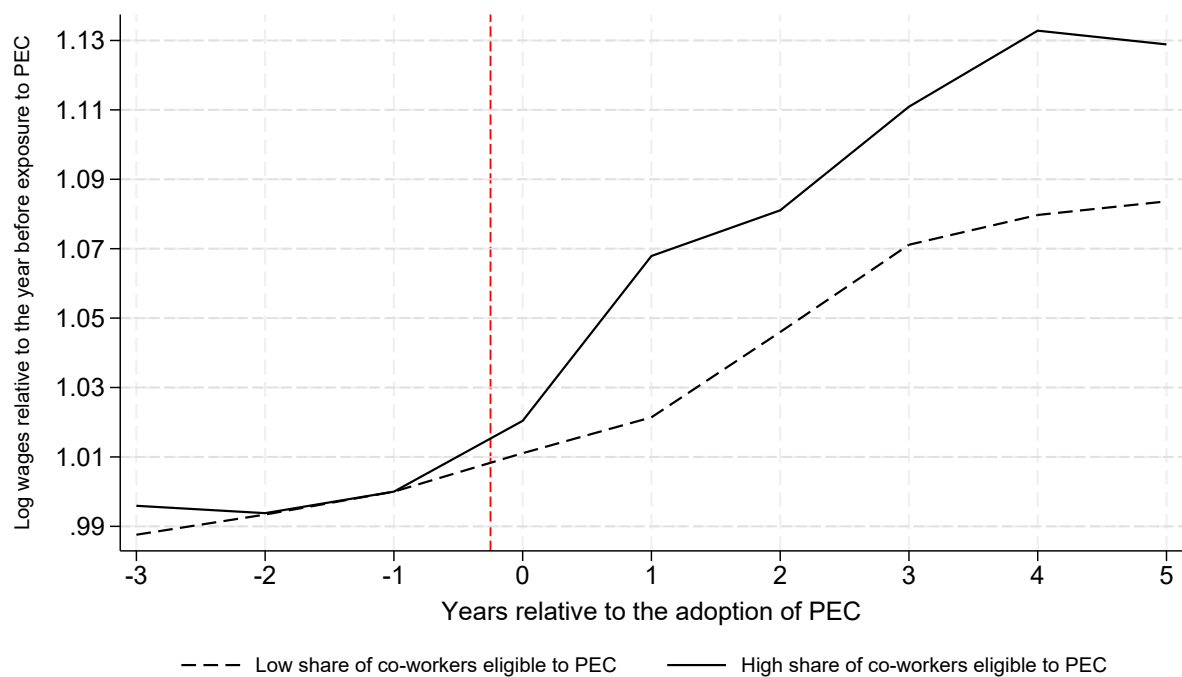
Notes: The solid line (left-axis) of this figure shows the cumulative proportion of firms adopting PEC over the months between January 2010 and March 2022. The dashed line (right-axis) shows the proportion of firms that once adopted the program and decided to leave at any moment in the future.

Figure 2: Cumulative distribution of days in maternity leave at the worker level.



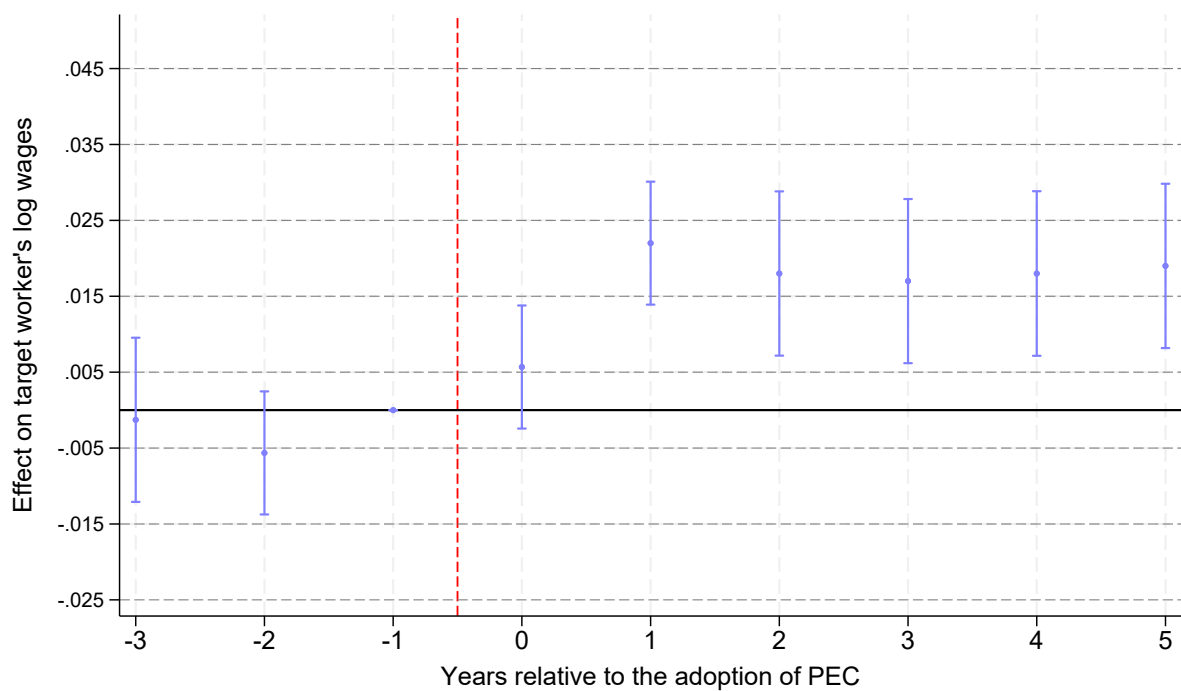
Notes: This figure shows the accumulated proportion of workers by the length of their maternity leave spells using all spells registered in RAIS between 2007 and 2019. The black line represents spells from workers mothering a child in firms that never adopted PEC. The grey line shows the cumulative distribution for workers working in firms that adopted PEC at any point between 2010 and 2022 but were ineligible for extended maternity leave (i.e., mothered a child before the policy was adopted in the workplace). The purple line represents maternity leave spells of workers giving birth after the policy was introduced in their workplace.

Figure 3: Wage trajectories and co-workers' eligibility to extended maternity leave.



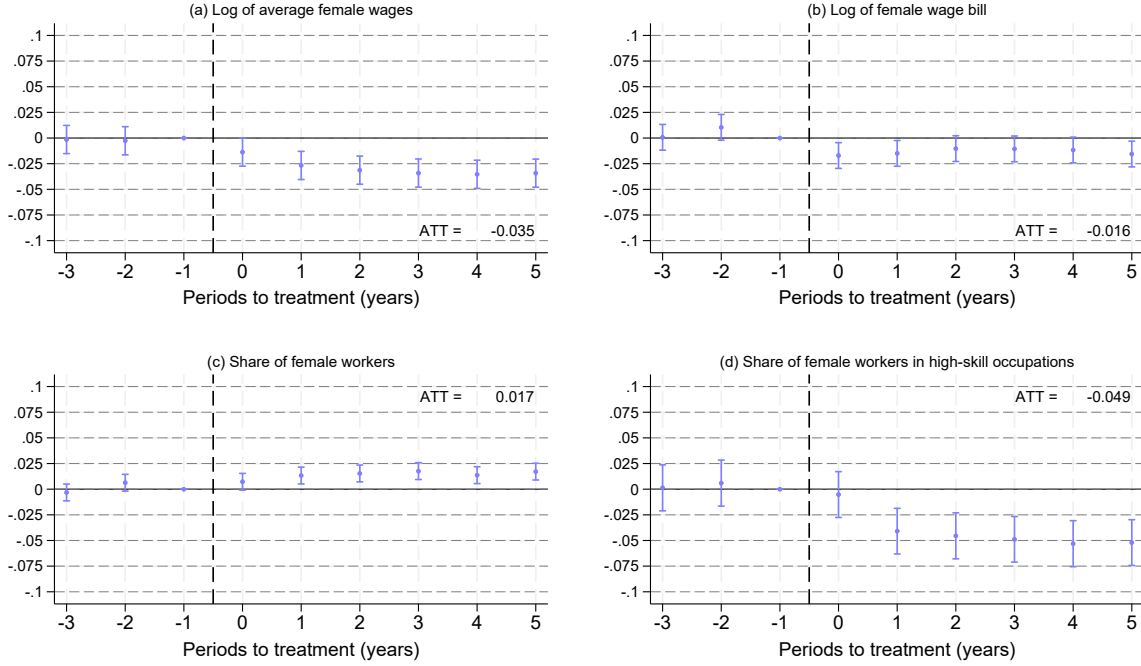
Notes: This figure shows the relative log-wages of target workers with a low and high share of co-workers eligible for PEC. These are presented relative to one year before the year each target worker is initially exposed to PEC in their workplaces.

Figure 4: Reduced form effects of co-worker eligibility on target workers' log wages.



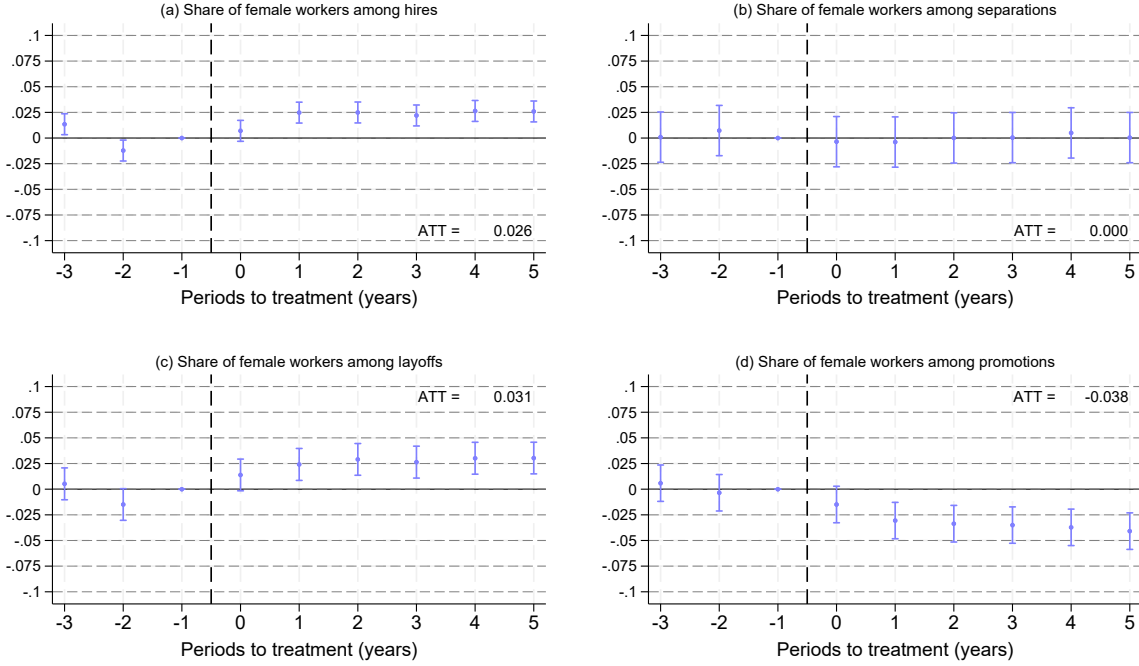
Notes: This figure shows Equation's 2 estimates using the share of eligible co-workers (z_i) as explanatory variable. Fixed effects for individuals, event-year and event-year by year of adoption are included. The bars indicate 95% confidence intervals using standard errors clustered at the establishment (at year $k = 0$) level.

Figure 5: OLS effects of PEC's adoption at the workplace - Main outcomes.



Notes: This Figure shows the estimated coefficients from Equation 5 using the sample of establishments from firms that adopted PEC between January 2010 and December 2014. The outcome in panel (a) is the log of average female wages at the workplace in each event year. Panel (b) has the log of the female wage bill measured as the sum of all wages paid to female workers in the establishment by December of each year (notice that this amount includes all types of payments, including the wages paid by the firm during maternity leave that are later refunded by the government). Panel (c) shows the results for the share of female workers in the workplace by December of each year, and Panel (d) for the share of female workers in high-skill occupations. The ATT displayed in each figure is calculated as the average effect in the between event years $k = 0$ and $k = 5$.

Figure 6: OLS effects of PEC's adoption at the workplace - Additional outcomes.



Notes: This Figure shows the estimated coefficients from Equation 5 using the sample of establishments from firms that adopted PEC between January 2010 and December 2014. The outcomes of each panel are: (a) the number of female workers hired in a given year divided by the total number of workers hired in the same year; (b) the number of separations from female workers divided by the total number of separations recorded by the establishment in each year ; (c) the number of layoffs of female workers (defined as a separation originated from the firm's initiative) divided by the total number of layoffs in the year ; and (d) the share of workers promoted in the year who female (the definition of promotion is the same one described in Appendix B. The ATT displayed in each figure is calculated as the average effect in the between event years $k = 0$ and $k = 5$.

Table 1: Descriptives - RAIS 2015.

Variable	(1)	(2)	(3)	(4)	(5)
Total number of employment spells	69,805,217	48,980,500	33,873,924	30,519,752	10,349,900
Total number of female employment spells	29,719,539	21,227,648	13,091,525	11,643,112	3,636,264
Total number of maternity leave spells	1,031,463	949,462	704,469	641,255	209,535
Total number of firms	2,711,457	2,134,422	628,025	597,863	56,237
Total number of establishments	3,395,763	2,683,396	784,032	712,827	104,855
Average number of employment spells across firms	25.7	17.8	37.4	34.8	124.2
Median number of employment spells across firms	4	3	11	10	23
Average number of employment spells across establishments	20.6	14.1	32.0	30.4	69.7
Median number of employment spells across establishments	4	3	11	11	18
Sample restrictions					
Employed at 01/01/2015		X			
Private-sector firms with at least five employment spells			X	X	X
Permanent workers working full-time			X	X	X
Firms eligible to PEC's fiscal rebate				X	X

Notes: Universe of firms and workers registered in RAIS 2015 with at least one employment spell on 01/01/2015. A permanent worker is a worker under a contract that is not temporary (i.e., does not have a pre-determined date to end), and a worker is considered to be full-time if she works at least 35 hours per week. A firm is considered to be eligible for PEC's fiscal rebate if it is under a real-profit tax scheme in 2015. The maternity leave spells recorded in this table include those spells that started in 2014 and finished in 2015, as well as the spells that started in 2015.

Table 2: Matching between RAIS, tax scheme information, and firms adopting PEC.

	Headquarters only	All establishments
Firms adopting PEC matched to RAIS	16,038	98,316
Firms adopting PEC matched to the tax registry	12,430	64,829
Eligible firms ^a	4,371	54,829
Non-eligible firms ^a	8,059	10,000
Firms that became eligible ^b	547	1,216
Importance in terms of employment spells ^c	0.012	0.041
Importance in terms of maternity leave spells ^c	0.012	0.047

^a Firms under a real-profit tax scheme between 2014 and 2020.

^b Firms that started the 2014-2020 period in any tax scheme other than real profits and moved to real profit taxation at any time.

^c The importance of these establishments is calculated using the average number of employment and maternity leave spells registered in the country between 2010 and 2019.

Table 3: Descriptives for target worker's observables in the year before birth.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Whole sample		Low-share ($z \leq 0.50$)		High-share ($z > 0.50$)		Difference ^d
	Mean	SD	Mean	SD	Mean	SD	
<i>Target worker</i>							
Year of admission	2,004.27	7.89	2,004.27	7.91	2,004.26	7.88	0.013
Tenure at PEC's adoption	6.68	7.54	6.67	7.55	6.68	7.52	-0.012
Age at adoption	31.06	9.97	31.07	9.97	31.06	9.96	0.009
Female worker	0.45	0.50	0.45	0.50	0.45	0.50	0.001
College educated	0.45	0.50	0.45	0.50	0.45	0.50	0.001
Annual wage (in 000's of BRL) ^a	38.79	39.97	38.77	39.98	38.81	39.97	-0.040
Mean (median) number of co-workers ^b	11.77 (10)	12.39	11.69 (10)	12.19	11.84 (10)	12.59	-0.153
Share of co-workers eligible to extended leave ^{b,c}	0.49	0.45	0.26	0.47	0.72	0.36	-0.465***
Share of co-workers using extended leave ^{b,c}	0.24	0.25	0.11	0.18	0.37	0.37	-0.264***
Number of observations	423,926		215,780		211,146		
<i>Target worker's workplace</i>							
Average firm's earnings (in 000's of BRL) ^a	38.31	25.29	37.98	24.62	38.67	25.99	-0.691
Firm size	115.93	484.55	110.69	425.27	121.61	541.68	-10.925
Service sector	0.81	0.39	0.81	0.39	0.81	0.39	-0.004
Share of female workers	0.47	0.20	0.46	0.20	0.47	0.20	-0.002
Share of college-educated workers	0.45	0.32	0.44	0.32	0.46	0.32	-0.014*
Number of observations	7,028		3,660		3,368		

Notes: This table shows descriptive statistics for the sample of target workers. Columns (1)-(2) present the results for the pooled sample. Columns (3)-(4) show the results for the subsample of workers with a low share of co-workers eligible for PEC (i.e., less than 50% of co-workers giving birth after the adoption of the policy in her workplace). Columns show (5)-(6) the results for the subsample of workers with a high share of co-workers eligible to PEC (i.e., at least 50% of co-workers giving birth after the adoption of the policy in her workplace).

^a In Brazilian Reals (BRL). Prices of 2010.

^b Weighted by the inverse of team size.

^c Among co-workers who are target mothers.

^d T-test for difference in means between groups with unequal variances. * if p-value < 0.1; ** if p-value < 0.05, *** if p-value < 0.01.

Table 4: Effects of co-worker absence on target workers' log wages.

	(1)	(2)	(3)
Panel I - OLS			
Post $\times$ Share of absent co-workers (a)	0.061*** (0.006)	0.055*** (0.007)	0.012*** (0.006)
Panel II - Intent to Treat (ITT)			
Post $\times$ Share of eligible co-workers (z)	0.014* (0.008)	0.015** (0.007)	0.016*** (0.007)
Panel III - IV			
Post $\times a$	0.037* (0.020)	0.040** (0.020)	0.044** (0.018)
Event-year by year of adoption FE		X	X
Individual covariates			X
Number of observations	3,815,334		

Notes: This table reports equation's 3 estimates based on a panel of target workers observed three years before and five years after the year PEC was implemented in their firms. The variable a denotes the share of co-workers who used extended maternity leave. The instrument z measures the share of co-workers eligible for PEC. The variable $Post$ is an indicator to denote observations that happen after the adoption of the program. Standard errors clustered at the firm level.

Table 5: Robustness on the effects of co-worker eligibility on target workers' log wages.

	(1)	(2)	(3)	(4)	(5)	(6)
Post $\times$ Share of eligible co-workers (z)	0.016*** (0.007)	0.014*** (0.005)	0.015*** (0.005)	0.011** (0.005)	0.010* (0.005)	0.019** (0.009)
Event-year by year of adoption FE	X	X	X	X	X	X
Individual Covariates	X	X	X	X	X	X
Event-year by demographic group FE		X	X	X	X	X
Linear trend on month and year of adoption			X	X	X	X
Linear trend by number of co-workers			X	X		
Linear trend by number of mothers among co-workers				X	X	
Dropping births four months before adoption						X
Number of observations	3,815,334	3,815,334	3,815,334	3,815,334	3,815,334	2,260,784

Notes: This table reports equation's 3 estimates based on a panel of target workers observed three years before and five years after the year PEC was implemented in their firms. The variable z measures the share of co-workers eligible for extended maternity leave. Column (2) includes a linear trend of demographic group (defined as cells of age at birth quartiles and an indicator for having a college education) by event year. Column (3) allows for differential trends on month and year of PEC's adoption at the firm. Columns (4) and (5) include differential linear trends by number of co-workers (1-4, 5-10, 11-24, and 25+ co-workers) and number of mothers among co-workers (1, 2, 3, 4, and 5+), respectively. Column (6) drop from the set of co-workers any mother who was already on maternity leave when PEC was implemented in her firm. Standard errors are clustered at the establishment level.

Table 6: Effects of co-worker eligibility on target workers' log wages - Placebo adoption.

	(1)	(2)	(3)	(4)	(5)	(6)
	Placebo adoption one year before			Placebo adoption two years before		
Post $\times$ Share of eligible co-workers (z)	0.001 (0.008)	0.003 (0.007)	-0.004 (0.007)	-0.008 (0.009)	0.002 (0.007)	0.006 (0.006)
Event-year by year of adoption FE		X	X		X	X
Individual covariates			X			X
Number of observations		3,748,932			3,712,383	

Notes: This table reports the ITT effects from equation 3 using a placebo adoption of PEC. The variable z measures the share of co-workers eligible for extended maternity leave. The variable $Post$ is an indicator to denote observations that happen after the adoption of the program. The placebo exercise is defined as if the introduction of PEC in each firm in the sample has happened one year (columns 1-3) or two years (columns 4-5) before the actual date of adoption. The sample is based on a panel of target workers observed three years before and five years after the placebo date of the program's introduction in the firm. The variable z measures the share of co-workers eligible for extended maternity leave. All regressions have standard errors clustered at the establishment level.

Table 7: Effects of co-worker eligibility on target workers' log wages - Heterogeneity by different workplace settings.

	(1)	(2)		(3)		(4)	(5)	(6)
	Expected prize		Firm size growth		Availability of high-skill jobs			
	Low dispersion	High dispersion	Low growth	High growth	Low availability	High availability		
Post $\times$ Share of eligible co-workers (z)	0.010 (0.008)	0.021*** (0.008)	0.032*** (0.009)	0.010 (0.010)	0.052*** (0.008)	0.012 (0.010)		
Number of observations	1,910,618	1,904,716	1,934,052	1,881,282	1,917,695	1,897,639		

Notes: This table reports equation's 3 estimates based on a panel of target workers observed three years before and five years after the year PEC was implemented in their firms. The variable z measures the share of co-workers eligible for extended maternity leave. The variable *Post* is an indicator to denote observations that happen after the adoption of the program. Columns (1)-(2) split the sample between target workers who were in firms with wage growth dispersion (measured as the standard deviation of the within-establishment wage growth distribution of all female workers in the workplace between two years prior and the year of PEC's adoption) above and below the median, respectively. Columns (3)-(4) do the same but split the sample using the growth size of their establishment within the same period. Finally, Columns (5)-(6) split the sample between target workers in firms with above and below the median share of high-skill jobs in their establishments in the year before birth, respectively. All regressions include individual fixed effects and event-year by year of adoption fixed effects. Standard errors are clustered at the firm level.

Table 8: Effects of co-worker absence on target workers' labour market outcomes.

	(1)	(2)	(3)	(4)	(5)	(6)
	Prob. of separation		Prob. of layoff		Prob. of promotion	
Share of eligible co-workers (z)	-2.498*** (0.678)	-2.469*** (0.577)	-1.587* (0.845)	-1.564* (0.822)	2.876*** (0.901)	2.912*** (0.837)
$z \times \text{Female}$	0.597 (0.709)	0.622 (0.678)	1.175 (1.025)	1.720* (0.941)	-1.892* (1.052)	-1.828* (0.958)
Event-year by year of adoption FE	X	X	X	X	X	X
Individual covariates		X		X		X
Number of observations	423,926					

Notes: This table reports the regression coefficients for the effects of the share of co-workers eligible for PEC (z) on employment outcomes using a cross-section of target workers. Columns (1)-(2) have as dependent variable an indicator for workers who separated from their original firm anytime within five years after the year of PEC's adoption (column 2 includes individual covariates). Columns (3)-(4) replicate the same specifications but change the outcome variable for an indicator for workers who left their jobs due to the employer's initiative (layoffs) in the same period. Columns (5)-(6) use an indicator for workers promoted at least once in the same period. The variable z measures the share of co-workers eligible for PEC, and Female is an indicator to denote female target workers. Covariates include the worker's tenure at the year of PEC's adoption, year of birth, an indicator for college education, an indicator for being white, team size and fixed effects for city, occupation, and industry. Standard errors clustered at the firm level.

Table 9: Effects of co-worker eligibility on target workers' log wages - Heterogeneity by gender and age group.

	(1)	(2)	(3)	(4)	(5)
	Whole sample				
		Female workers		Male workers	
		All age groups	40+ years old	All age groups	40+ years old
Post $\times$ Share of eligible co-workers (z)	0.016*** (0.007)	0.003 (0.014)	0.001 (0.020)	0.028** (0.012)	0.021 (0.019)
Number of observations	3,815,334	1,376,914	344,228	1,633,470	460,722

Notes: This table reports equation's 3 estimates based on a panel of target workers observed three years before and five years after the year PEC was implemented in their firms. The variable z measures the share of co-workers eligible for extended maternity leave. The variable *Post* is an indicator to denote observations that happen after the adoption of the program. Column (1) shows the main specification from Table 4. Columns (2)-(3) restricts the sample to female workers from all age groups and those at least 40 years old in the year of PEC's adoption in the firm. Columns (4)-(5) split the sample similarly for male workers. All regressions include individual and event-year by year of adoption fixed effects. Standard errors are clustered at the firm level.

Table 10: Descriptive statistics for treated workers and correspondent matched comparison groups.

Variable	Group	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel I - Worker's characteristics								
Female	Treated	0.45	0.46	0.46	0.47	0.47	0.48	0.49
	Matched comparison group	-	0.46	0.46	0.47	0.47	0.48	0.49
Age	Treated	31.06	31.62	31.56	31.77	31.89	31.03	31.68
	Matched comparison group		31.62	31.50	31.84	31.97	31.07	31.72
Monthly earnings	Treated	3232.75	3281.69	3280.25	3250.39	3403.43	3300.33	3348.67
	Matched comparison group		3406.69	3169.25	3354.39	3490.43	3182.33	3430.67
Hours worked per week	Treated	40.79	40.45	40.12	40.56	40.76	40.98	40.94
	Matched comparison group		40.27	40.64	40.63	40.08	40.86	40.93
Tenure in years	Treated	6.68	6.71	6.70	6.72	6.72	6.71	6.71
	Matched comparison group	-	6.71	6.70	6.72	6.72	6.71	6.71
College	Treated	0.45	0.49	0.46	0.49	0.48	0.46	0.47
	Matched comparison group	-	0.48	0.47	0.50	0.48	0.46	0.47
Number of co-workers	Treated	11.77	11.84	11.78	11.86	11.89	11.89	11.82
	Matched comparison group		11.16	10.97	12.48	11.76	12.89	12.59
Share of female co-workers	Treated	0.45	0.46	0.46	0.46	0.46	0.46	0.46
	Matched comparison group	-	0.45	0.46	0.46	0.46	0.47	0.45
Number of observations		423,926	364,576	195,005	252,659	178,472	83,937	38,023
Panel II - Firm's characteristics								
Size	Treated	115.93	115.62	115.90	116.24	115.40	116.69	115.94
	Matched comparison group	-	115.68	116.43	116.01	114.54	116.04	115.43
Share of female workers	Treated	0.47	0.47	0.47	0.47	0.48	0.46	0.47
	Matched comparison group	-	0.48	0.46	0.47	0.48	0.46	0.46
Share of college-educated workers	Treated	0.45	0.46	0.44	0.45	0.46	0.45	0.45
	Matched comparison group	-	0.46	0.44	0.45	0.45	0.46	0.45
Number of observations		7,028	6,198	3,327	4,287	3,072	1,423	653

Notes: This table shows a set of descriptive statistics for the sample of treated and comparison units constructed according to the procedure described in Appendix C.1. Column (1) shows the baseline characteristics of treated workers (target workers in the main sample). Columns (2)-(6) present the same characteristics for different groups of comparison units. Column (2) allows all workers who were never exposed to PEC (i.e., worked in firms under the real-profit tax scheme but never adopted the program) to be included in the comparison group. Comparison workers from this group are also matched using the full six-digit occupation code from the CBO classification. Column (3) uses workers employed in firms who adopted PEC at least three years after the year each target worker was exposed to the policy. Column (4) restricts the comparison group to workers from the same firm as the target worker but with two additional restrictions: (a) having no female co-worker in the year of PEC's adoption, (b) having the same 4-digit occupation as the target worker. Column (5) replicates the restrictions in column (4) but uses the full 6-digit occupation to perform the matching. Column (6) restricts the comparison units from being from the same workplace as the target worker but not being exposed to any co-worker using maternity leave on the 18-month window around the date of PEC's adoption. Finally, Column (7) restricts the comparison units to workers from the same workplace who do not experience any co-workers using extended maternity leave during the 18-month window around the date of PEC's adoption.

Table 11: OLS effects of exposure to PEC for different comparison groups.

	(1)	(2)	(3)	(4)	(5)	(6)
Panel I - Log wages						
Post $\times$ Treat	0.014** (0.006)	0.023* (0.012)	0.017 (0.018)	0.019 (0.036)	0.025 (0.016)	0.023 (0.436)
Panel II - Probability of promotion						
Post $\times$ Treat	0.845** (0.370)	1.181 (0.722)	0.884 (1.102)	1.096 (2.234)	1.054 (7.789)	0.783 (12.749)
Sample restrictions:						
Never treated	X					
Not-yet-treated		X				
Same firm, different workplace			X	X		
Same workplace					X	X
Six-digit occupation	X	X		X		
Four-digit occupation			X			
No female co-workers			X	X		
No co-workers on maternity leave					X	
No co-workers on extended maternity leave						X
Number of observations	729,152	390,010	505,318	356,944	167,874	76,046

Notes: This table presents the estimates of Equation 4 for the effects of exposure to PEC for workers exposed to the program. Each column in this table presents the results for a different comparison group. Panel I shows the results for a regression that has the log of average hourly wages as dependent variable. Panel II shows the results for the probability of the worker being promoted two years after PEC was adopted in his/her firm (the coefficients in this panel are multiplied by 100 to represent variations in percentage points). Column (1) allows all workers who were never exposed to PEC (i.e., worked in firms under the real-profit tax scheme that never adopted the program) in the comparison group. Comparison workers from this group are also matched using the full six-digit occupation code from the CBO classification. Column (2) uses workers employed in firms who adopted PEC at least three years after the year each target worker was exposed to the policy. Column (3) restricts the comparison group to workers from the same firm as the target worker but with two additional restrictions: (a) having no female co-worker in the year of PEC's adoption, (b) having the same 4-digit occupation as the target worker. Column (4) replicates the restrictions in column (3) but uses the full 6-digit occupation to perform the matching. Column (5) restricts the comparison units from being from the same workplace as the target worker but not being exposed to any co-worker using maternity leave on the 18-month window around the date of PEC's adoption. Finally, Column (6) restricts the comparison units to workers from the same workplace who do not experience any co-workers using extended maternity leave during the 18-month window around the date of PEC's adoption. See Appendix C.1 for more details about the construction of each comparison group. Standard errors clustered at the establishment level.

Table 12: Effect heterogeneity of exposure to PEC.

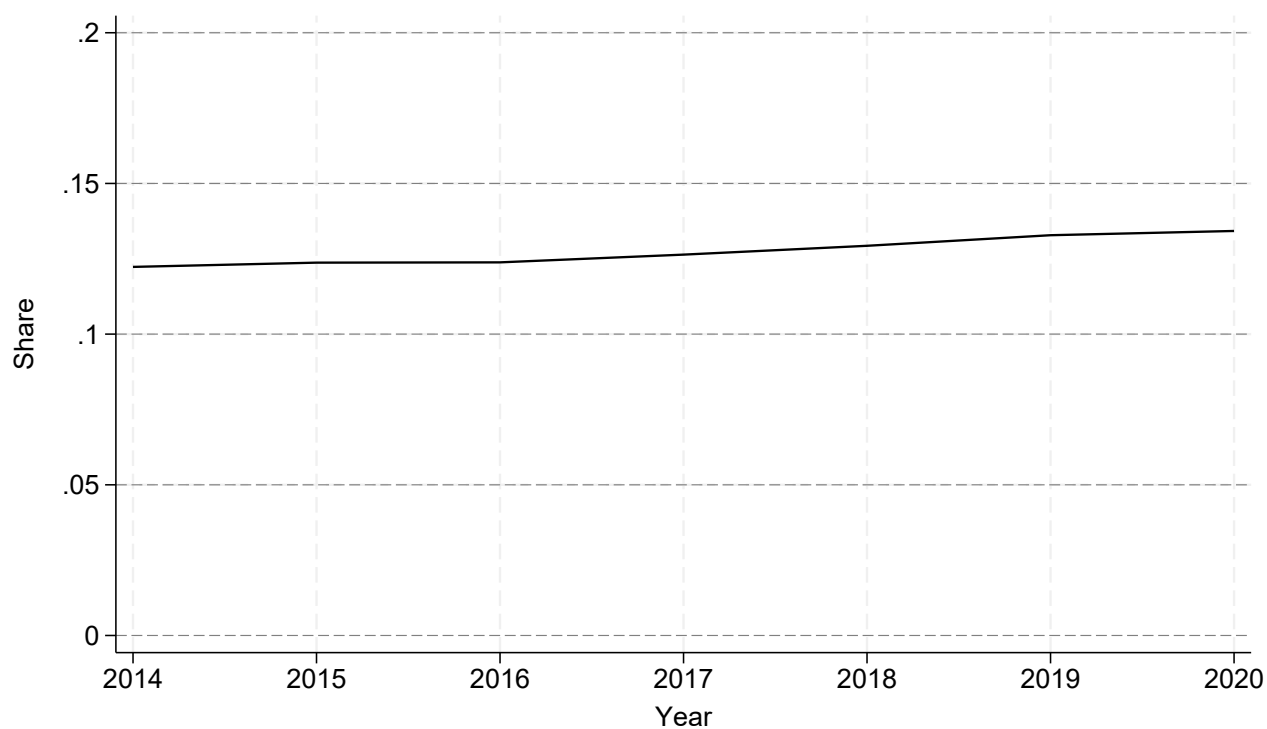
	(1)	(2)	(3)	(4)	(5)
Panel I - Log wages					
Post $\times$ Treat	0.014*** (0.006)	0.014*** (0.005)	0.018*** (0.007)	0.005 (0.009)	0.030*** (0.009)
Post $\times$ Treat $\times$ Female			-0.007 (0.007)	0.009 (0.009)	-0.016* (0.009)
Panel II - Probability of promotion					
Post $\times$ Treat	0.845** (0.369)	0.856*** (0.355)	1.213*** (0.397)	0.865* (0.521)	1.962*** (0.425)
Post $\times$ Treat $\times$ Female			0.420 (0.410)	0.845 (0.551)	-0.495 (0.564)
Covariates		X	X	X	X
Low increase in co-worker absence				X	
High increase in co-worker absence					X
Number of observations	729,152	729,152	729,152	379,888	349,264

Notes: This table presents the estimates of Equation 4 for the effects of exposure to PEC on workers exposed to the program in the year of adoption ($k = 0$). The comparison group in this table is composed of workers who have never worked in a firm that adopted PEC. Panel I shows the results for a regression that has the log of average hourly wages as the dependent variable. Panel II shows the results for the probability the worker being promoted two years after PEC was adopted in his/her firm (the coefficients in this panel are multiplied by 100 so they represent variations in percentage points). Column (1) replicates the first column of Table 11. Column (2) includes a set of covariates (indicators for using maternity leave within two calendar years after the exposure - i.e., $k \in \{0, 1, 2\}$, number of co-workers in $k = -1$, the share of female co-workers in $k = -1$, and fixed effects for month-year of exposure). Columns (3)-(5) allow for gender-specific effects. Columns (4) and (5) split the sample between target workers who faced low and high increase in the level of absenteeism from their co-workers observed in the first two calendar years after their initial exposure to PEC, respectively. The intensity of the increase in absenteeism a worker faces is defined as the share of co-workers who use extended maternity leave within two years after the worker is exposed to PEC. A worker has a low (high) increase in absenteeism if this intensity is smaller (bigger) than the median level of intensity recorded in the sample. See Appendix C.1 for more details about the construction of the matched comparison group. Standard errors clustered at the establishment level.

Appendices

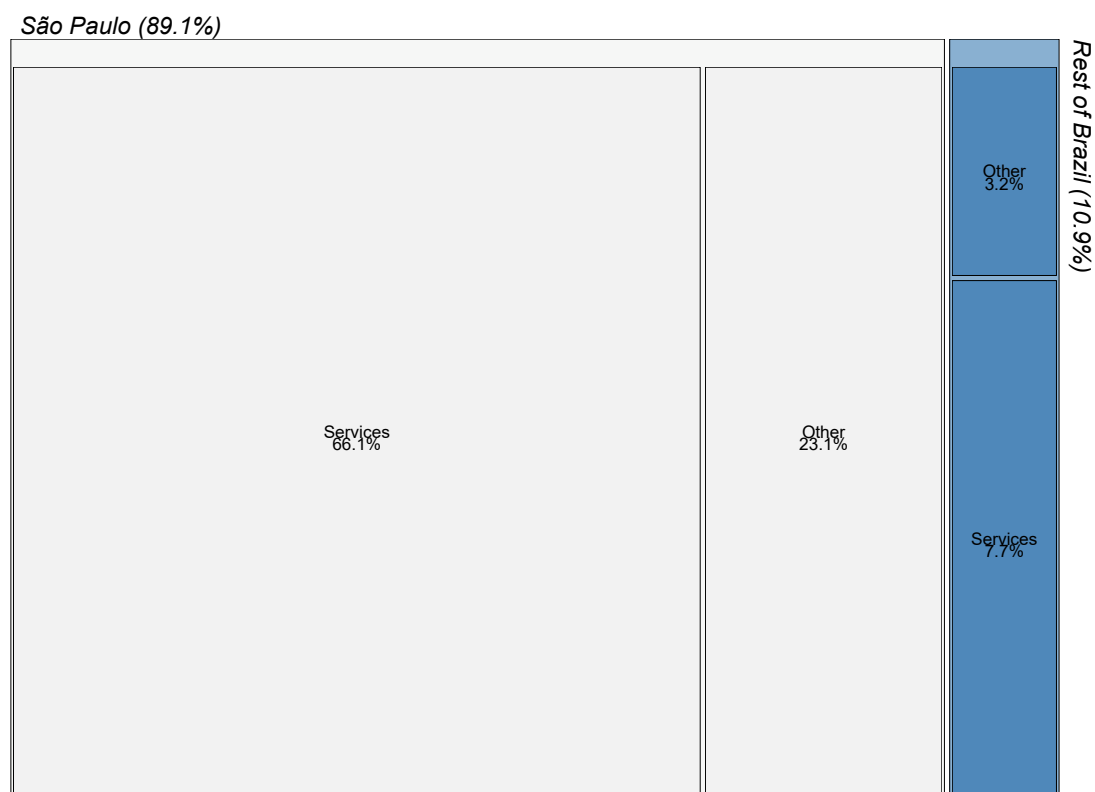
A Additional figures and tables

Figure A1: Share of firms in a real profit taxation scheme over time.



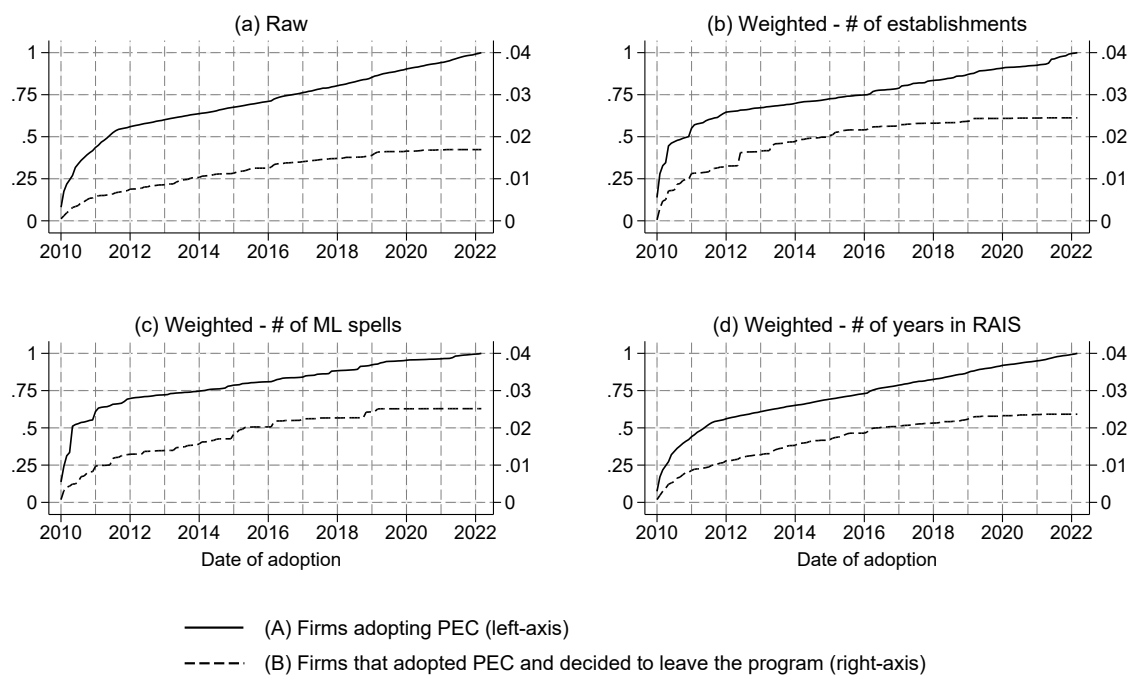
Notes: This picture shows the share of firms in the *tax registry sample* that were under a real profit taxation scheme between 2014 and 2020.

Figure A2: Share of firms adopting PEC by sector and region.



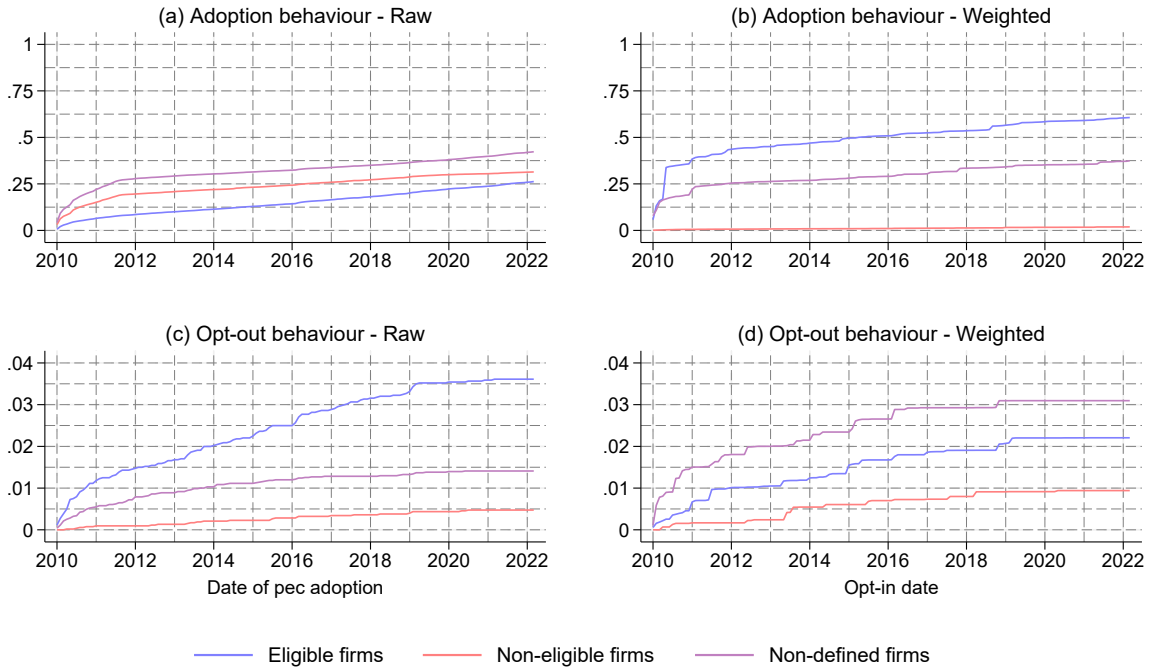
Notes: This figure describes the proportion of firms that adopted PEC between January 2010 and March 2021 by region and sector of activity. The sector variable is defined by using the Brazilian Classification of Economic Activities (CNAE version 2010).

Figure A3: Cumulative distribution of firms adopting and leaving PEC over time using different weights.



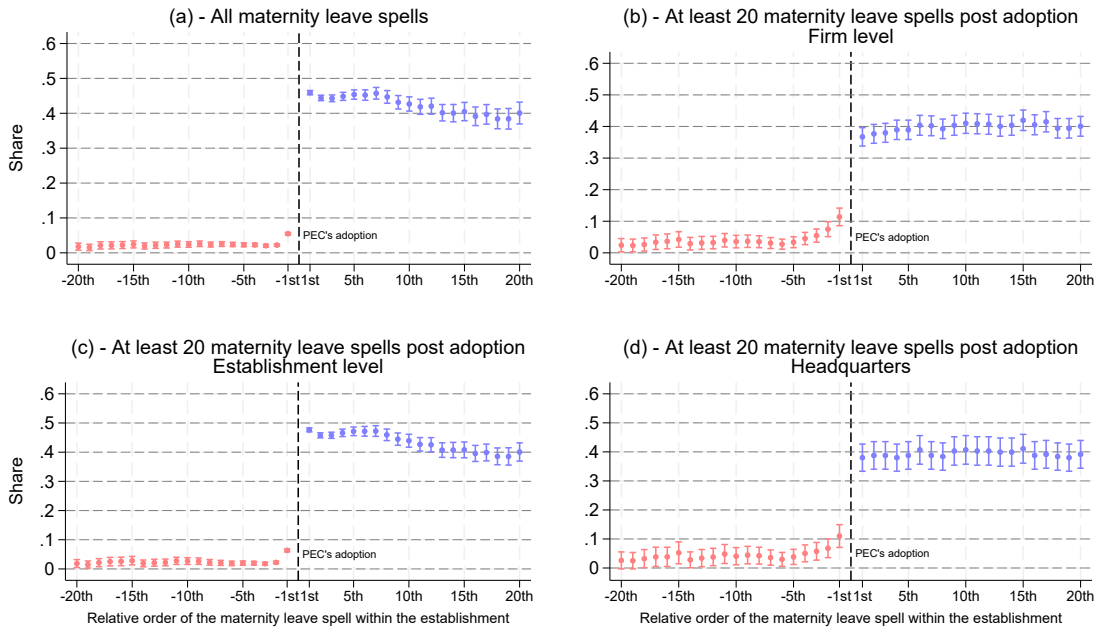
Notes: This figure replicates Figure 1 using different weights for each firm in the sample. Panel (a) presents the raw proportions as in Figure 1. Panel (b) weights each firm in the sample using their respective number of establishments, Panel (c) uses the number of maternity leave spells registered by each firm between 2007-2019, and Panel (d) uses the years each firm appeared in RAIS to calculate such weights. See notes to Figure 1 for more details.

Figure A4: Cumulative distribution of firms adopting and leaving PEC over time using different weights and eligibility status.



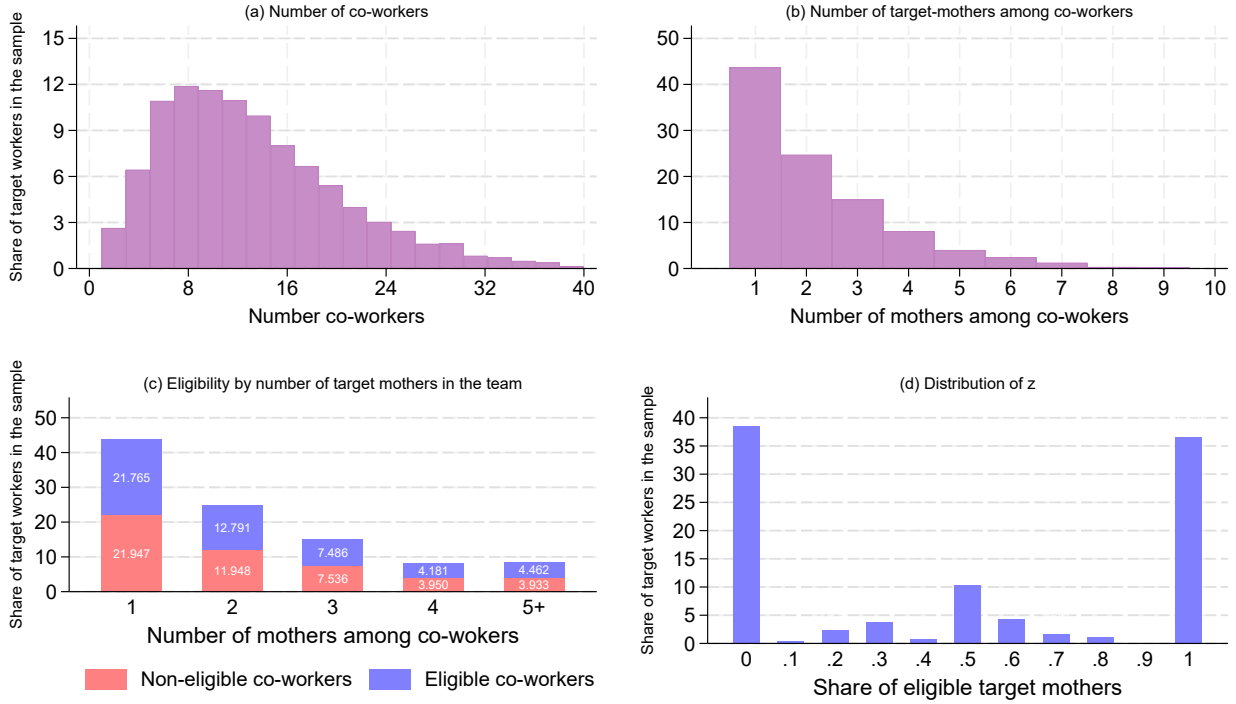
Notes: This figure replicates Figure A3 splitting the samples based on their eligibility status. The set of eligible firms is composed of firms under the real-profit tax scheme at any moment between 2014-2021. The non-eligible firms are those not registered in the real-profit tax scheme in the same period. The non-defined firms can be of two types: (i) those that joined PEC and were not matched to RAIS, or (ii) those for which *Receita Federal* did not provide the tax scheme information. See notes to Figure 1 for more details.

Figure A5: Proportion of workers using extended maternity leave at the establishment level around the adoption of PEC.



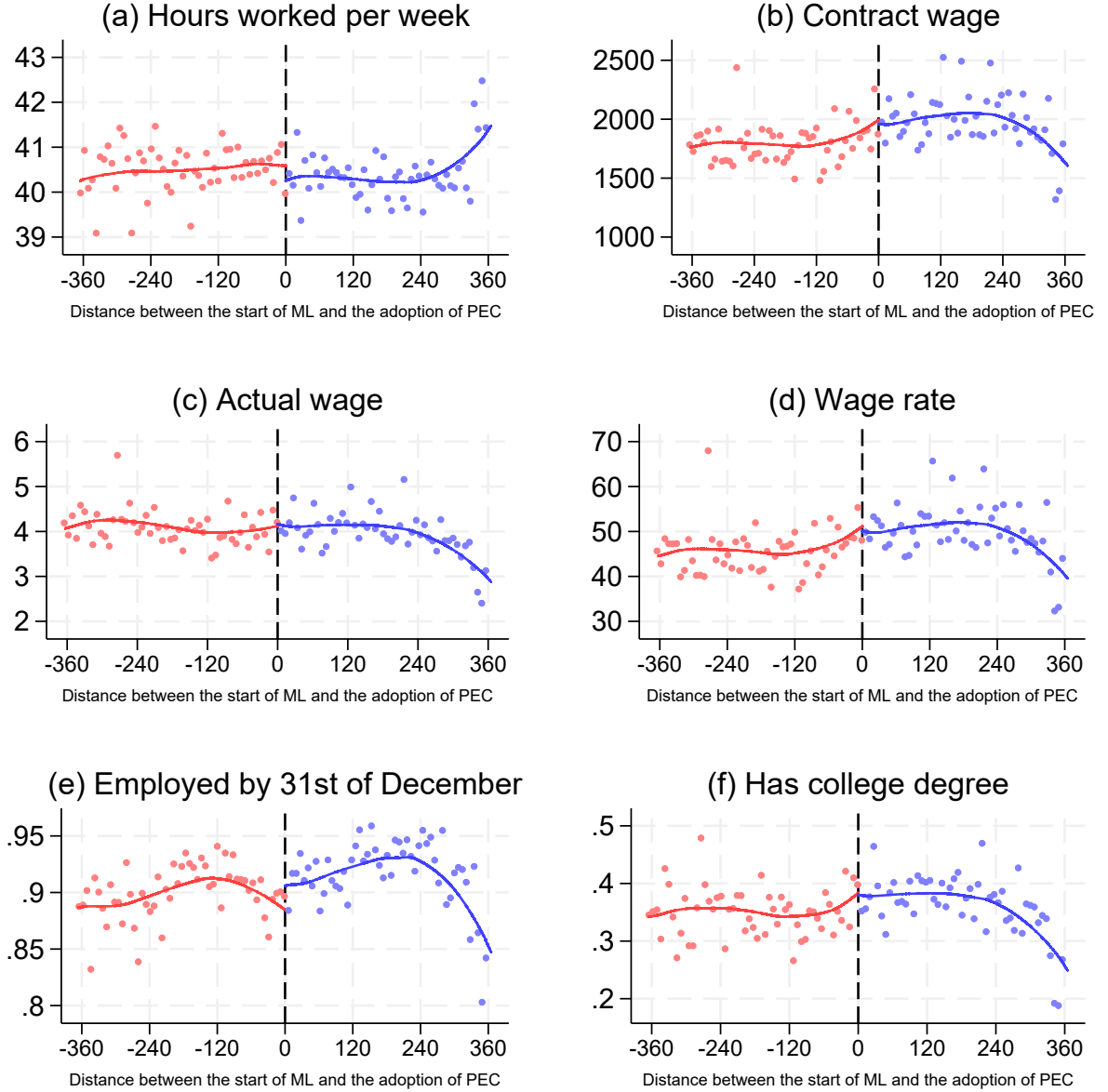
Notes: This figure shows the average proportion of workers using extended maternity leave according to the relative position of each maternity leave spell around the date of PEC's adoption within the establishment. Panel (a) uses all maternity leave spells in the sample. Panel (b) restricts the sample to firms with at least 20 spells after the adoption date and aggregates all maternity leave spells at the firm level. Panel (c) does the same but aggregates the spells at the establishment level. Panel (d) restricts the sample to only headquarters establishments.

Figure A6: Distribution of co-workers for the sample of target workers.



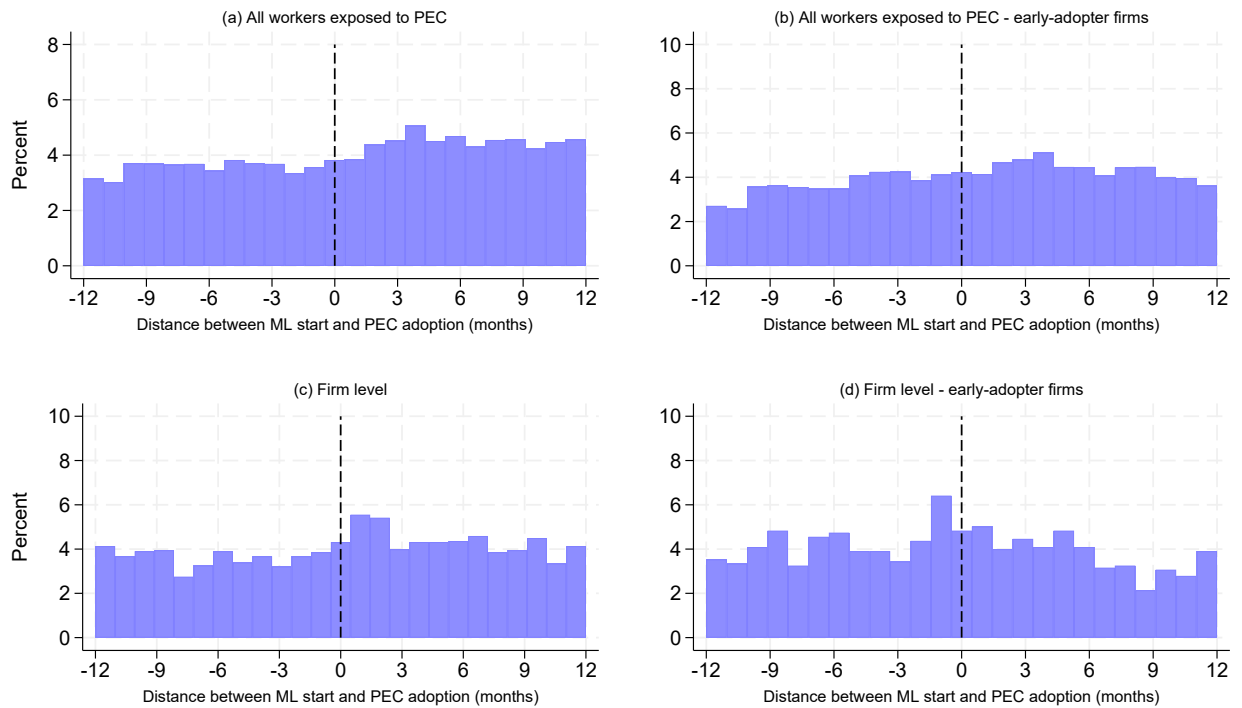
Notes: This Figure shows the distribution of target workers based on the number of co-workers who mothered a child in the window between nine months before and after the introduction of PEC in their firms. Panel (a) shows the distribution of team size (excluding the target worker) measured as the number of co-workers in the year of PEC's adoption (workers from the same workplace, with the same four-digit occupation code, employed by the 31st of December of the year of exposure to PEC). Panel (b) shows the distribution of target mothers (workers who mothered a child in the 18-month window around the date of PEC's adoption) among the set of co-workers. Panel (c) splits the sample from Panel (b) between target mothers who are eligible (blue bars) and not eligible (red bars) to PEC. The category 5+ represents those target workers with five or more mothers among their co-workers. Panel (d) shows the distribution of the instrumental variable z : the share of target mothers eligible to PEC among all target mothers.

Figure A7: Observable characteristics in the year before birth year by date of birth.



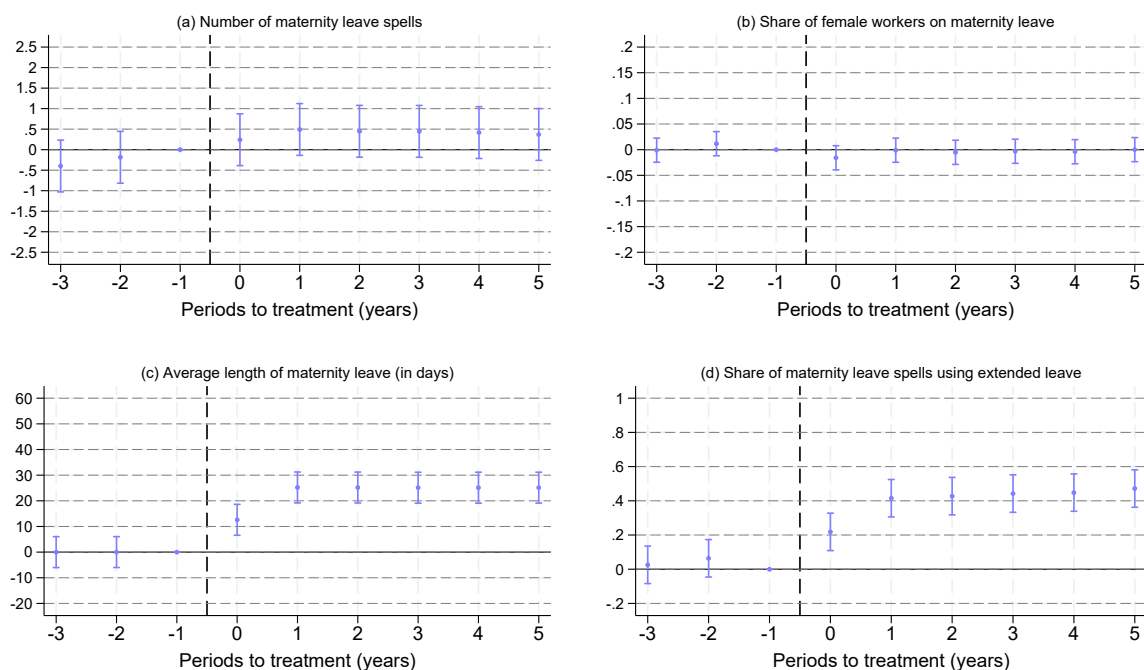
Notes: This figure displays local sample means for a series of observable characteristics measured in the year before birth for a sample of workers giving birth in the 12-month window around the date of PEC's adoption. Each local sample mean is calculated as the mean value of the outcome variable in bins of equal length (one week). The red (blue) line represents the estimates of a 4th-order global polynomial regression using the raw data before (after) the adoption of PEC in the workplace, the bandwidth of one week, and a triangular kernel function to weight the data points. Panel (b) displays the worker's contractual wage, i.e., the base wage written in her contract. Panel (c) displays her actual wage, i.e., the average wage paid to the worker across the year (measured in minimum wages). Panel (d) displays the wage per hour. Panel (e) has as outcome an indicator to denote if the worker was employed by the 31st of December of the year she gave birth. The outcome in Panel (f) is an indicator for target mothers with a college degree. All wage variables are in values of 2010. The lines in each plot represent the local polynomial regressions using the raw data.

Figure A8: Density of maternity leave take-up around PEC's adoption.



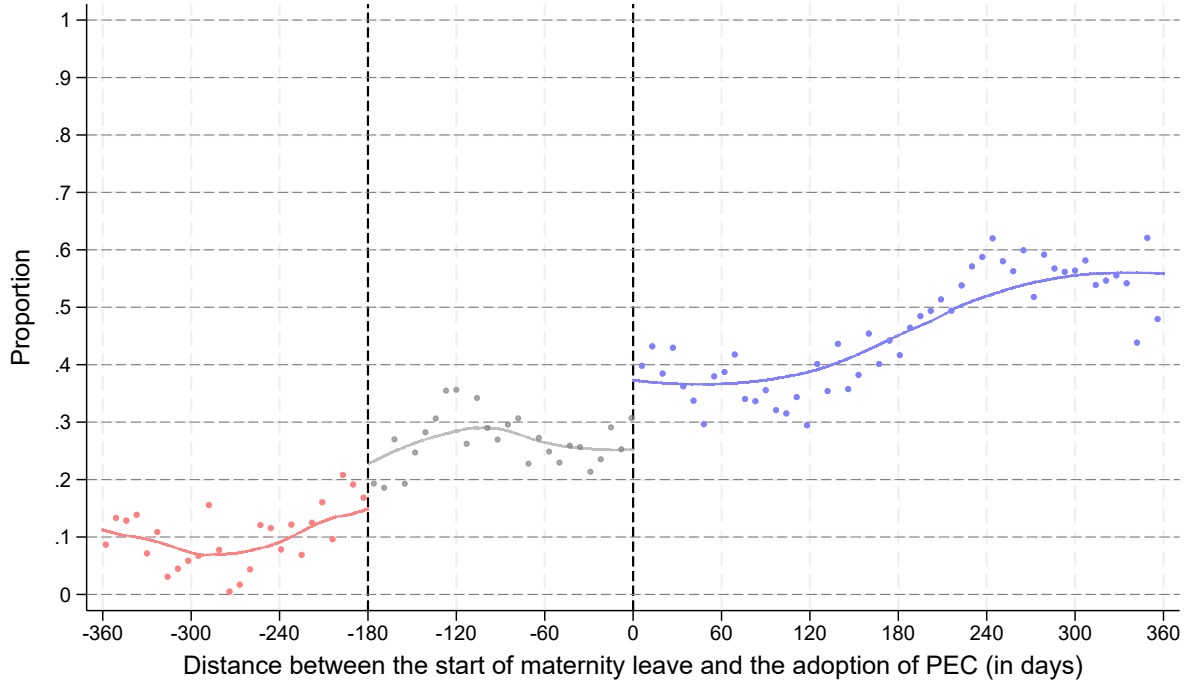
Notes: This figure presents the density of workers taking maternity leave in firms that adopted PEC between 2010 and 2020. Panel (a) shows the density for all workers, and panel (b) for workers from firms adopting the program in 2010. Panels (c) and (d) do the same but collapse the individual spells at the firm level.

Figure A9: Event-study regressions on establishment-level maternity leave outcomes



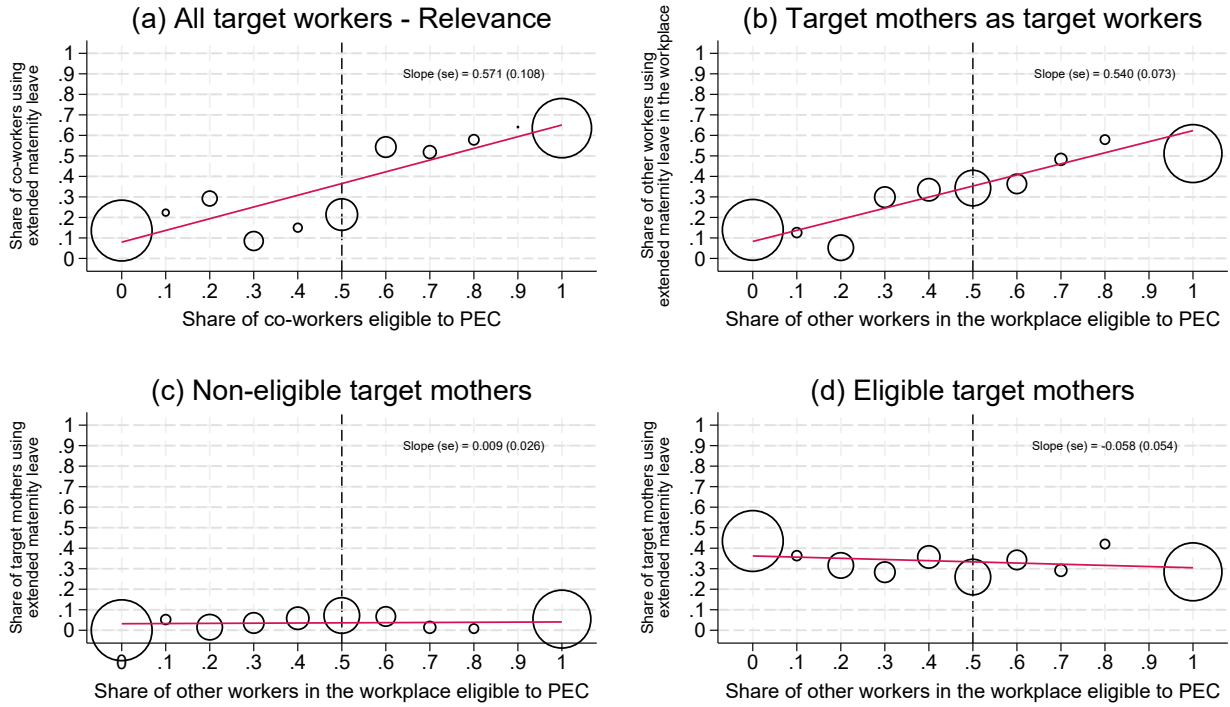
Notes: This figure shows the results from a set of event-study regressions at the establishment level using the sample of workplaces from firms that adopted PEC between January 2010 and December 2014. The event time $k = 0$ is defined as the calendar year PEC was introduced in the firm. The outcomes in each panel are: (a) the total number of maternity leave spells started in each calendar year; (b) the share of female workers starting a maternity leave spell in each year; (c) The average length of each maternity leave spell (measured in days); and (d) the share of maternity leave spells that used extended maternity leave (i.e., mothers who stayed at home for six months).

Figure A10: Share of workers using extended maternity leave.



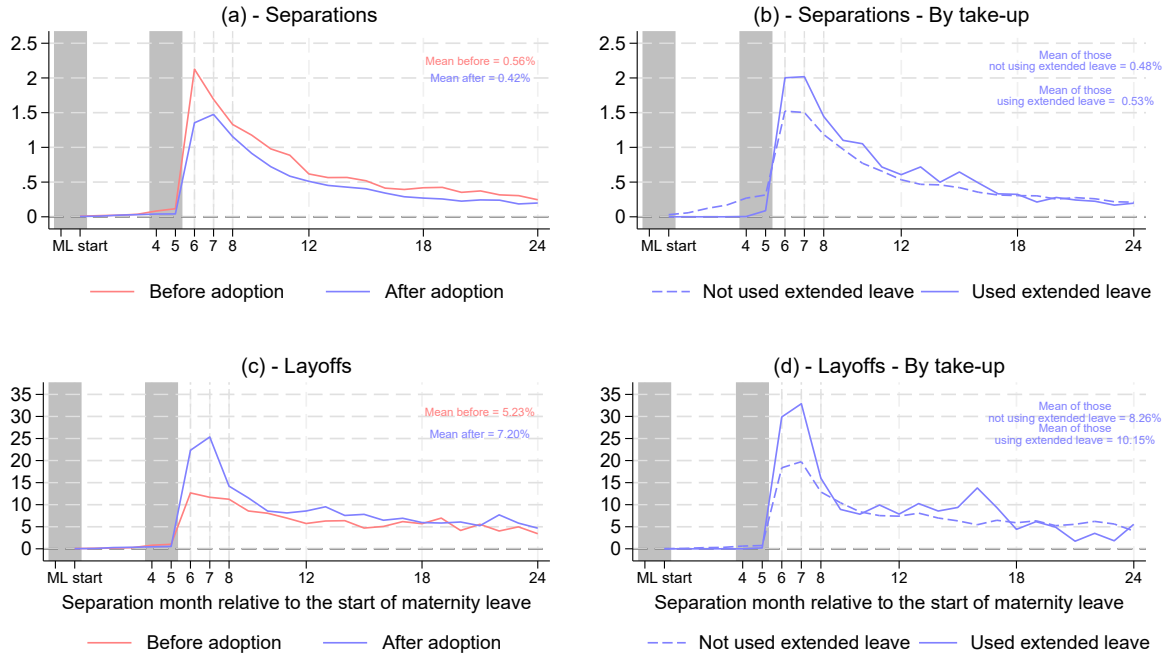
Notes: This figure displays the local sample mean for the proportion of workers using extended maternity leave in the 24-month window around the date of PEC's adoption. Each local sample mean is calculated as the mean value of the outcome variable in bins of equal length (one week). The red line represents the estimates of a 4th-order global polynomial regression using the raw data for workers giving birth between 12 and 6 months before the adoption of PEC in the workplace. The grey line does the same for the subsample of mothers giving birth within 6 months before the adoption of PEC. The blue line is for the subsample of mothers giving birth in the 12 months after PEC's adoption. All regressions use a triangular kernel function to weight the data points..

Figure A11: Relationship between co-workers' eligibility to PEC and the take-up of extended maternity leave.



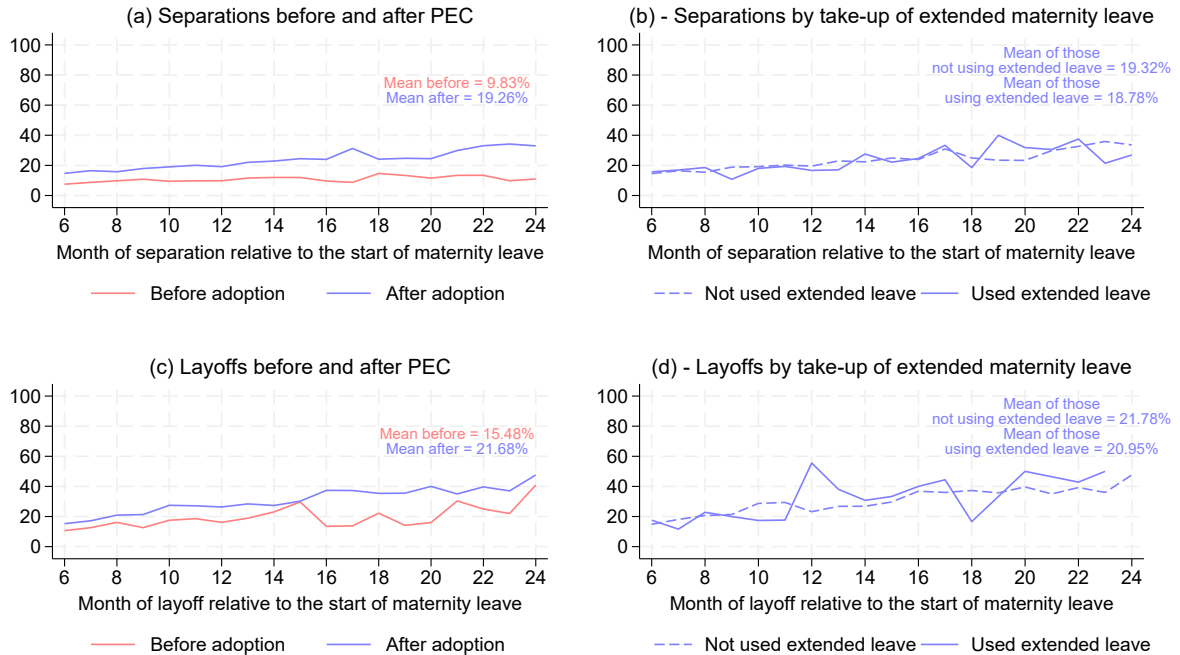
Notes: This figure shows the share of co-workers eligible for PEC, explaining two different outcomes. The size of each circle represents the share of target workers in each category in the x-axes. Panel (a) focuses on the main sample of target workers and plots the share of co-workers using extended maternity leave in the y-axis. Panel (b) restricts the sample to target mothers from the same workplace and uses the share of those workers who are eligible for PEC (x-axis) to explain the average take-up of extended leave at the workplace (y-axis). Panels (c) and (d) use the share of target mothers in the workplace eligible to PEC (x-axis) to explain the probability of each target mother using extended leave herself (y-axis). Panel (c) considers only those target mothers non-eligible for PEC, and Panel (d) is for the eligible mothers in the sample.

Figure A12: Probability of separation after the start of maternity leave.



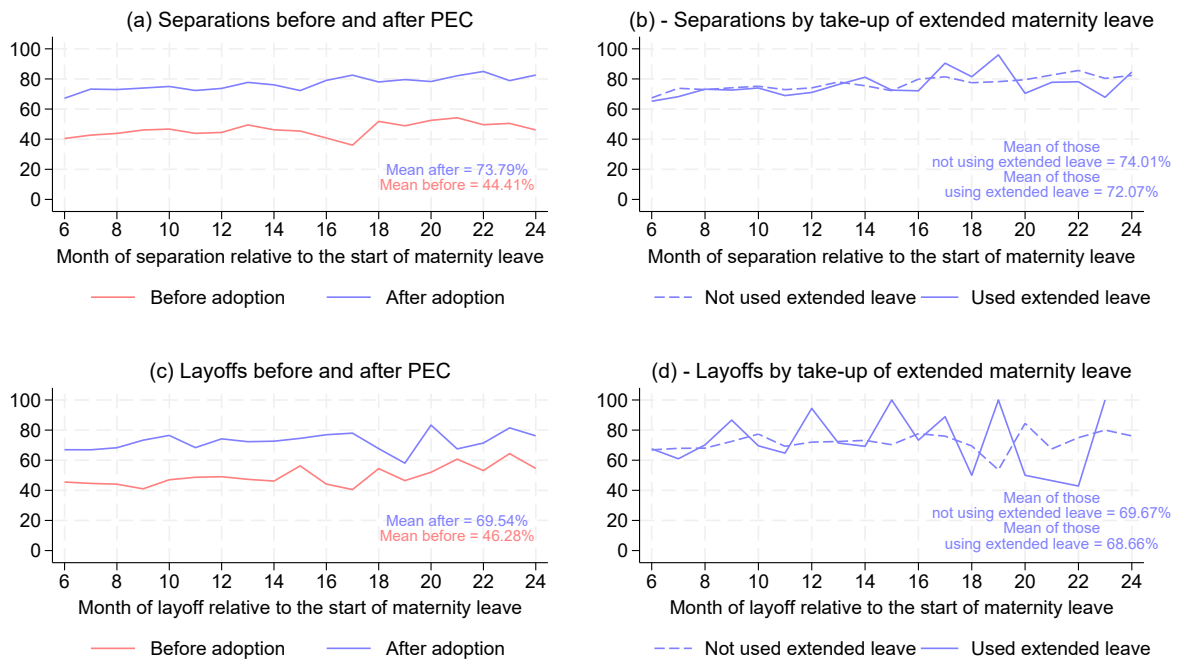
Notes: This figure shows the probability a worker experiences a separation/layoff from the firm they were working when they gave birth, conditional on being separated/laid off within five years after birth. The sample comprises workers who mothered a child in firms that adopted PEC between 2010 and 2017. The probability of separation/layoff in month t is calculated as the ratio of workers dismissed at t and those not yet dismissed until t . Panel (a) splits the sample between eligible mothers and those not eligible for PEC. Panel (b) includes only eligible mothers in the analysis and splits the sample between mothers using four and six months of maternity leave. Panels (c) and (d) replicate the same analysis but include only separations coming from layoffs. The first grey area in the figure represents the birth window (between 28 days before the due date and the date of birth). The second grey area represents the window that ends the period of job protection guaranteed by law in Brazil (up to five months after the birth). The means displayed in each panel are weighted averages of reemployment probabilities that use the number of individuals counted in each group-month as weights to calculate the average.

Figure A13: Probability of reemployment within six months after separation.



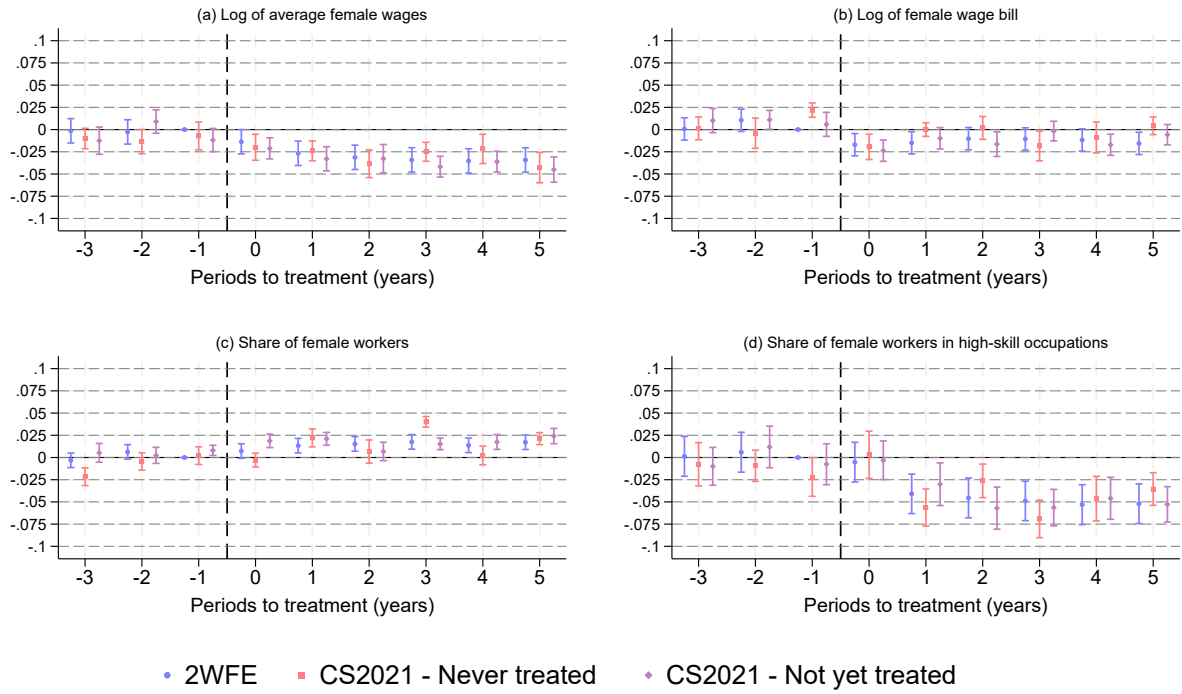
Notes: This figure shows the probability of reemployment within six months after separation for a worker separated from the firm she was working for when she mothered a child. The horizontal axis represents the month of separation, and the vertical axis displays the probability of reemployment within six months of separation. The sample comprises workers who mothered a child in firms that adopted PEC between 2010 and 2017. Panel (a) splits the sample between eligible mothers and those not eligible for PEC. Panel (b) includes only eligible mothers in the analysis and splits the sample between mothers using four and six months of maternity leave. Panels (c) and (d) replicate the same analysis but include only separations coming from layoffs. The means displayed in each panel are weighted averages of reemployment probabilities that use the number of individuals counted in each group-month as weights to calculate the average.

Figure A14: Probability of reemployment within three years after separation.



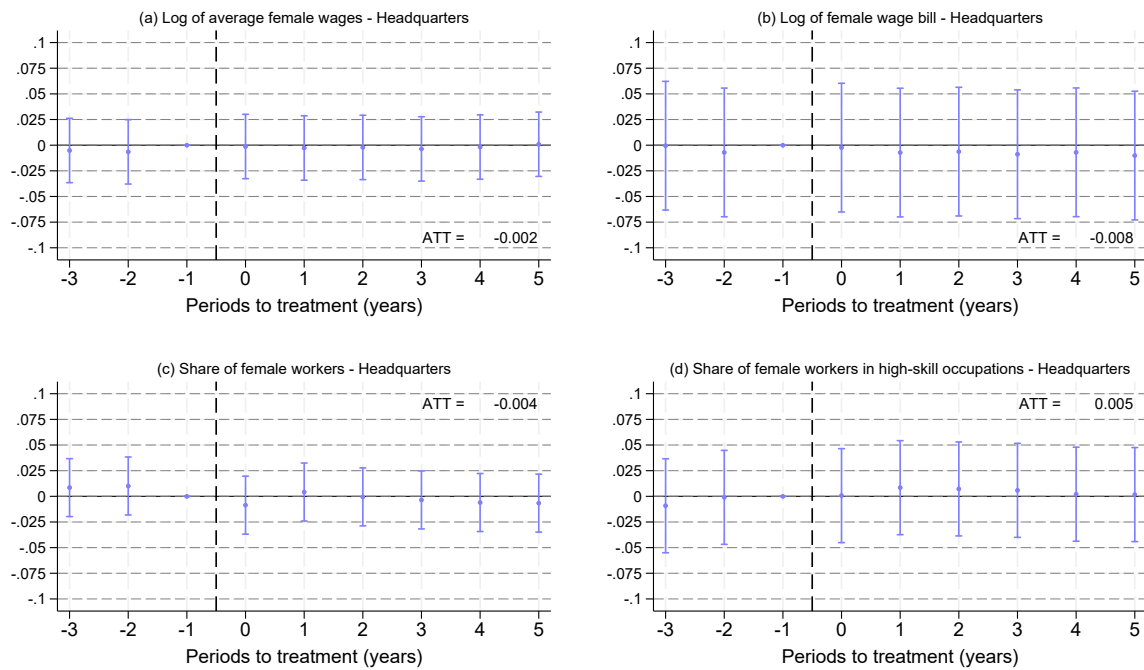
Notes: See notes to Figure A13 for details.

Figure A15: Robustness of the effects of PEC's adoption at the workplace



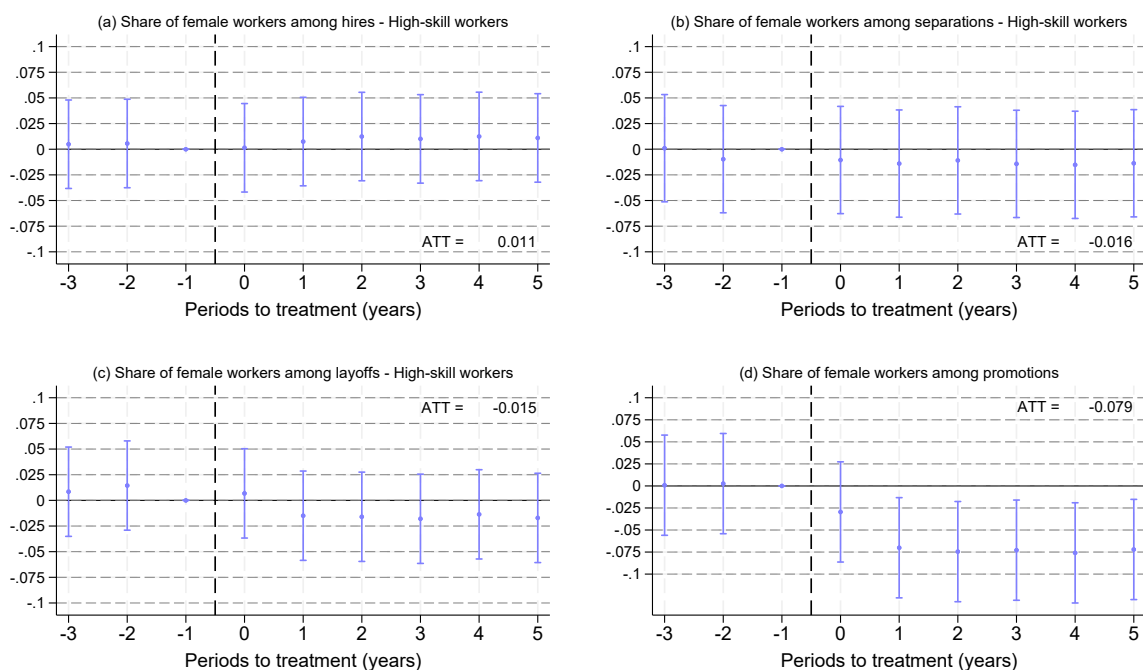
Notes: The blue circles in this figure show the estimated coefficients from Equation 5. The red squares show the results for the dynamic treatment effects using the method proposed by [Callaway and Sant'Anna \(2021\)](#) with the matched group of never treated firms as main comparison units. The purple diamonds estimate the same effects but use not yet treated firms as main comparison units. See notes to Figure 5 for a detailed description of the outcome in each panel.

Figure A16: OLS effects of PEC's adoption at the workplace - Main outcomes - Subset of headquarters establishments.



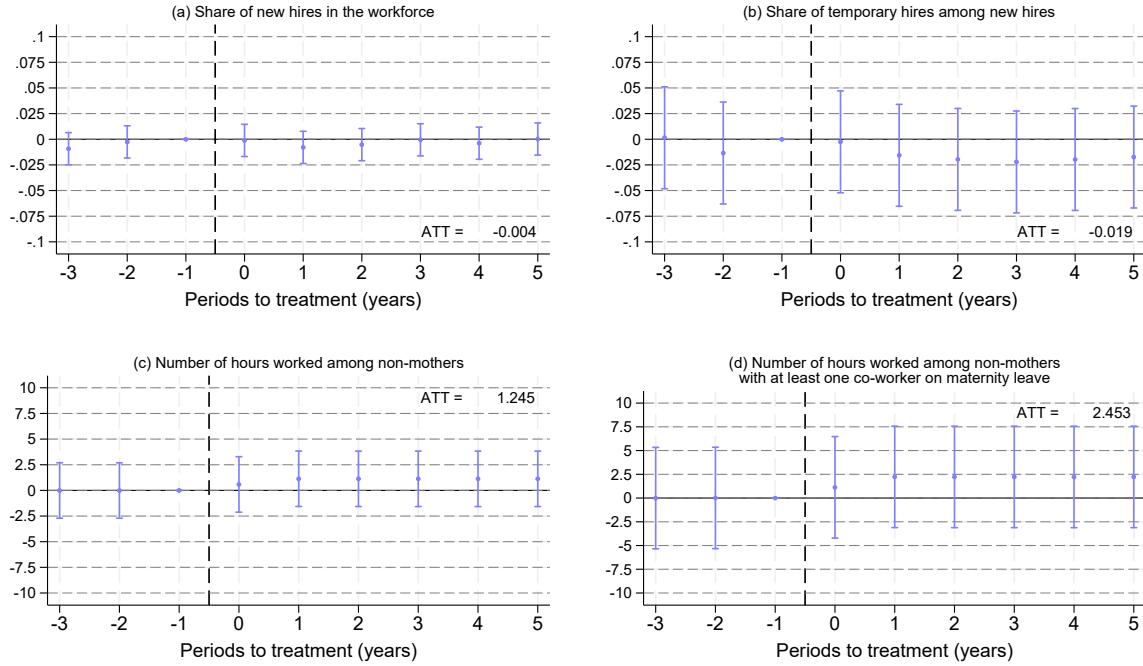
Notes: This figure replicates the estimates from Figure 5 using only the headquarters branch of each firm in the sample. See the notes to that figure for more details about each outcome.

Figure A17: OLS effects of PEC's adoption at the workplace - Main outcomes - Subset of high-skill workers.



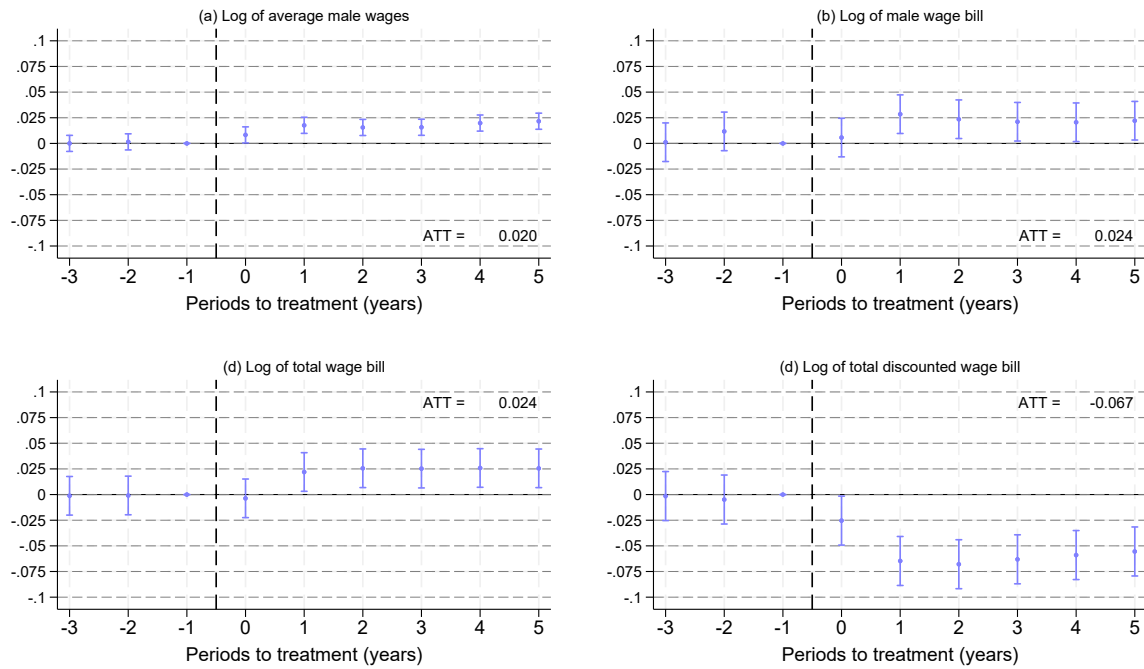
Notes: This figure replicates the outcomes from Figure 6 considering only the subset of high-skill workers to construct the firm's yearly outcomes. See the notes to that figure for more details about each outcome.

Figure A18: OLS effects of PEC's adoption at the workplace - Labour demand outcomes.



Notes: This Figure shows the estimated coefficients from Equation 5 using the sample of establishments of firms that adopted PEC between January 2010 and December 2014. The outcome in panel (a) is the share of new hires (i.e., workers hired in that calendar year) among all workers employed by the end of each calendar year in each workplace. Panel (b) shows the share of temporary hires (i.e., workers hired with a temporary contract) among all hires registered in each calendar year. Panel (c) shows the effects on the number total number of hours (calculated as the sum of the number of hours worked per week times the number of weeks each worker worked in the year) among non-mothers (workers who did not use maternity leave in that year). Panel (d) shows the effects on the same outcome, but for the subset of workers who had at least one co-worker (a worker from the same workplace with the same 4-digit occupational code) starting a maternity leave spell in each calendar year. The ATT displayed in each figure is calculated as the average effect in the between event years $k = 0$ and $k = 5$

Figure A19: OLS effects of PEC's adoption at the workplace - Other outcomes.



Notes: This Figure shows the estimated coefficients from Equation 5 using the sample of establishments of firms that adopted PEC between January 2010 and December 2014. The outcome in panel (a) is the log of average male wages at the workplace in each event year. Panel (b) has the log of the male wage bill measured as the sum of all wages paid to male workers in the establishment by December of each year. Panel (c) shows the effects on the log of the total wage bill (i.e., the sum of all wages paid to workers by December of each year) and Panel (d) shows the effects on the log of the firm's discounted wage bill (measured as the total wage bill across the calendar year minus the total wage bill of workers on maternity leave during the days they were on leave).

Table A1: Design of maternity leave policies for a selected sample of countries.

Country	Length (in months)	Paid months	Well paid months
Argentina	8	2	2
Belgium	8.8	3.3	3.3
Brazil	4	4	4
Chile	5.5	5.5	5.5
France ^a	3.3(6, 8)	3.3	3.3
Ireland	9.3	6	0
South Africa	4	0	0
Turkey	9	3	3
United Kingdom	12	9	1.4

Source: International Review of Leave Policies and Related Research (2022).

^aIn France, a mother is entitled to 6 months of maternity leave if she already has two children and 8 months if she is expecting twins.

Table A2: Descriptives at firm level by tax scheme - RAIS 2015.

Variable	Tax scheme					
	Simples	Real profit	Presumed profit	Immune or exempt	Arbitrated profit	Not defined
Average number of employment spells	8.6	206.3	26.7	47.9	53.2	32.7
Total number of employment spells	15,875,477	17,787,466	6,781,447	1,741,361	14,203	15,541,610
Average share of female workers	0.47	0.34	0.43	0.62	0.45	0.40
Average share of white workers	0.58	0.56	0.56	0.58	0.66	0.57
Average share of college educated workers	0.06	0.15	0.11	0.21	0.11	0.07
Average wage rate ^a	21.4	41.7	27.8	33.5	28.2	26.7
Average monthly wage ^a	896.6	1,718.2	1,161.4	1,218.1	1,200.5	1,087.8
Average annual wage ^a	7,946.7	15,560.9	10,398.1	12,221.0	11,687.0	10,336.2
Average male-female wage ratio	1.15	1.23	1.18	1.23	1.26	1.23
Average wage bill ^a (in millions)	0.1	4.1	0.3	1.1	0.8	0.7
Total wage bill ^a (in billions)	165.78	349.67	84.35	41.14	0.21	325.39
Number of firms	1,840,143	86,219	253,983	36,367	267	475,724
Number of establishments	1,906,027	554,551	285,324	49,675	333	565,455
Number of firms that adopted PEC	2,749	3,653	1,284	205	2	3,082

Note: This table shows a set of descriptives at the firm level in 2015 and splits these firms by the tax scheme they were under in the same year.

Universe of private-sector firms registered in RAIS 2015 with at least one employment spell on 01/01/2015. For more details about the tax schemes above, see Appendix B.

^a In Brazilian Reais (BRL). Prices of 2010.

Table A3: Descriptives for firms that never adopted PEC and firms that joined the program before and after the adoption.

Variable	(1) Non-PEC firms	(2) PEC firms (before adoption)	(3) PEC firms (after adoption)	(4) Difference (after - before)
Firm size	50.38 (214.178)	206.48 (806.741)	245.02 (796.707)	38.54* [20.694]
Proportion of female workers	0.35 (0.272)	0.36 (0.234)	0.38 (0.235)	0.02*** [0.006]
Proportion of 40+ years workers among women ^a	0.26 (0.253)	0.21 (0.197)	0.25 (0.204)	0.04*** [0.005]
Proportion of 40+ years workers among men ^a	0.32 (0.242)	0.30 (0.219)	0.33 (0.208)	0.03*** [0.006]
Wage bill ^b (in 000s)	77.02 (338.755)	653.16 (3,053.229)	798.25 (3,109.199)	145.09* [79.533]
Average wage for female workers ^b	8.25 (9.312)	17.17 (18.063)	17.73 (17.844)	0.55 [0.469]
Average wage for male workers ^b	9.98 (14.436)	23.50 (27.221)	23.60 (26.922)	0.09 [0.703]
Proportion of female workers in high-skill occupations ^c	0.13 (0.209)	0.19 (0.223)	0.24 (0.237)	0.05*** [0.006]
Proportion of male workers in high-skill occupations ^c	0.13 (0.205)	0.20 (0.244)	0.24 (0.256)	0.04*** [0.006]
Share of women among high-skill workers ^d	0.36 (0.343)	0.35 (0.280)	0.37 (0.262)	0.02*** [0.007]
Average number of ML spells per year ^e	2.09 (9.652)	10.44 (151.604)	12.25 (179.718)	1.81 [5.716]
Share of ML spells using extended leave ^e	0.01 (0.092)	0.07 (0.228)	0.47 (0.452)	0.40*** [0.012]
Number of firms	134,597	3,313	3,313	3,313

Notes: This table reports a set of descriptive statistics for the headquarters of firms under a real-profit tax scheme that never adopted PEC (column 1), eligible firms that adopted the program between 2010 and 2018 before adoption (column 2), and the same set of firms after the adoption (column 3). The averages for non-PEC firms are calculated by averaging a given firm for all years between 2010 and 2019. The averages for PEC firms one year before and after the year of PEC's adoption. Column (4) presents a t-test for differences in means before and after the adoption of the program. Standard deviations in parenthesis and standard errors in square brackets.

^a Measured as the number of workers of this sex that are 40 years old or more divided by the total number of workers of the same sex in the firm.

^b In Brazilian Reais (BRL). Prices of 2010.

^c Measured as the number of workers of this sex in high-skill occupations divided by the total number of workers of the same sex in the firm.

^d Measure as the number of female workers in high-skill occupations divided by the total number of high-skill workers in the firm.

^e Conditional on having at least one maternity leave spell during the year.

Table A4: Predictors of PEC adoption at the firm level.

Variable	Coefficient
Total number of ML spells before the adoption of PEC (in 10s)	0.454*** (0.175)
Average number of employment spells per year (in 10s)	0.0663*** (0.00609)
Average share of female workers across all years ^a	-0.00528*** (0.000243)
Proportion of workers taking extended ML before the adoption of PEC ^a	0.348*** (0.00439)
Indicator for PEC eligibility	0.672*** (0.0180)
Constant	0.332*** (0.0215)
Observations	1,135,949
Adjusted R-squared	0.218
F-statistic	978.2

Robust standard errors in parenthesis. This table shows the coefficients of a regression that has an indicator for PEC adoption at the firm level. The dependent variable is multiplied by 100. Year and Region fixed effects are included.

^aMultiplied by 100, so the coefficient represents a variation in percentage points.

* p<0.10, ** p<0.05, *** p<0.01

Table A5: Predictors of the take-up of extended maternity leave at the individual level.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
White worker	1.074*** (0.205)	1.132*** (0.207)	1.938*** (0.205)	0.896*** (0.218)	-0.191 (0.193)	-0.333 (0.211)
Worker with college	1.522*** (0.277)	1.402*** (0.279)	0.119 (0.276)	1.202*** (0.277)	1.238*** (0.253)	0.803*** (0.278)
Second quartile of the tenure distribution	-2.197*** (0.265)	-2.164*** (0.267)	-1.721*** (0.264)	-1.864*** (0.260)	-2.170*** (0.225)	-1.970*** (0.237)
Third quartile of the tenure distribution	-1.310*** (0.271)	-1.285*** (0.273)	-1.144*** (0.269)	-1.322*** (0.267)	-2.038*** (0.234)	-1.523*** (0.254)
Fourth quartile of the tenure distribution	1.789*** (0.291)	1.786*** (0.293)	2.003*** (0.289)	1.280*** (0.290)	-2.904*** (0.266)	-2.245*** (0.294)
Second quartile of the wage distribution	9.802*** (0.270)	9.583*** (0.272)	9.257*** (0.270)	7.244*** (0.279)	3.084*** (0.270)	2.203*** (0.296)
Third quartile of the wage distribution	8.336*** (0.328)	7.960*** (0.330)	8.906*** (0.327)	7.528*** (0.335)	4.279*** (0.346)	2.747*** (0.387)
Fourth of the wage distribution	12.66*** (0.386)	12.21*** (0.389)	14.16*** (0.385)	13.28*** (0.398)	5.423*** (0.409)	4.064*** (0.464)
Age	0.244 (0.158)	0.259 (0.159)	0.261* (0.158)	0.272* (0.156)	0.542*** (0.139)	0.435*** (0.146)
Age squared	-0.00838*** (0.00252)	-0.00854*** (0.00253)	-0.0101*** (0.00251)	-0.00993*** (0.00248)	-0.0119*** (0.00222)	-0.0101*** (0.00233)
Constant	35.38*** (2.398)	35.61*** (2.416)	36.22*** (2.398)	37.28*** (2.359)	36.87*** (2.116)	39.10*** (2.213)
Eligible to PEC	Yes and No	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Municipality FE	No	No	No	Yes	No	No
Firm FE	No	No	No	No	Yes	No
Plant FE	No	No	No	No	No	Yes
Observations	283,523	280,678	280,678	280,109	279,394	269,984
Adjusted R-squared	0.0117	0.0110	0.0384	0.0841	0.333	0.415
F-statistic	348.0	320.6	359.8	273.5	53.16	29.82

Robust standard errors in parenthesis. This table shows the results of a set of regressions that have an indicator for PEC usage as dependent variable (multiplied by 100) at the worker level. Universe of workers taking maternity leave in a firm that adopted PEC. * p<0.10, ** p<0.05, *** p<0.01

Table A6: Effects of co-worker absence on target workers' log wages - Alternative measure of co-worker absence.

	(1)	(2)	(3)
Panel I - OLS			
Post $\times$ Share of absent co-workers among all co-workers ($\tilde{a}$)	0.295*** (0.030)	0.262*** (0.034)	0.251*** (0.028)
Panel II - Intent to Treat (ITT)			
Post $\times$ Share of absent co-workers among all co-workers ($\tilde{z}$)	0.071* (0.037)	0.074** (0.037)	0.082*** (0.032)
Panel III - IV			
Post $\times \tilde{a}$	0.185* (0.098)	0.196** (0.094)	0.212*** (0.087)
Event-year by year of adoption FE		X	X
Individual covariates			X
Number of observations	3,815,334		

Notes: This table reports equation's 3 estimates based on a panel of target workers observed three years before and five years after the year PEC was implemented in their firms. The variable $\tilde{a}$ denotes the number of co-workers who used extended maternity leave in the 18-month window around PEC's adoption divided by the number of co-workers employed in the same workplace as the target worker by the end of the year of PEC's adoption. The instrument $\tilde{z}$ measures the share of co-workers eligible for PEC among the same subgroup of co-workers. The variable *Post* is an indicator to denote observations that happen after the adoption of the program. Standard errors clustered at the firm level.

Table A7: Effects of co-worker eligibility on target workers' log wages - Heterogeneity by team size and industry.

	(1)	(2)	(3)	(4)	(5)
	Whole sample		Services		Other sectors
		1-10 co-workers	11+ co-workers	1-10 co-workers	11+ co-workers
Post $\times$ Share of eligible co-workers (z)	0.016*** (0.007)	0.021* (0.011)	0.019** (0.009)	0.013 (0.017)	0.010 (0.014)
Number of observations	3,815,334	1,132,220	1,797,956	293,164	591,994

Notes: This table reports equation's 3 estimates based on a panel of target workers observed three years before and five years after the year PEC was implemented in their firms. The variable z measures the share of co-workers eligible for extended maternity leave. Column (1) shows the main specification from Table 4. Columns (2)-(3) restricts the sample to workers from the services sectors who are in the bottom and top half of the team size distribution, respectively. Columns (4)-(5) do the same, but for workers from other sectors (industry and agriculture). Standard errors are clustered at the firm level.

Table A8: Reduced form effects of co-workers' eligibility on workers' leave of absence take-up.

	(1)	(2)	(3)	(4)	(5)
	Any leave	Work-related accident	Work-related illness	Work- unrelated illness	Parental leave
Panel I - Extensive margin: Probability of taking leave of absence^a					
Share of eligible co-workers (z)	2.238 (1.470)	0.024 (0.018)	0.012 (0.009)	0.031 (0.020)	0.143 (0.126)
Mean of dep. variable	42.16	0.10	0.40	1.74	1.35
Number of observations	423,926	423,926	423,926	423,926	423,926
Panel II - Intensive margin: Length of the absence (in days)					
Share of eligible co-workers (z)	5.689 (3.910)	7.700 (6.352)	5.864 (4.791)	7.620 (7.298)	0.275 (0.162)
Mean of dep. variable	77.01	73.12	109.74	47.72	106.54
Number of observations	178,727	423	1,695	7,376	5,723

Notes: This table reports the coefficient of a set of regressions estimating the reduced-form effects of the proportion of leave-eligible co-workers (z) on target workers' extensive and intensive margin of work absenteeism. Panel I measures the extensive margin of leave take-up having as dependent variable an indicator for the take-up of a given type of leave of absence at least once within the five years after the adoption of PEC in the workplace. Panel II estimates the effects on the intensive margin, with the length of the absence as dependent variable (conditional on being absent at least once in the period). Column (1) uses an indicator for being absent for any reason in the period. Column (2) measures the effects of z on the probability of being absent due to a work-related accident. Columns (3) and (4) measure the effects of work-related and unrelated sick leave. Column (5) has as dependent variable an indicator for the take up of parental leave (maternity or paternity leave). Standard-errors are clustered at the establishment level and are reported in parentheses.

^a All coefficients in this panel are multiplied by 100 to represent variations in percentage points.

Table A9: Direct and indirect effects of PEC's introduction at the workplace on the worker's take-up of extended maternity leave.

	(1)	(2)
Panel I - Intensive margin: Number of days on leave		
Indicator of own-eligibility (E)	7.735*** (1.308)	7.735*** (1.307)
Share of eligible co-workers (z)		1.540 (1.028)
Panel II - Extensive margin: Indicator for using 6 months of leave		
E	0.033*** (0.008)	0.033*** (0.008)
z		0.013 (0.009)
Number of observations	8,799	

Notes: This table reports the estimates of a regression that has a measure of the target mother's maternity leave take-up as dependent variable. The variable E is an indicator of her being eligible for PEC, and z denotes the share of co-workers who are eligible for the policy. Panel I analyses the intensive margin measure (number of days on leave), and Panel II uses the extensive margin (an indicator to denote if the target mother used 6 months of leave) as the dependent variable. All regressions include fixed effects for establishment, mother's and child's birth year, and education level. Standard errors are clustered at the establishment level.

B Data construction

The Relação Anual de Informações Sociais (RAIS) is a matched employer-employee dataset covering the universe of formal employment in Brazil.

In this appendix, I describe all datasets used in the paper that were constructed using information from RAIS. Three main sets of data were derived from the raw data in RAIS. I describe each of these below:

Worker panel at the employment spell level: each employment spell in the dataset has unique firm and worker identifiers. That allows me to link and track workers and firms over time. To simplify the analysis, I select the employment spell with the highest tenure when a worker is linked to more than one firm in the same year.

Establishment/Firm panel: to construct aggregates at the firm/establishment level, I define the set of relevant workers in each year of the panel. The panel is defined at the last day of each year (31st December). So, a worker will compose the pool of employees of a given firm/establishment if she is recorded as being employed at that firm/establishment on the 31st of December.

Promotion measure($\mathbb{P}_{it}$): I use information about wage growth within the firm to define my main measure of promotions. To start the analysis, I define the set W_j^t composed of all workers registered in firm j by the end of year t . Then, to construct the measure of wage growth, I define the subset $\overline{W}_j^t = W_j^{t-1} \cap W_j^t$, composed of all workers who stayed in firm j between years $t-1$ and t . I then calculate a measure of relative wage growth for each worker in $\overline{W}_j^t$, using the wage paid to the worker in December of that year from RAIS⁵⁰. Then, I use this measure of annual wage growth to rank each worker in this subset. I finally define my measure of promotions ($\mathbb{P}_{it}$), considering that a worker is promoted if he/she is in the top decile of the within-firm wage growth distribution.

This notion is consistent with the results of [Baker et al. \(1994\)](#), which finds that individuals experiencing strong wage growth are promoted more rapidly in the firm. Defining promotions as a function of abnormal growth in wages relative to other employees from the same workplace as opposed to changes in occupation has two main advantages. First, a worker who is promoted will not necessarily have his/her occupational code changed in RAIS immediately, which could reduce

Let o_{ij}^t denote occupation o for worker i , working in firm j in year t . I define two types of occupational changes. The first one is defined if the occupational code of this worker changed at any moment between two consecutive years, conditional on the worker being employed in the same firm. Specifically, $y_{it}^A = \mathbb{1}(o_{ij}^{t-1} \neq o_{ij}^t)$. The second concept defines a ranking of occupations, and it is defined if the change in occupation recorded in the occupation was upwards. Let $rank(o_j^1)$ be the rank of a given occupation in year t . The upwards occupational change is defined as $y_{it}^B = \mathbb{1}[rank(o_{ij}^{t-1}) < rank(o_{ij}^t)]$. To define the overall ranking of an occupation, I run a set of Mincerian regressions for log wages and a set of covariates⁵¹. I then average the residuals at the occupation-city-industry level. I use these average residuals to rank occupations, with occupations observing higher residualized wages being higher ranked.

⁵⁰RAIS provides two measures of wage that could be used: an average annual wage and the wage paid to the worker in December. The latter is more precise than the former. Restricting the sample to employment spells that were active on the 31st of December guarantees that I have a precise wage measure for all workers in the sample. Once more, all wages are in real values of 2010.

⁵¹The covariates used here are sex, age polynomials, race, education level, tenure, firm size

C Matching procedure

C.1 Matching workers

The matching procedure performed for the estimation of Equation 4 aims to find a suitable comparison unit for each target worker exposed to PEC. The goal of this exercise is to estimate the effects of early exposure to PEC on labour market outcomes. I do this by comparing the outcomes of a target worker in the sample with a matched comparison worker who was not exposed to the policy in the same way. I follow a procedure similar to the one performed by Jäger and Heining (2022) using observed characteristics of target workers measured before their exposure to PEC to find a comparison worker to perform the analysis.

The matching is performed using a set of observable characteristics measured two calendar years before the year the target worker was exposed to PEC. Target worker i working in firm⁵² f is in the treatment group if he/she is working in that firm in the year PEC was adopted by that firm (T_{if}^{PEC}). I define the event-time $k = t - T_{if}^{PEC} = -2$ as the base year used to perform the matching procedure⁵³.

The goal of the matching procedure is to find at least one similar worker from the pool of potential comparison units (workers with different types of exposure to the policy). I use the following baseline dimensions to perform the matching: sex, age group (divided into bins of four years: 18-21, 22-25, 26-29, 30-33, 34-37, 38-41, 42-45, 46-49, 50+), monthly wages (divided in bins of 200BRL), hours worked per week, tenure in years, firm's industry, firm's size (divided in bins of 10 workers), firm's wage deciles, and city. I also restrict these potential comparison units to be working in a firm under the real-profit tax scheme (i.e., eligible to PEC) in year $t = T_{if}^{PEC}$. I then define six sets of restrictions to find a suitable comparison worker:

- (1) *Workers never exposed to PEC*: This subset is the least restrictive and allows any worker in the pool of donors described above to be a comparison unit. Beyond the baseline dimensions, I also match these workers using their full six-digit occupation code.
- (2) *Workers in (1) coming from a different firm that was not yet treated*: For each target worker in the sample exposed to PEC in calendar year $t = T_{if}^{PEC} \in \{2010, 2011, 2013, 2014\}$, I look for a comparison worker who was exposed to PEC three years later.
- (3) *Workers from the same firm, from a different workplace, with a similar occupation and no female co-workers in $t = T_{if}^{PEC}$* : This comparison group aims to hold fixed any firm effect and shuts absenteeism effects down by not allowing female workers in the pool of co-workers in the comparison group. I match each target worker to a comparison unit using their four-digit occupation code.
- (4) *Workers in (3) with the same occupation*: Comparison units here are collected from comparison workers who match the full six-digit occupation code.

⁵²Since the assignment to treatment here happens at the firm level and that entitles all establishments of a given treated firm to benefit from the program, I will use the word *firm* while referring to a given establishment.

⁵³Remember that the definition of a target worker restricts these to be working in the firm for at least

- (5) *Workers from the same workplace who do not have any co-workers on maternity leave in the 18-month window around PEC's adoption:* This comparison group does not restrict the comparison unit to have a similar occupation, but compare workers working in the same workplace in the year of PEC's adoption.
- (6) *Workers from the same workplace who do not have any co-workers using extended maternity leave in the 18-month window around PEC's adoption:* Comparison units here are collected from the same workplace as the target worker with the additional restriction of these not having any co-worker using extended maternity leave themselves.

For each subset above, I perform exact matching using the corresponding set of variables. For each target worker exposed to PEC in the calendar $T_{if}^{PEC} \in \{2010, 2011, 2012, 2013, 2014\}$, I select a worker from the pool of comparison units who were not exposed to PEC and have the same characteristics in $T_{if}^{PEC} - 2$. In cases where a given target worker has more than one match, I randomly select one worker from the pool of comparison units. I also drop any target worker not matched to any comparison unit from the sample.

C.2 Matching workplaces

The matching procedure described in Section 4.4 is performed to find a suitable comparison group for workplaces exposed to PEC between 2010 and 2022. The main idea here is to use a set of lagged observable characteristics measured at the establishment level for those workplaces exposed to PEC and find at least one establishment that was never exposed to the policy and has similar lagged characteristics.

I closely follow the procedure proposed in [Azoulay et al. \(2010\)](#) and define the event year that firm f adopted PEC as T_f^{PEC} . The calendar year is denoted by t , and the relative event year is defined as $k = t - T_f^{PEC}$. For each event year between 2010 and 2022, I use the restrictions described in Section 2.2 to define the set of eligible firms exposed to the policy. For a given firm f treated in the event year T_f^{PEC} define a set of observable characteristics (better described below) three years before T_f^{PEC} ⁵⁴. The set of comparison units for firm f is sampled from all firms that were never exposed to the program but had similar characteristics in $T_f^{PEC} - 3$.

The set of observable characteristics (measured on the 31st of December of each calendar year) used to perform the matching is firm size (measured as the number of employment spells and divided into bins of 10 workers), the proportion of female workers in the workforce (divided into bins of 5 percentage points), the proportion of college-educated workers in the workforce (divided into bins of 5 percentage points), the firm's wage bill (divided into bins of 10.000 BRL), the average female wage in the firm (divided into bins of 200 BRL), the firm's city and sector of activity using 2 digits of the Brazilian Classification of Economic Activity (CNAE). When no matching is found for a given firm, I perform a second round of matching search and relax the city restriction, allowing firms in the same microregion as

two years before the year of PEC's adoption. That restriction allows me to have observable characteristics for all treated workers in the sample

⁵⁴This has two objectives: first, the last year I observe in RAIS is 2019, and the last group of firms adopting PEC happens in 2022. Using three lagged years to match on observables allows me to use all treated firms in my sample based on information from RAIS. Second, using three lags to perform the match allows me to use the pre-trends to evaluate the validity of the parallel trends assumption necessary for identification in a DiD framework.

firm f to compose the comparison pool. The third round allows firms in the same State, the fourth round uses only the first CNAE digit, and the fifth and last round allows all firms in the country to compose the pool. Table C.2.1 shows that an average of less than 2% of firms remain unmatched after the fourth round of matching. A firm that matches f using this procedure is defined as f' . When more than one firm f' is matched to f , I randomly select one firm from the pool of matched firms.

Table C.2.1: Proportion of unmatched establishments in each stage of the matching procedure.

Year	Number of treated firms	First round	Second round	Third round	Fourth round	Fifth round
2010	31,472	0.155	0.028	0.015	0.005	0.000
2011	7,296	0.164	0.044	0.024	0.008	0.001
2012	1,978	0.185	0.056	0.032	0.010	0.001
2013	1,438	0.231	0.065	0.033	0.008	0.000
2014	1,800	0.197	0.085	0.047	0.013	0.001
2015	1,725	0.170	0.057	0.030	0.007	0.001
2016	1,736	0.196	0.071	0.038	0.007	0.001
2017	3,029	0.125	0.046	0.021	0.003	0.000
2018	2,122	0.163	0.065	0.038	0.010	0.000
2019	4,439	0.166	0.060	0.033	0.008	0.000

Notes: Universe of firms that adopted PEC between 2010 and 2022 from the *tax registry* sample.