Firm Responses to Earned Income Tax Credits: Evidence from Italy

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November 2021

Abstract

This paper uses administrative data to analyze the incidence effects of a large EITC program in Italy. I find that firms are an important vector of transmission of incidence: firms very exposed to the tax credit responded to the program by decreasing their employees' earnings relative to less exposed firms. Evidence suggests that the response was mainly driven by a decrease in the earnings *growth* rather than by a decrease in earnings *level*. This finding is consistent with the presence of wage rigidities that prevent firms from directly lowering wages and suggests that the transmission of tax credit incidence from workers to firms happens in a dynamic way.

Keywords: Earned Income Tax Credits, Tax Incidence, Firm Responses, Wage Rigidity

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1 Introduction

A crucial question in the design of welfare programs is who bears their economics incidence. While policy-makers design programs with a clear target of beneficiaries in mind, in many cases, unintended consequences of the design of policies might lead the economic incidence to be different from the statutory incidence. This is likely to be particularly important for all those welfare programs which directly interact with the labor market. Earned Income Tax Credits (EITCs) are a prominent example of this kind of social programs. They are the most popular transfer programs that governments use to support low-income individuals and while sustaining labor force participation. Despite their popularity, still relatively little is known about the effects of the introduction of EITCs on wages. In particular, the mechanisms through which the economic incidence of tax credits is shifted between workers and firms are still poorly understood.

Standard approaches to the analysis of these issues have relied on the assumption of perfectly competitive labor markets: in these models, the incidence of tax credits depends on the relative elasticity of aggregate labor demand and supply in the economy. However, these approaches completely abstract from the role of firms, with the consequence of potentially missing important channels of adjustments that can affect the incidence and welfare analysis of EITC programs. The importance of firm-level channels is likely to be significant: recent empirical studies have documented the central role of firms in the wage-setting process (Card et al., 2012; Card, Heining, and Kline, 2013; Card et al., 2018) and the importance of firm-level mechanisms as channels of transmission of tax incidence (Saez, Schoefer, and Seim, 2019; Paradisi, 2019). Moreover, using firms as intermediaries in the distribution of Earned Income Tax Credits is becoming increasingly popular in several countries (Working Families' Tax Credit in the UK, Advance Earned Income Tax Credit in the US, Salário Família in Brazil), making firm responses extremely relevant in the evaluation of these policies. Understanding how firms react to the introduction of tax credits is therefore crucial to have a complete understanding of the incidence and welfare consequences of these programs.

In this paper, I present new evidence on firm responses to Earned Income Tax Credits by analyzing the introduction of a large and salient EITC program in Italy. Two main

takeaways emerge from my analysis. First, I show that standard approaches that abstract from the role of firms miss an important channel of transmission of the incidence of tax credits. I find that there is significant heterogeneity in responses across firms and my results suggest that firms are an important vector for the pass-through of the effects of tax credits. The second takeaway from my analysis is related to the mechanisms through which firms respond to the introduction of the EITC program. Overall, I find that annual earnings of the recipients of the tax credit do not decrease after the introduction of the tax credit. However, I find that earnings of eligible workers *grow at a slower rate* after the introduction of the program relative to similar non-eligible workers. This finding highlights the fact that firms might respond to the introduction of welfare programs not only by lowering wages but also by adjusting the growth rate of wages. The latter mechanism is particularly important in settings where nominal wage rigidities may prevent firms from directly lowering wages and suggests that the incidence of tax credits might be shifted from workers to firms over time, in a dynamic way.

In this paper, I study the introduction of an Earned Income Tax Credit in Italy, the so-called *80 Euros Bonus*, that was introduced in 2014 with the stated objective of supporting low-income workers, stimulate consumption and sustain economic growth. Its introduction was unexpected and, according to many, motivated by electoral reasons[1]. Nevertheless, it represents a significant welfare reform and resulted in an immediate €80 ($90) increase in the monthly salary of eligible workers which translated into a €960 ($1000) increase in their annual earnings. The tax credit was distributed to all employees with annual gross earnings between €8,000 and €26,000, regardless of any other personal or family characteristics. Importantly, employers played a key role in the administration of the tax credit. They determined the eligibility of employees based on their prediction of the annual income they would pay the worker and therefore had perfect information on who received the tax credit. The tax credit was then distributed monthly directly in the paycheck of workers.

I evaluate the effects of the introduction of the program using administrative matched employer-employee data from the Italian Social Security Institute (*Istituto Nazionale di Previdenza Sociale* or INPS). I have access to a random sample that covers 7% of all salaried

[1]The program was introduced in April 2014, just a month before the European Parliament election.

employees working in the private sector from 1985 to 2016. The data contain detailed information on earnings, type of occupation and type of contract, worker demographics and firm characteristics. The main drawback of this source of data is that I only have information up to 2016: I can observe only three post-reform years and, as a consequence, I can only evaluate the effects of the introduction of the tax credit in the short-run.

I first outline a simple conceptual framework to guide the empirical analysis of the wage effects of the introduction of the tax credit. I start by describing the predictions of the standard tax incidence model and the empirical approach to identify the incidence of the program within this setting. In the standard tax incidence model within-firm shocks generated by the introduction of the program and subsequent firm responses do not play any role in determining the incidence of the program. The standard empirical approach therefore usually relies only on worker-level variation in the exposure to the program. I then discuss how the framework changes when considering firm-specific responses to the introduction of the program and how different firms might be able to respond differently to the introduction of the tax credit based on their concentration of eligible employees in the workforce. Firms with a higher concentration of eligible employees experience, at least potentially, a differential decrease in the cost of labor relative to firms with a lower concentration of eligible employees. Within the model, this decrease is caused by the differential share of workers whose outside option decreases after the introduction of the program. I also explore alternative mechanisms motivating differential responses for differently exposed firms.

In the first part of the empirical analysis, I investigate the effects of the introduction of the tax credit on earnings of eligible workers in relation to the predictions of the standard tax incidence model. I start by presenting descriptive evidence on the evolution of earnings of eligible workers before and after the introduction of the program. I then exploit worker-level variation in eligibility for the tax credit to compare otherwise similar eligible and non-eligible workers. I find that, at the market-level, annual earnings of eligible workers do not decrease after the introduction of the tax credit, suggesting that the benefits of the tax credit were fully reaped by workers. While this result may reflect wage rigidities preventing employers from responding to the introduction of the program, I show that it cannot be explained by minimum wage floors, on-the-job wage rigidity or institutional constraints such

as unionization. Moreover, I find that, although earnings of eligible workers do not decrease, they grow at a slower rate than for similar non-eligible workers.

While the first part of the analysis provides useful insights into the incidence effects of the tax credit, it completely abstracts from firm-specific responses to the policy. Given the key role of firms in wage-setting (Card, Heining, and Kline, 2013; Card et al., 2018) and in light of the recent evidence highlighting the active role of firms in the pass-through of the effects of welfare programs (Saez, Schoefer, and Seim, 2019; Harasztosi and Lindner, 2019), abstracting from firm responses has concrete consequences for the welfare analysis of this program. The second part of the empirical analysis, therefore, explores the role of firm-level mechanisms as potential determinants of tax incidence. In particular, I test for the presence of differential firm responses by firms' pre-reform concentration of eligible employees. To do so, I use an identification strategy common in the minimum wage literature (Draca, Machin, and Van Reenen, 2011; Harasztosi and Lindner, 2019) that was also recently applied by Saez, Schoefer, and Seim (2019) to study the firm-level transmission mechanisms of payroll tax incidence. I exploit the pre-reform, firm-level variation in exposure to the policy, measured as the share of employees eligible for the tax credit before the introduction of the program, to test whether firms that are more or less exposed to the policy behave differently after the introduction of the program. Identification relies on the assumption that the evolution of key outcomes at firms with fewer eligible workers is a valid estimate of the counterfactual for firms with many eligible workers. I show that, reassuringly, before the introduction of the program, the evolution of a wide range of outcomes follows parallel trends for firms with different concentrations of eligible employees.

Overall, I find that average annual worker earnings in highly exposed firms decrease relative to less exposed firms after the introduction of the program. The divergence in average annual earnings between more and less exposed firms is driven by eligible employees. On the other hand, average earnings of non-eligible employees do not differentially change between firms more and less exposed to the policy change, suggesting that there are no spillover effects of the introduction of the policy on non-eligible workers and giving further support to the story that the changes are driven by the reform. I estimate that, three years after the introduction of the program, annual earnings of the average eligible worker in highly

exposed firms are almost €500 lower than annual earnings of the average eligible individual in less exposed firms. A naive estimate suggests that the pass-through to firms is around 50% after three years.

I then try to shed light on the mechanisms behind the differential firm response by their concentration of eligible employees. First, I find suggestive evidence that the ability or willingness of firms to adjust their wage policies is monotonic in the exposure to the policy. I then show that even firms that are extremely exposed to the program, on average, are not able (or willing) to decrease the *level* of earnings. Rather they seem to respond to the introduction of the program by decreasing the *growth rate* of earnings. I find that, on average, the earnings growth rate of eligible workers in firms highly exposed to the program decreased by 2 percentage points after the introduction of the tax credit relative to firms less exposed to the program.

I conclude the firm-level analysis by testing whether firm-responses are heterogeneous across different dimensions. I find that the effect on annual earnings is larger in large firms than in small firms. On the other hand, there do not seem to be large differences in response by unionization level: the decrease in earnings is slightly more pronounced in firms in low unionized sectors but the difference is not significant. Finally, I test whether the effect is similar across the distribution of eligible workers. I show that the decrease in annual earnings is uniform for all eligible employees.

This paper contributes to different strands of literature. First of all, it contributes to the extensive literature on the effects of Earned Income Tax Credits (Eissa and Liebman, 1996; Meyer and Rosenbaum, 2001; Hotz, 2003; Eissa and Hoynes, 2006; Meyer, 2010 and Nichols and Rothstein, 2015) and to the narrower literature on the incidence and wage effects of these programs. Rothstein (2008, 2010) and Leigh (2010) analyze the incidence of the EITC in the US. Rothstein (2008) finds that low-skilled mothers in the US keep only 70% of every dollar they receive in EITC because of wage decreases. Leigh (2010) finds that a 10% increase in the generosity of the EITC leads to wage reductions of 5% for high-school dropouts. Azmat (2019) estimates a similar effect focusing on male claimants of the Working Family Tax Credit in the UK. Bennmarker, Calmfors, and Seim (2014) investigate how both unemployment benefits and EITCs influence wages through their effects on the net replacement rate for

the unemployed. These studies assess the wage effects of EITCs using worker-level variation and mostly ignoring firm-level factors that can influence the transmission of incidence. This paper contributes to this literature first by showing that neglecting to account for the role of firms in the incidence analysis misses an important part of the story. Second, this analysis points out mechanisms behind firm responses that have not been previously highlighted in other studies by showing that the *level* of wages is not the only margin through which firms can shift the incidence of the tax credit. Earnings growth is an additional channel that firms can use to capture part of the benefits of the program in contexts characterized by downward nominal wage rigidity. The last contribution is data-related: while most of the previous studies rely on survey data, I use matched employer-employee administrative data to study the incidence of the tax credit.

By taking a firm-level perspective to the analysis of the effects of tax policies, this paper contributes to a broader literature studying the firm-level transmission of tax incidence. The most recent example among such studies is Saez, Schoefer, and Seim (2019) documenting the effect of a payroll tax cut for young workers in Sweden. While they do not find effects on the net wages of young workers at the market-level, they find that firms more exposed to the payroll tax cut respond more to the policy and exploit the tax windfall to increase employment, capital, sales, and profits. They also find evidence of rent-sharing of the benefits from the tax cut among all incumbent workers. Another example is Paradisi (2019) who uses French administrative data to revisit the standard wage tax incidence framework and documents the role of firms in the redistribution of the burden of payroll tax increases.

This paper is also related to several studies showing that the institutional and informational context plays a key role in determining tax incidence. Saez, Matsaganis, and Tsakloglou (2012) exploit a cohort-based discontinuity in social security contributions tax rates and show that there is full pass-through of employers' contributions to employers and of employees' contributions to employees. Bozio, Breda, and Grenet (2017) also find limited pass-through of employer social security contributions to wages for reforms that increased social security contributions with no tax-benefit linkage. On the other hand, they find evidence of full pass-through to workers in the case of a strong and salient relationship between contributions and expected benefits.

This work obviously relates to the literature studying the introduction of the *80 Euros Bonus* in Italy. Neri, Rondinelli, and Scoccianti (2015) analyze the effect of the introduction of the tax credit on household spending. They find that households that received the tax rebate increased their monthly consumption, in particular for food and means of transportation. To the best of my knowledge, this is the first study investigating the effects of the program on wages.

Finally, this paper speaks to the literature on the design of tax credits and welfare programs (Jones, 2010 and Romich and Weisner, 2002 on the Advanced Earned Income Tax Credit), serving as a case study analyzing the effects on wages when firms play an active role in the distribution of the transfer.

The paper proceeds as follows. Section 2 outlines the institutional details of the Italian Earned Income Tax Credit and the data used in the analysis. Section 3 outlines the simple conceptual framework that will guide the analysis. Section 4 presents descriptive evidence on the effects of the introduction of the tax credit on the evolution of earnings of individuals eligible for the program. Evidence on the firm-level responses to the introduction of the program in terms of earnings and employment are presented in Section 5. Section 6 conceptualizes the findings, discusses potential explanations for the evidence and concludes.

2 Institutional Background and Data

2.1 Institutional Background

2.1.1 The Program

In April 2014 the Italian government introduced the so-called *80 Euros Bonus*. The *80 Euros Bonus* is an Earned Income Tax Credit targeted at employees with annual gross income between €8,000 and €26,000. The tax credit was first distributed in May 2014 to around 10 million employees in 2014 (*Ministero dell'Economia e delle Finanze*). Its introduction was unexpected (as shown in Figure A1, which reports Google searches of the program around the time of its introduction) and, according to many, motivated by electoral reasons. I describe the main features of the program below.

Eligibility All individuals working as employees with a total annual gross income between €8,000[2] and €26,000 are eligible for the tax credit. Eligibility for the tax credit, conditional on being an employee, depends only on income and on no other personal or family characteristic. The eligibility range is in terms of *nominal* annual gross income and it is not adjusted annually for inflation. Moreover, although the tax credit is targeted at employees only, the relevant income measure for eligibility is total annual gross income and not annual gross labor income.

Distribution of the Credit Workers do not need to apply to receive the credit. The distribution of the tax credit is automatic and administered by the tax withholding agent, the employer. The credit is distributed directly in the paycheck of workers (Figure 1) by the employer. It either takes the form of reductions in the tax withheld or, since the tax credit is refundable, of a transfer. While the tax credit is distributed monthly, eligibility is based on the annual gross income earned at the end of the year. The employer determines the eligibility of a given worker based on calculations on the annual income that the employer expects to pay the worker. This implies that, in practice, the eligibility for the tax credit is effectively based on annual gross labor income. Because annual gross income is not known with certainty at the moment of the distribution of the tax credit, this mechanism inevitably implies the possibility of mistakes that are corrected through adjustments during tax filing[3].

Structure The structure of the program is described in Figure 2. The figure plots the annual tax credit received by annual gross income. The dashed line describes the structure of the tax credit in 2014, the first year the tax credit was introduced which was a transition year: the tax credit was distributed for the first time in May and this resulted in an annual tax credit of €640. From 2015 onwards the program was at full capacity, the tax credit was distributed every month and resulted in an annual tax credit of €960.

The introduction of the tax credit generates three important points in the budget con-

[2]Provided that the tax due on income is larger than the tax deductions the worker is entitled to (*INPS*).

[3]It was estimated that in 2014 around 1.5 million individuals had to return the tax credit during tax filing (*Ministero dell'Economia e delle Finanze*). These cases were mostly of workers whose annual gross income at the end of the year was lower than the lower eligibility cutoff of €8,000 because they worked only part of the year or lost their job during the year.

straint of individuals: the *lower eligibility* cutoff of €8,000, the *phase-out* cutoff of €24,000 and the *upper eligibility* cutoff of €26,000. At the lower eligibility cutoff of €8,000, the program creates a sharp discontinuity in after-tax income. When the program is at full capacity, individuals earning just above the lower cutoff experience an increase in after-tax income of 12% compared to those earning just below. This point corresponds to a *notch*[4]. When annual gross income exceeds €24,000, the tax credit starts to phase-out and decreases until it reaches zero at €26,000. For incomes between €24,000 and €26,000 the amount of the tax credit is determined by the following formula: $\frac{(26{,}000 - annual\ taxable\ income) \cdot 960}{2{,}000}$. Note that the phase-out cutoff of €24,000 constitues a *kink*[5] in the budget constraint of individuals since it leads to a discrete increase in the marginal tax rate. The phase-out region is extremely steep and characterized by an extremely high effective marginal tax rate: almost 70% compared to the standard marginal tax rate of 31.5%.

2.1.2 Wage Setting in Italy

The Italian labor market is mainly regulated by collective bargaining agreements (CBAs). More than 96% of private sector employees are covered by CBAs, which are negotiated at the sector-level. These agreements are typically renegotiated every three years and define the rules for wage bargaining. Italy has no legislated national minimum wage, but CBAs prescribe minimum wages that differ both across CBAs and within CBAs by age, experience (time spent working in the industry), tenure (time spent working in the firm) and education. Other than the minimum wage, CBAs also define the work schedule and the set of tasks for any given occupation within a sector. Collective bargaining in Italy is often seen as the source of excessive wage rigidities that limit the flexibility of firms.

2.2 Data and Descriptive Statistics

For the analysis, I use administrative data from social security registers of the Italian Social Security Institute (*Instituto Nazionale di Previdenza Sociale* or *INPS*). I have access to a sample that covers around 7% of all salaried or semi-subordinate employees working in

[4] Kleven and Waseem (2013), Kleven (2016).
[5] Saez (2010).

the private sector. The random sample is made up of workers who were born in 24 randomly selected birth dates. The data cover the period 1985-2016.

The basic observation in the data is a *job relationship* with a private employer within a calendar year. The dataset includes around 1.5 million job relationships per year. For every job relationship, I observe information on employees (date of birth, gender, and region of residence), information on the employer (sector and size) and the characteristics of the job relationship: type of contract (fixed-term vs permanent), occupation of employees within the firm (blue-collar, white-collar, manager), date of the start of the job relationship and date and reason of the end of the job relationship. The only information about earnings I have in my data is *annual gross earnings*[6], namely the annual wage earnings paid by the employer to the worker before taxes which therefore do not include the tax credit. I do not have information on after-tax earnings and on hourly or weekly wages. Moreover, given the employer-employee structure of my data, I only have information on annual wage income but no information on the total annual income of individuals. Given that, as explained above, eligibility for the tax credit was in practice determined by the employer on the basis of annual wage income of individuals, annual wage earnings are the relevant earning measure to study the incidence effects of the tax credit.

I can follow employees over time and have detailed information on their work histories: I can observe hirings, firings, retirements, job-to-job transitions, maternity and sickness leaves. For the main analysis, I restrict the sample to individuals aged 25-65 years old and working at least 6 months every year. However, in most specifications, I will consider employees working 52 weeks to isolate from labor supply responses.

Table 1 reports summary statistics for the full sample and for the subsample of eligible workers in 2013, the last year before the introduction of the policy. Note that 56% of the employees in the sample are eligible for the tax credit. Overall, because the eligibility range for the tax credit is so wide, the characteristics of eligible employees are not remarkably different

[6]More in detail, I observe the gross earnings used to compute individual contributions to the social security system (*imponibile previdenziale*) which are different from the taxable earnings (*imponibile fiscale*) as the social security contributions are included in the former but excluded in the latter. I therefore adjust my measure of income for this difference. Although the measure might not perfectly capture the range of eligible individuals, all results and calculations are robust to different definitions of the eligibility range that take into account the difference between these two earnings concepts.

from the characteristics of workers in the full sample. Annual earnings are obviously lower for eligible employees, but there are no important differences in terms of weeks worked, age, gender or share of workers employed with temporary contracts.

Finally, to have information on unionization levels, I integrate the matched employer-employee data with administrative data on the degree of unionization at the sector-level from the Italian National Institute of Statistics (*ISTAT*).

3 Conceptual Framework

In this section, I present a simple conceptual framework that will guide my empirical analysis of the incidence of the tax credit. I start by outlining the predictions of the standard tax incidence model. I then discuss how the framework changes when considering firm-specific responses to the introduction of the program.

3.1 Standard Tax Incidence Model

In the standard tax incidence model, labor markets are perfectly competitive. Competitive wages are determined such that aggregate labor demand equals aggregate labor supply. In this framework, the incidence of the tax credit depends on the relative elasticity of the aggregate demand and supply for labor.

More in detail, suppose we start from a pre-reform equilibrium where a worker of type i receives a pre-tax (gross) competitive wage w_i which depends on the aggregate labor demand and supply in the economy. When the tax credit is introduced, the after-tax wage of an eligible worker j changes discontinuously and becomes equal to $\omega_j = w_j + \tau_j$. On the other hand, the after-tax wage of non-eligible workers does not change after the introduction of the tax credit. The increase in after-tax wage for eligible workers induces labor supply responses that bid down pre-tax wages for eligible workers until a new equilibrium is reached. The standard partial-equilibrium tax incidence model, therefore, predicts that, as long as the labor supply elasticity is positive and demand is less than infinitely elastic, a portion of the money spent on the transfer will be captured by employers through lower wages. The amount of benefits captured by employers is determined by the relative elasticity of aggregate labor

demand and aggregate labor supply. The employer share will be larger the more inelastic the aggregate labor demand and the more elastic the aggregate labor supply.

In this particular framework, within-firm shocks generated by the introduction of the program and subsequent firm responses do not play any role in determining the incidence of the program. Therefore, within this framework, the standard approach to empirically identify the incidence of the program would rely on worker-level variation in the exposure to the program without exploiting any firm-level variation.

This model is obviously an oversimplification of how the labor market works in practice, where frictions and wage rigidities play an important role. Several studies[7] have documented that nominal wages are downward rigid which may prevent employers from responding to the introduction of the tax credit by *decreasing* the level of wages. Among the explanations put forward for downward wage rigidity are institutional constraints (such as the presence of minimum wages and collective bargaining agreements) or norm-based constraints (such as fairness and pay equity considerations within firms[8]).

I will evaluate the basic predictions from the standard model and discuss how wage rigidities might play a role in this case when I present the empirical evidence in Section 4.

3.2 Firm-Level Adjustments

The simple model outlined above describes the effect of the introduction of the tax credit on wages in a context that completely abstracts from the role of firms and firm responses to the program. Below, I briefly describe how the predictions of the standard tax incidence model would change when extending the model to account for firm responses. I present one of many potential extensions to the framework that highlights the role of firms in the redistribution of the burden of taxes and then shortly discuss a number of alternative settings.

In an economy without labor market frictions, the standard tax incidence model fully describes the incidence of the tax credit on wages. In practice, this is unlikely to be the case. In light of the recent empirical evidence documenting the central role of firms in the wage-setting process and in the transmission of tax incidence, within-firm shocks generated

[7] Dickens et al. (2007), Barattieri, Basu, and Gottschalk (2014).
[8] Kaur (2019), Card et al. (2012), Dube, Giuliano, and Leonard (2019)

by the introduction of the program are likely to play a big role in determining its incidence.

In particular, tax incidence will depart from the predictions of the standard incidence model in the presence of frictions or imperfectly competitive labor markets. One way to model this situation is by following the setting in Paradisi (2019) and assuming imperfect substitutability between incumbent workers and new hires (due to, for example, the presence of hiring or firing costs) and that every incumbent worker can leave the firm and earn the competitive outside option. In such a setting, if firms and workers bargain over the wage according to Nash bargaining, the wage of workers can be thought of as a function of two terms: the outside option in the competitive labor market and a quasi-rent that arises because of the existence of imperfect labor markets. The quasi-rent will depend on firms' labor costs that are in turn, at least potentially, affected by the introduction of the tax credit. In this setting, the extent to which a firm and its labor costs will be affected by the policy will depend on the wage distribution of incumbent employees before the introduction of the policy. Firms with a higher concentration of eligible employees are likely to experience a differential shift in labor costs relative to firms with a lower concentration of eligible employees in their workforce. Within this model, the differential shift in labor costs by firms' exposure is driven by the differential share of workers whose outside option is affected by the introduction of the program. This model predicts that, when the tax credit is introduced, the effect on wages in firms with a higher concentration of eligible employees in their workforce is going to be larger than in firms with a lower concentration of eligible employees.

In Section 5 I explore the role of firm-level mechanisms as potential determinants of tax incidence by testing for the presence of differential firm responses and adjustments by firms' concentration of eligible employees before the introduction of the program.

This is obviously not the only mechanism that could explain differential firm responses by firms' concentration of eligible employees. Firms with a larger share of eligible employees have more to gain by responding to the introduction of the tax credit by decreasing wages. At the same time, as mentioned above, wage rigidities may prevent employers from lowering wages for existing employees. If these wage rigidities are norm-based, firms with a higher concentration of eligible employees are less likely to be affected by equity considerations within firms that prevent them from lowering wages in response to the tax credit to avoid cross-

sectionally discriminating by eligibility status. Finally, firms with a higher concentration of eligible employees are likely to have more bargaining power towards eligible workers driven, for example, by a higher degree of substitutability of eligible workers.

4 The Effects of the Tax Credit on Eligible Workers: Worker-Level Analysis

In this section, I analyze the effects of the introduction of the tax credit on the earnings of eligible workers in relation to the predictions of the standard tax incidence model. I start by presenting descriptive evidence on the evolution of earnings of eligible workers before and after the introduction of the program. I then exploit worker-level variation in eligibility for the tax credit to compare otherwise similar eligible and non-eligible workers. Although the evidence presented in this section is mainly descriptive, it is nonetheless helpful in providing insights into the incidence effects of the introduction of the program.

4.1 Worker-Level Analysis

The first step in my empirical analysis is to present descriptive evidence on the evolution of annual earnings of eligible individuals before and after the introduction of the tax credit. As explained in Section 2.2, in my data I observe only one measure of wage earnings, *annual gross earnings*, namely the annual wage earnings paid by the employer to the worker before taxes. This measure does not include the tax credit and it can be thought of as the observable equivalent of the pre-tax wage w_j defined above. The standard competitive model predicts that, after the introduction of the tax credit, annual gross earnings should decrease. The amount of benefits that employers will be able to capture is determined by the relative elasticity of aggregate labor demand and aggregate labor supply. Looking at the evolution of annual earnings for eligible workers is, therefore, a first, very simple, test to understand whether the benefits of the program were fully captured by workers.

Figure 3, Panel A plots the evolution of average annual earnings for eligible workers relative to 2013, the last pre-reform year. More in detail, the figure plots the results of a

simple event study controlling for both firm and worker fixed effects. In order to avoid picking up intensive and extensive margin labor supply responses to the introduction of the program, I restrict the sample to eligible workers that (i) were employed before the introduction of the program (in 2013) (ii) work full-time for the entire year.

The key fact that emerges from Figure 3, Panel A is that annual earnings of eligible workers do not seem to decrease after the introduction of the program. This very simple fact can be interpreted as suggestive evidence that, at the "market-level", firms are not capturing part of the tax credit in the form of lower wages and that workers are fully capturing the benefits of the transfer. This result is obviously only suggestive and subject to a number of caveats. First of all, the lack of a direct control group makes the evidence above difficult to interpret. Second, the fact that earnings of eligible individuals do not decrease after the introduction of the program might be consistent with the presence of wage rigidities that may prevent firms to adjust the level of wages. It is possible that the aggregate-level results mask heterogeneity across different categories of workers depending on the degree of wage rigidities they are subject to.

To address the first caveat, I exploit individual-level variation in eligibility for the program to build a control group with the goal of understanding how the evolution of annual earnings for eligible individuals would have looked like in the absence of the program.

Given that the only determinant of eligibility for the tax credit is annual earnings, I do not have, unlike many other EITC studies, a natural control group of unaffected workers (for example workers with and without children). I therefore follow the approach used by Bozio, Breda, and Grenet (2017) and build a treatment and control group using variation in eligibility status induced by variation in the level of annual earnings. In particular, I compare workers with annual earnings just *below* the upper eligibility threshold of €26,000, and therefore eligible for the tax credit, to workers with earnings just *above* the upper eligibility threshold, and therefore not eligible for the tax credit. I exclude individuals earning between €24,000 and €26,000 in order to isolate from potential behavioral responses due to the structure of the phase-out region[9]. In my baseline specification, I define as treated work-

[9]Results qualitatively do not change when including individuals earning between €24,000 and €26,000 in the analysis.

ers with annual earnings between €20,000 and €24,000 and as control workers with annual earnings between €26,000 and €30,000. The obvious trade-off in the construction of this treatment and control group is between comparability and power: the larger the bandwidth the higher the power but the higher the risk of differential trends between the treatment and control group and vice-versa. I also check the robustness of the results to different choices of bandwidths. The validity of this approach relies on the assumption that the average annual earnings of workers in the treatment and control groups would have followed parallel trends, absent the introduction of the tax credit. As before, I restrict the sample to eligible workers that (i) were employed before the introduction of the program (in 2013) (ii) work full-time for the entire year.

Figure 3, Panel B compares the evolution of annual gross earnings between the treatment and control group around the year of the reform. A few things are worth noticing. First of all, reassuringly, before the introduction of the program, the evolution of annual earnings in the two groups of workers followed similar trends. Second, the overall result of Figure 3, Panel A is confirmed: annual earnings of eligible individuals do not decrease after the introduction of the tax credit. Third, I find clear evidence of a slower earnings growth for the workers directly affected by the introduction of the tax credit. Given the sample restrictions described above, this result is unlikely to be driven by labor supply responses. One last thing to note is that, even though the policy was introduced in 2014, we start to see a divergence in the evolution of annual earnings for the two groups in 2015. This pattern is likely to be explained by the way the program was introduced. The introduction of the tax credit was completely unexpected (Figure A1) and the program was not introduced at full capacity until 2015 (in 2014 the tax credit was not distributed for the whole year but only from May onwards and there was substantial uncertainty on whether it would be confirmed for 2015). These factors make it reasonable to expect a delayed reaction to the program by firms and workers.

Robustness Appendix Figure A2 reports the results of different robustness checks to this exercise. Panel A and B report the results using smaller and larger bandwidths for the definition of the treatment and control group (€3,000 and €6,000 respectively). The results

of these robustness checks overall reflect the main trade-off in selecting the treatment and control group: using a larger bandwidth increases the likelihood of having dissimilar earning trends between the treated and control workers, as reflected in Panel B. Using a smaller bandwidth seems to reduce the divergence in annual earnings trends between the treatment and control group, suggesting that the effect is likely to be driven by eligible employees with lower earnings.

4.2 Sources of Wage Rigidities

The descriptive evidence presented above suggests that, at least at an aggregate level, annual earnings of eligible workers do not decrease after the introduction of the program. As explained in Section 3, several studies have documented that wage rigidities may prevent employers from responding to the introduction of the tax credit by decreasing the level of wages. In this section, I explore different sources of wage rigidities that might prevent firms from responding to the program by lowering wages.

Minimum Wage Constraints One widely discussed explanation for downward wage rigidity is the presence of a minimum wage. In Italy, the minimum wage is set through sector-level collective bargaining agreements and varies by industry and by occupation. The existence of the minimum wage could constrain firms from directly decreasing the level of wages. However, this should be true only for low-earners eligible workers. It is therefore possible to test whether wage rigidities induced by the minimum wage are responsible for the absence of response in earnings by looking at the evolution of annual earnings for eligible employees that are in the top 25% of the earnings distribution (conditional on eligibility). Figure A3, Panel A reports the evolution of annual earnings for the top and bottom 25% of the earnings distribution conditional on eligibility. Annual earnings do not decrease for the group of eligible top-earners. This suggests that binding minimum wages cannot explain the finding.

Unionization Wage rigidities induced by other institutional constraints may play a role in preventing firms from responding to the program, for example, the presence of unions. I

therefore look at whether there is heterogeneity in the evolution of annual earnings before and after the introduction of the program by the degree of unionization at the sector-level[10]. Figure A3, Panel B plots the evolution of annual earnings of eligible workers in sectors with a degree of unionization above the median and in sectors with a degree of unionization below the median. Interestingly, even though the level of earnings of eligible employees does not decrease in either case, eligible employees experience a much slower earnings growth in sectors with a lower degree of unionization.

New Hires Another discussed driver of wage rigidities is the presence of implicit contracts. Firms may promise a set of wage increases over time contingent on various outcomes which may limit the possibility of firms to adjust wages after the introduction of the program. One way to test whether this is the case is to look at the evolution of average earnings for new hires. I define new hires as workers that have a new firm identifier as their main employer relative to the previous year. This includes job-to-job transitions as well as new hires among previously non-employed individuals[11]. Figure A3, Panel C shows the evolution of annual earnings for new hires eligible for the program. Once again, there is no decrease in annual earnings of new hires after the introduction of the program.

4.3 Summary

Two main facts emerge from the simple analysis above. First of all, the introduction of the tax credit has no effect on the *level* of average annual earnings of eligible workers. Although this evidence is only suggestive, it can be interpreted as evidence that firms do not capture part of the benefits of the tax credit in the form of lower wages. While this finding can be consistent with the presence of wage rigidities, the analysis above shows that it does not seem to be explained by the presence of minimum wage floors or by implicit contracts. Second, the comparison between the evolution of annual earnings of eligible workers to similar non-eligible workers shows that, even though the *level* of earnings does not decrease in response to the policy, annual earnings of eligible workers grow at a slower rate after the introduction

[10] As explained in Section 2, unions in Italy mostly operate and negotiate at the sector-level.

[11] The results do not change when considering only job-to-job transitions in order to exclude new hires among previously non-employed individuals.

of the tax credit. This finding is unlikely to be explained by labor supply responses. One possible interpretation of the result is that firms might respond to the introduction of the tax credit through different margins: they can adjust the *level* of earnings or they can adjust the *growth rate* of earnings. In settings where nominal wage rigidities may prevent firms from directly lower wages, firms might respond by adjusting the growth rate of wages. This suggests that the incidence of the tax credit might be shifted to firms over time, in a dynamic way. Obviously, the evidence is only suggestive and there might be other explanations behind this result.

In the next section, I move to exploring the role of firm-level responses to the introduction of the tax credit. While this first analysis is helpful in understanding the overall impact and incidence of the tax credit, it likely masks heterogeneity in responses across different types of firms and therefore misses an important part of the story.

5 Firm-Level Transmission of Incidence

In this section, I explore the role of firm-level mechanisms as potential determinants of tax incidence. I test for the presence of differential firm responses by firms' concentration of eligible employees. Given that the tax credit changed the after-tax earnings of eligible workers, the extent to which a firm was affected by the policy is likely to depend on the concentration of eligible employees in its workforce. As discussed in Section 3, the concentration of eligible employees in a given firm is potentially linked to a *reform-induced* shift in labor costs prompted by lower competitive wages. I exploit firm-level variation in exposure to the policy generated by preexisting, persistent composition of their workforce to understand whether firms more exposed to the policy respond differently to the introduction of the program.

5.1 Empirical Strategy

I test whether firms with a higher concentration of eligible workers respond differently to the introduction of the program relative to firms with a lower concentration of eligible workers. My empirical strategy relies on firm-level variation in the pre-reform share of eligible

workers. I compare the evolution of key firm-level outcomes between firms with different concentration of eligible workers following a methodology popular in the minimum wage literature (Draca, Machin, and Van Reenen, 2011, Harasztosi and Lindner, 2019) and that was recently applied to study the firm-level transmission of incidence in the context of payroll taxes (Saez, Schoefer, and Seim, 2019).

Specifically, I consider a panel of firms active every year from 2010 to 2016 with more than 3 employees each year. I divide the panel of firms into four groups based on the quartiles[12] of the share of eligible employees they employ in the baseline year, 2013[13]. I define firm exposure to the policy in the baseline year in order to abstract from potential behavioral responses to the policy.

Table 2 provides descriptive statistics for the four groups of firms defined using the quartiles of the share of eligible workers in 2013. Firms in different groups are not extremely different in terms of observable characteristics. The characteristics of medium-high and high exposure firms are particularly similar: the share of temporary workers and unionization degree is comparable in the two groups of firms and the same is true for average size. The distribution of firms across industries is also similar, with almost the majority of firms in both groups operating in manufacturing. Obviously, the two groups of firms differ in terms of average annual earnings. However, annual earnings of eligible individuals are, on average, relatively comparable between the two groups of firms. This is less true for firms in the bottom two groups, where eligible workers earn on average more than eligible workers in more exposed firms.

Given the similarity in observable characteristics, in my baseline analysis, I will compare *medium-high exposure* firms (firms whose share of eligible employees in 2013 was between

[12] I define the quartiles restricting to firms with a non-zero share of eligible workers. Firms with exactly zero eligible workers in the baseline year are then included in the first group along with the firms in the bottom quartile. Results do not change when defining the quartiles without restricting to firms with a non-zero share of eligible workers.

[13] The fact that I do not observe the universe of private sector employees but only a 7% random sample may create problems in the definition of the share of eligible employees by firm. The main concern is that some firms could be misclassified as employing a high share of eligible employees when they do not and vice-versa. A first step to reduce this misclassification problem is to restrict to firms for which I observe at least 3 employees each year (with the obvious drawback of underrepresenting smaller firms). The results are robust to variation of this threshold. Moreover, the fact that the random sample is selected at the worker level should imply that the distribution of workers within firms mirror the true distribution.

the 50th and the 75th percentile) to *high exposure* firms (firms in the top quartile of share eligible in 2013). This way, I compare firms with comparable observable characteristics that face heterogeneous exposure to the reform. Below, I also broaden the analysis to include less exposed firms.

I study the effects of firm-level exposure to the policy by estimating a multiple period difference-in-differences model. I estimate the following model, at the firm-level:

$$y_{f,t} = \eta_f + \eta_t + \sum_{k=-m}^{q} \beta_k \left(T_f \cdot \mathbb{1} \left(t = t_0 + k \right) \right) + \varepsilon_{f,t} \tag{1}$$

where $y_{f,t}$ is a firm-level outcome of interest such as the average earnings of eligible employees, η_f are firm fixed effects (which capture time-invariant heterogeneity across firms) and η_t are year fixed effects. In the baseline specification, T_f is equal to 1 if firm f's share of eligible employees in 2013 was in the top quartile of the pre-reform distribution of the share of eligible employees (*high exposure*) and equal to zero if firm f's share of eligible employees in 2013 was between the 50th and the 75th percentile (*medium-high exposure*). I perform several robustness checks estimating the same model using different definitions of T_f.

Identification relies on the assumption that more and less exposed firms would have had parallel trends in key outcomes absent the reform. This assumption can be assessed by evaluating the coefficients β_k for $k < 0$. Testing for their significance allows to establish whether firms that are differentially exposed to the reform have different trends in earnings dynamics.

Critical to this empirical strategy is the persistence of the share of eligible workers across years within firms. If firms respond to the policy by changing their composition of workers the estimates might be biased. For example, if, after the introduction of the policy, the share of eligible employees at medium-high exposure firms strongly decreases, we would observe a decrease in average gross earnings in high exposure firms relative to medium-high exposure firms that would be wrongly attributed to differential responses between groups of firms but would instead be due to composition effects. Figure 4, Panel A depicts the average share of eligible workers in each year for each group of firms. There is considerable persistence in the share of eligible employees across groups of firms and years. This is reassuring and increases

the confidence that the effects are not driven by compositional effects. Note that the spike in 2013 is due to mean reversion and it naturally follows from the definition of groups of firms: firms with a high share of eligible employees in 2013 are likely to have a lower share of eligible employees before and after. The opposite is true for firms with a low share of eligible employees.

5.2 Results

Earnings Effects I start the analysis by looking at the effects of exposure to the reform on annual earnings of employees. As explained above, in my baseline specification I compare *high exposure* firms (firms in the top quartile of the pre-reform distribution of the share of eligible employees) to *medium-high* exposure firms (firms in the third quartile of the distribution of the share of eligible employees in 2013). I call "treated" the firms in the high exposure group and "controls" the firms in the medium-high exposure group.

A useful first step in the analysis is to plot the average annual earnings and the average annual earnings of eligible workers by firms in the treatment and in the control group. Figure A4, Panel A shows that the two groups of firms have extremely similar dynamics in terms of annual earnings in the pre-reform period but a clearly divergent pattern after the tax credit is introduced. Annual earnings in high exposure firms have a lower growth relative to the control. The pattern is even more striking when looking at the average annual earnings of eligible workers. On average, eligible workers in treated firms experience a much slower earnings growth than eligible workers in the control group. Although this evidence is only descriptive, it is helpful in showing that the treatment and control groups followed similar trends before the reform.

Figure 5, Panel A reports the results of the estimation of equation 1 where the outcome is the firm-level average annual earnings. Before the introduction of the tax credit, average earnings per worker followed the same trend in the two groups of firms, giving support to the parallel trends assumption. After the introduction of the program, average earnings per worker in treated firms (*high exposure*) are significantly lower relative to control firms (*medium-high exposure*).

While this result is suggestive evidence that firms with a high share of eligible employees

start to behave differently after the introduction of the program, it does not speak to the mechanisms through which this change in behavior happens. In particular, it does not allow to distinguish whether the effect is driven by a similar decrease in annual earnings of eligible individuals in each group of firms or by higher responses in terms of earnings of eligible individuals in high exposure firms. Figure 5, Panel B reports the results of the estimation of equation 1 using as outcome the annual earnings of the average eligible worker in each firm. Annual earnings of the average eligible worker are significantly lower after the introduction of the program in high exposure firms relative to medium-high exposure firms. By 2016, annual earnings of the average eligible workers decreased by almost €500 in high exposure firms relative to medium-high exposure firms. Again, the divergence in average annual earnings between firms with different levels of exposure emerged only after the introduction of the tax credit. Finally, Figure 5, Panel C reports the same estimates for average earnings of non-eligible employees. Note that this within-firm group of workers can be identified as a group not directly affected by the tax credit. The only way through which this group's earnings might be affected is through spillover effects. Figure 5, Panel C shows that the earnings of non-eligible workers do not differentially change between high exposure and medium-high exposure firms after the introduction of the program. This result can be interpreted as suggestive evidence that there are no spillover effects from the introduction of the tax credit to non-eligible individuals.

Quantitative estimates of the effects are reported in Table 3. Average annual earnings decrease by around €200 after the introduction of the program in high exposure firms relative to medium-high exposure firms (column 1). The decrease in average annual earnings of eligible employees is larger and around €240 (column 2). Column 3 reports the same result using as dependent variable the change in firm-level average annual earnings for eligible workers relative to 2013. More exposure to the program causes annual earnings of eligible employees to drop by almost 1% of the 2013 earnings relative to less exposed firms.

These results can be used to quantify tax incidence, which is measured as the fraction of the tax credit that benefits the employer (pass-through to firms). A naive way to compute the pass-through to firms is to divide the gross earnings coefficient by the change in the amount of the tax credit. This naive estimates indicates an average pass-through to firms in

the post-reform period of around 20%.

One thing that emerges from Figure 5 is that, while the tax credit was introduced in 2014, the response seems to appear from 2015 onwards. As noted above, this pattern is likely to be explained by the fact that 2014 was a transition year when the program was not yet at full capacity and when there was still uncertainty on whether the program would be extended to 2015. Table A1 explores more in detail the timing of the response. The divergence in annual earnings between treated and control firms emerges in 2015 and widens in 2016. Column 2 shows that by 2016 the annual earnings of eligible individuals were almost €500 lower in treated firms than in control firms relative to 2013, implying a naive pass-through to firms of 50%. Column 3 reports the results using as dependent variable the annual earnings of eligible individuals normalized relative to 2013. By 2016, annual earnings of eligible employees in high exposure firms dropped by 2.1% of the 2013 earnings relative to medium-high exposure firms.

Employment Effects The earnings results show that firms highly exposed to the policy, after the introduction of the tax credit, have lower average earnings than less exposed firms. This translates into a reduction in labor costs. A potential consequence of this reduction in labor costs is that highly exposed firms increase their hirings. It is therefore natural to ask whether firms highly exposed to the policy change their employment patterns after the introduction of the policy.

Figure 6 explores whether firms with a high share of eligible employees and firms with a lower share of eligible employees respond differently to the introduction of the tax credit in terms of employment. Panel A reports the results of the estimation of equation 1 using as dependent variable the number of employees observed by firm while Panel B uses as dependent variable the number of new hires. There are no significant differences in employment behavior between the two groups of firms after the introduction of the program. Columns 5 and 6 of Table 3 confirm the same patterns.

5.3 Robustness

In this section, I test the robustness of the analysis described above to different definitions of treatment and control group.

One concern is that, given the prevalence in the sample of firms whose share of eligible employees in 2013 is exactly one (Figure 4, Panel B), the results above are driven by a very specific group of firms. To check whether this is the case, I estimate equation 1 using as treatment group firms whose share of eligible employees is between the 70th and 90th percentile of the pre-reform distribution of the share of eligible employees. This definition excludes from the treatment group all those firms for which all observed employees are eligible for the tax credit in 2013 (since they represent the top 10% of the pre-reform distribution of share of eligible employees). The control group is defined as those firms whose share of eligible employees is between the 50th and 70th percentile. Figure A6, Panel A reports the results. Overall, the results obtained using the baseline definition of treatment and control group are confirmed: after the introduction of the program, annual earnings decrease in firms with a larger share of eligible employees compared to firms with a lower share of eligible employees. This finding gives support to the claim that the effect is not driven by firms with an exceptionally high share of eligible employees.

Figure A6, Panel B reports the results of an additional robustness check to different definitions of treatment and control groups. In this case, I assign to the treatment group all firms in the top 10% of the pre-reform distribution of the share of eligible employees (namely firms whose share of eligible in 2013 is equal to 1). The control group is composed of firms between the 80th and 90th percentile of the distribution. The main results are confirmed also using this definition of treatment and control group. Overall, these robustness checks suggest that firm responses to the program are increasing in firms' exposure to the policy.

5.4 What are the Mechanisms Behind Firm-Level Responses?

The results above show that firms with a higher share of eligible employees before the reform respond more to the policy than similar firms with a lower share of eligible employees. In this section, I try to shed light on the mechanisms behind this differential response.

As pointed out in Section 3, there might be a number of reasons behind the differential earnings response of firms differentially exposed to the program. Firms employing more eligible employees experience a larger (at least potential) reduction in labor costs which increases their incentives to respond to the program by decreasing wages. At the same time, firms with a higher concentration of eligible employees may have more bargaining power driven, for example, by higher substitutability of eligible workers. Also, norm-based wage rigidities preventing firms to respond by lowering wages due to equity concerns might be of less importance in firms with a higher concentration of eligible employees, potentially leading to higher responses by exposure.

In this section, I first investigate more systematically the link between exposure and firm responses. I then move to the analysis of the specific channels through which earnings decrease in more exposed firms relative to less exposed firms. Finally, I investigate the heterogeneity of responses by firms' characteristics.

Monotonicity of Responses While in the baseline analysis I focused on the comparison between high exposure firms and medium-high exposure firms, I now expand the analysis and investigate the behavior of lower exposed firms. Understanding whether firm responses and in general the ability of firms to adjust their wage policies are monotonic in the exposure to the policy is useful to try to shed light on the specific mechanisms driving the firm-level transmission of incidence.

I therefore investigate descriptively whether firm responses, and in particular the impact on workers' earnings, are increasing in firms' exposure to the program. I do so by comparing the evolution of average annual earnings of eligible workers in high exposure firms, medium-high exposure firms and medium-low exposure firms (i.e. firms whose pre-reform share of eligible employees are between the 25th and 50th percentile of the distribution in 2013). I exclude firms in the low exposure group (i.e. firms in the bottom quartile of the distribution of the share of eligible employees) due to comparability reasons: firms in the low exposure groups either have zero eligible employees or a very small share of eligible employees and therefore have different earnings dynamics than the other groups.

The results are shown in Figure 7 which depicts the evolution (relative to 2010) of the

average annual earnings of eligible employees in each group of firms. Firms with the largest share of eligible employees experience a slower increase in annual earnings per eligible worker than firms with a medium-high share of eligible employees after the reform. Similarly, firms with a medium-high share of eligible employees experience a slower increase in annual earnings per eligible worker than firms with a medium-low share of eligible employees, suggesting that there is monotonicity in the reaction of firms to the policy by exposure. Importantly, the growth of annual earnings before 2014 follows very similar trends across the three groups (although, pre-trends are slightly different for *medium-low exposure* firms). While this evidence is only suggestive, it points towards the idea that the ability or willingness of firms to adjust their wage-setting policies is a direct function of the share of eligible employees they employ. This is consistent with firms having more bargaining power with eligible employees the more eligible workers they employ or with more exposed firms having more incentives or ability to adjust.

Earnings Growth The results above show that, after the introduction of the tax credit, annual earnings for eligible workers in firms with a high concentration of eligible employees decrease relative to firms less exposed to the policy. However, this finding does not speak to whether firms that are highly exposed to the policy are actually able to decrease the *level* of wages.

As already shown in Figure A4, while, on average, earnings in high exposure firms grow slower than earnings in medium-high exposure firms, the level of earnings does not decrease in either group of firms. This is suggestive evidence of the fact that, at the group-aggregate level, average earnings do not decrease. However, carrying out the analysis as such an aggregate level could miss different responses at the individual level.

I therefore conduct an individual-level analysis that follows workers over time, grouped by their employer. I compare the evolution of annual earnings for individuals working in firms belonging to either the high exposure or the medium-high exposure group. In particular, I estimate the following model, at the individual level, separately for workers in each group of firms:

$$y_{i,f,t} = \mu + \eta_i + \eta_f + \sum_{k=-m}^{q} \beta_k \left(\mathbb{1} \left(t = t_0 + k \right) \right) + \varepsilon_{i,f,t} \tag{2}$$

where $y_{i,f,t}$ is the individual-level outcome of interest (annual earnings) of individual i, working in firm f, in year t, η_i are worker fixed effects and η_f are firm fixed effects. I restrict to individuals working full-time and for the full year each year in order to abstract from labor supply responses.

The results for high exposed and medium-high exposed firms are reported in Figure 8. Eligible workers in high exposure firms experience a slower growth in annual earnings after the introduction of the tax credit relative to workers in medium-high exposure firms. However, the *level* of annual earnings does not decrease for workers in either group of firms.

The result is confirmed when estimating the baseline specification, equation 1, using as outcome the average individual-level earnings growth defined as $g_{f,t} = \frac{\sum_{i=1}^{N_{f,t}} \log(w_{i,f,t}) - \log(w_{i,f,t-1})}{N_{f,t}}$. This is useful in order to test whether earnings growth slowed down for eligible employees working in highly exposed relative to eligible employees in less exposed firms. Results are presented in Figure 9. Panel A shows the results for all workers while Panel B and C restrict to eligible and non-eligible employees respectively. The average individual-level earnings growth decreases in high exposure firms relative to medium-high exposure firms after the introduction of the tax credit. Before the introduction of the tax credit, average individual-level earnings growth followed the same trend in the two groups of firms, giving support to the parallel trends assumption. As shown in Panel B the result is driven by eligible workers. Average individual-level earnings growth does not decrease for non-eligible employees, reinforcing the hypothesis that the effect is actually driven by the introduction of the tax credit. Quantitative estimates of the results are reported in Table 4. After the introduction of the tax credit, earnings growth of eligible individuals in treated firms decreases by 2 percentage points relative to eligible individuals in the control group (the baseline earnings growth of eligible individuals in high exposure firms is 2.2%).

These findings are important since they speak to the mechanisms through which firms are responding to the introduction of the tax credit. Even firms that are extremely exposed to the program, on average, are not able (or willing) to decrease the level of earnings. This

is again consistent with the presence of nominal downward wage rigidities. Firms might be prevented from directly lowering wages and therefore respond to the introduction of the program by decreasing wage growth. This finding highlights the fact that tax incidence might be shifted from workers to firms in a dynamic way. One important downside of this analysis is that, having information on just three post-reform periods, I observe firm responses only in the short-run. As a consequence, I am not able to say whether the response in terms of earnings growth is a one-time response or if it lasts for a prolonged period of time. Distinguishing between these two cases would certainly be a further step towards understanding the mechanisms behind the response. A one-time response is, for example, consistent with a situation where firms and workers negotiate on net wage and the tax credit effectively works as a pay raise for eligible employees that, after the introduction of the program, earn €960 more per year. If a firm was increasing net wages at a 2% rate before the program, with the introduction of the program, the firm can slow down wage growth, because net wages automatically increase.

Heterogeneity The final step of the analysis aimed at understanding the mechanisms behind firm responses is to conduct a heterogeneity analysis. I ask whether responses are different depending on firms' observable characteristics. I focus on firm-level heterogeneity across two dimensions: size and degree of unionization.

I categorize firms based on their characteristics in 2013 and then estimate equation 1 separately for different groups of firms. I start by testing whether firm size plays a role in firm responses in terms of earnings.

Figure 10, Panel A shows the results of the estimation[14] of equation 1 separately for small and large firms. Small firms are defined as firms whose size is below the median firm size, which in my sample is 50 employees, and large firms are defined as firms with a number of employees above the median. Two things are worth noting. First, the effect on annual earnings of eligible workers is larger in large firms than in small firms. Second, large firms seem to react earlier to the introduction of the tax credit: the decrease in earnings in high exposure firms relative to medium-high exposure firms becomes visible in 2014 in large firms,

[14] I report the results using annual earnings of eligible employees as outcome but results are consistent when using annual earnings of all workers as dependent variable.

the first year of the program. Both of these findings are consistent with the fact that larger firms are likely to be more sophisticated in their wage-setting policies and overall more able to respond to the introduction of the tax credit than smaller firms. Moreover, larger firms with a high concentration of eligible employees benefit more from adjusting their wage policies in response to the introduction of the tax credit, which might also explain the results.

I explore heterogeneity in responses by another dimension: the degree of unionization of employees. Unionization is likely to play a big role if, for example, firms with a higher concentration of eligible are able to respond more because they have more bargaining power relative to eligible workers. Note that the degree of unionization is defined at the sector-level, which, as explained in Section 2 is the relevant level for union-firms bargaining in the Italian context. I call "high unionization" firms operating in a sector where the degree of unionization is higher than the median and "low unionization" firms operating in sectors where the degree of unionization is lower than the median. Figure 10, Panel B reports the results of the estimation of equation 1 by degree of unionization. Interestingly, responses do not seem to be significantly different by unionization level.

I conclude the heterogeneity analysis by investigating which categories of workers are more affected by the program. The analysis above shows that there do not seem to be spillover effects of the introduction of the tax credit to non-eligible individuals. Here, I try to understand better the distributional effects of the tax program by considering heterogeneity by initial earnings level of eligible workers in each firm. More in detail, I split the sample of eligible workers by relative earnings groups within their employer. I consider two groups: eligible workers with earnings above the firm median for eligible workers (high eligible earners) and eligible workers with earnings below the firm median for eligible workers (low eligible earners). Columns 1 and 2 of Table 5 report the results of a variant of specification 1, where I collapse time periods in pre and post 2013. The dependent variable is annual earnings for low eligible earners and high eligible earners (normalized to their 2013 value). Column 1 reports the results for low eligible earners and Column 2 for high eligible earners. The effect seems to be slightly larger for high earners: 1.01 percent for higher earners and 0.89 percent for lower earners. However, these results should be interpreted with caution since the effect is not statistically significant in the case of low eligible earners. This is probably due to the

fact that low eligible earners in high exposure firms are not completely comparable to lower earners in medium-high exposure firms, as shown in Figure A7. Columns 3 and 4 of Table 5 show the results for individual-level earnings growth for low eligible earners and high eligible earners. In this case, the decrease in earnings growth is similar for both categories of workers suggesting that the effect does not substantially change across the distribution of eligible workers.

6 Discussion and Conclusions

This paper provides an assessment of the incidence effects of the introduction of a large and salient EITC program in Italy. My analysis suggests that firms are an important vector for the pass-through of the effects of the tax credit and shows the importance of considering the role of employers in the analysis of public policies. Firms play a key role in the wage formation process and should not be ignored when analyzing the incidence of welfare programs. This paper shows that abstracting from the role of firms would miss an important channel of transmission of incidence and would lead to incomplete conclusions in the incidence analysis. In particular, I find that firms with a higher concentration of eligible employees in the workforce, and therefore more affected by the introduction of the program, respond more in terms of annual earnings than firms with a lower concentration of eligible employees in the workforce. My estimates suggest that, three years after the introduction of the program, annual earnings of eligible individuals in highly exposed firms were almost €500 lower than annual earnings of eligible individuals in less exposed firms relative to before the introduction of the program, implying a pass-through of 50%.

My analysis also highlights mechanisms behind firm responses that have not been considered in other studies. I show that the level of wages is not the only margin through which firms can shift the incidence of the tax credit. Earnings growth is an additional channel that firms use to capture part of the benefits of the program in contexts characterized by downward nominal wage rigidity. One important downside of my analysis is that I am only able to investigate firm responses in the short-run and, as a consequence, I am not able to distinguish whether the response in terms of earnings growth is a one-time response or if it lasts for a

prolonged period of time. Future research should investigate more the mechanisms behind firm responses and the connection between wage rigidities and firms' margin of adjustments.

Finally, in terms of policy implications, by highlighting the role of firms in the transmission of incidence, my analysis calls into question the efficacy of using firms as intermediaries in the distribution of Earned Income Tax Credits. In particular, my findings suggest that there might be a trade-off when giving employers an active role in the distribution of tax credits: on the one hand, using firms as intermediaries in the distribution of the credits allows for the possibility of monthly transfers (which are preferred to yearly transfers if individuals have liquidity constraints) and reduces problems of low take-up by making the distribution of the credit automatic, on the other hand, giving employers perfect information on who receives the credit and on the magnitude of the transfer is likely to make it easier for firms to capture part of the benefits of the tax credit destined to workers. Future research should investigate deeper the connection between the way tax credits are designed, the role of firms and incidence.

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Figures and Tables

Figure 1: **Example of a Paycheck**

Totale : 1.823,55

COD.	DESCRIZIONE	ORE / GG	%	DATO BASE	RITENUTE	COMPETENZE
1	IMPORTO ORDINARIO	26,00		70,13654		1.823,55
111	STRAORDINARIO 15%	2,00	15,00	12,48262		24,97
999	TOT.LORDO SOGG.CONTR			1.848,52		
1	CONTRIB.FAP 9.19%		9,1900	1.849,00	169,92	
58	FONDO EST TERZ.			2,00	2,00	
991	SOLID. M980			10,00		
125	FONDO INT. SALAR.(5)		0,1500	1.849,00	2,77	
581	ALLEATA PREV.100%TFR		100,0000	(125,83)	(125,83)	
	INAIL Pat: 91825354/97 Tar: 0722			(1.849,00)		
	Ctr.Ass.San. Progr.			(36,00)		
	Ctr.Ass.San. dedotti			(12,00)	(2,00)	
	TFR versato al fondo			(378,21)	(378,21)	
	Tot. rit. sociali			172,69		
	Imponibile Fiscale			1.673,83		
	Impon. fiscale netto			1.673,83		
	Rit. Fis. mese lorda			401,93		
	Imponibile detraz.			23.154,02		
	Detrazioni fiscali			101,62		
	Rit. Fis. mese netta				300,31	
	Credito Art.13 TUIR					80,00
	Add.Reg. rata pagata (Cod.: LO)				29,93	
	Add.Com. rata pagata (cod.: E265)				11,53	

NOTE

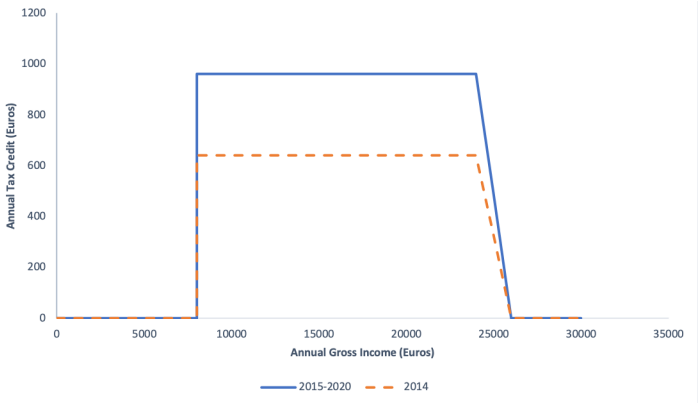
TOTALE RITENUTE: 521,69 — TOTALE COMPETENZE: 1.930,05

NETTO IN BUSTA

Continua su foglio numero 00000043689

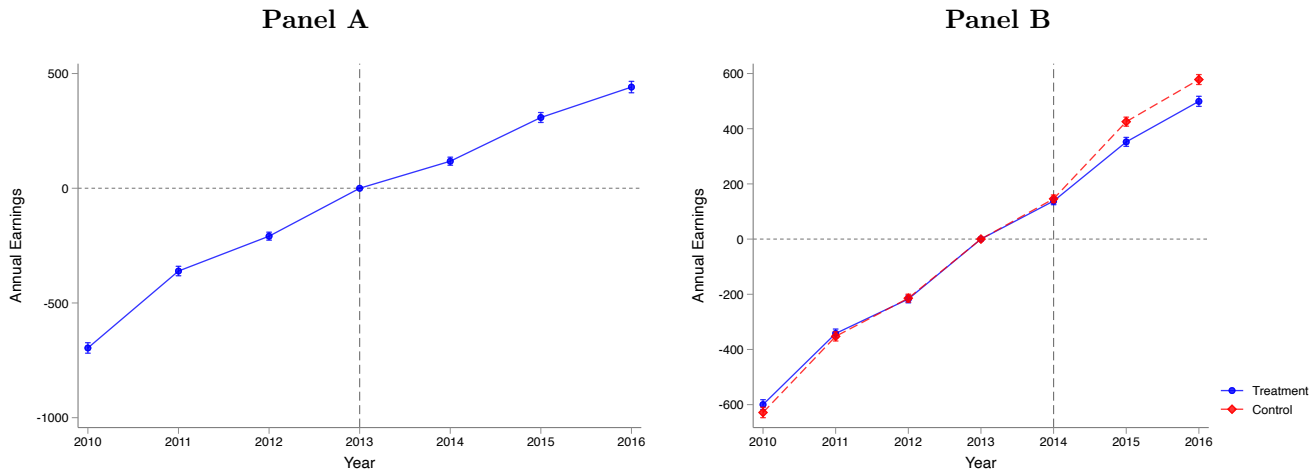
ARR. PRECEDENTE | ARR. ATTUALE

Figure 2: **Structure of the Tax Credit**



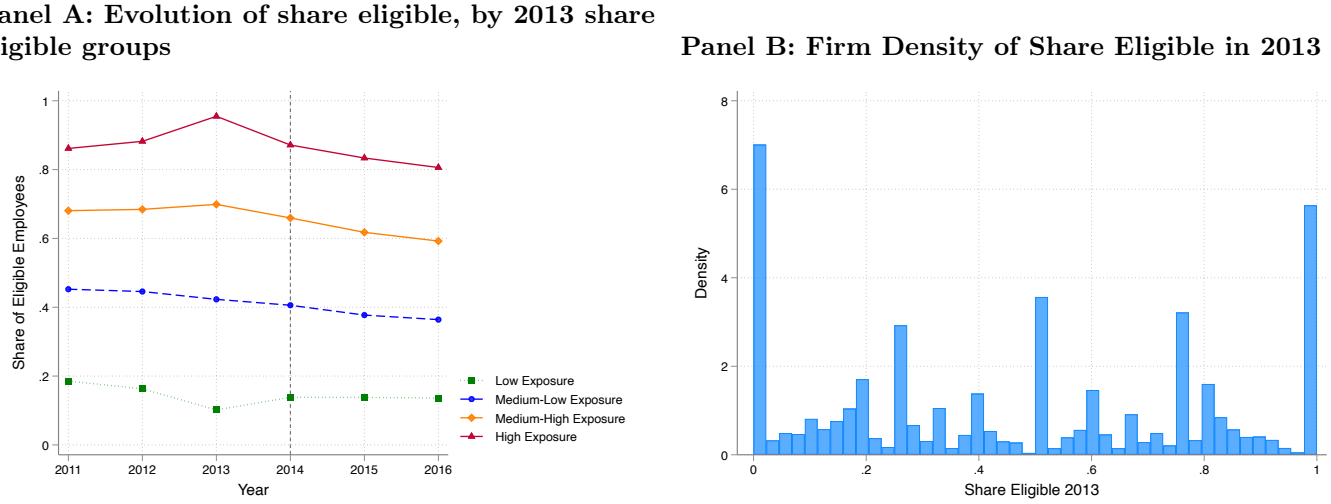
Notes: This figure shows the structure of the tax credit in 2014 (dashed line) and from 2015 onwards (solid line). Individuals with annual gross income between €8,000 and €24,000 are eligible for an annual tax credit of €960 (€640 in 2014 since the tax credit was distributed from May onwards). For employees whose annual gross income is between €24,000 to €26,000 the tax credit due is calculated as $\frac{(26{,}000-annual\,gross\,income)\cdot 960}{2{,}000}$ $\left(in\ 2014\ \frac{(26{,}000-annual\,gross\,income)\cdot 640}{2{,}000}\right)$.

Figure 3: **Evolution of Annual Earnings of Eligible Workers**



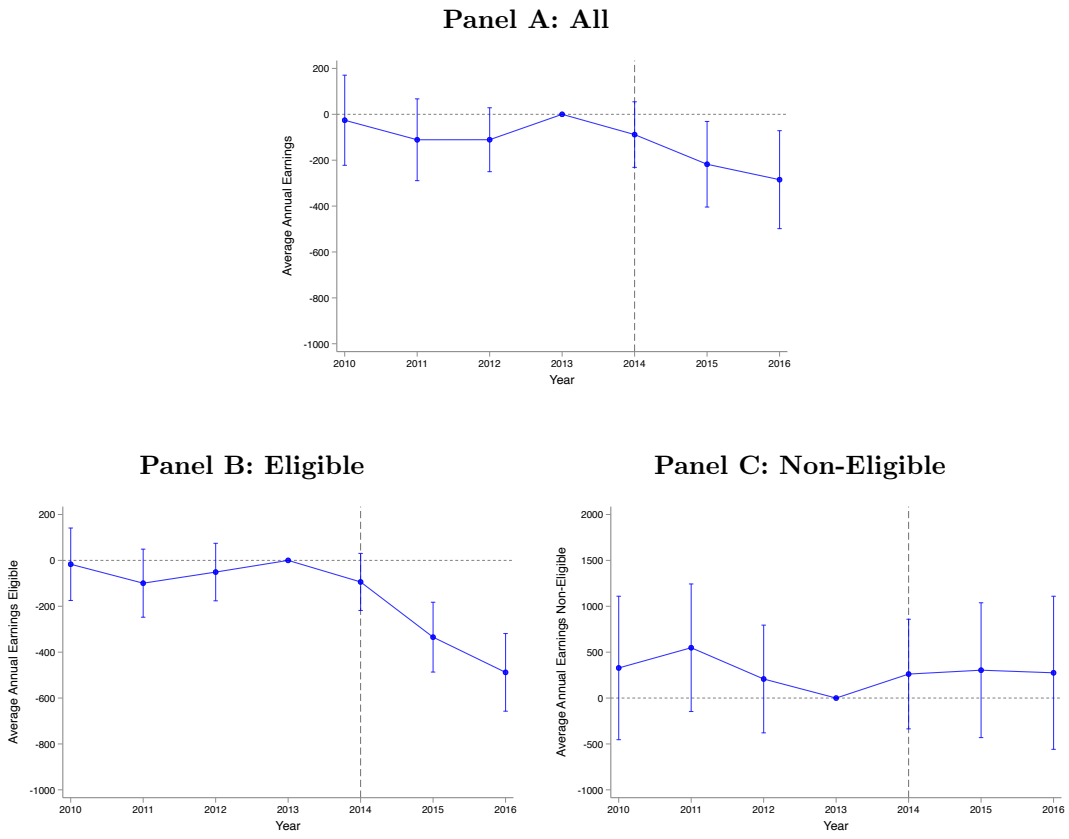
Notes: These figures depict the evolution of annual earnings of eligible employees before and after the tax credit is introduced. Panel A reports the coefficients from a simple event study of annual earnings on time dummies, controlling for individual and firm fixed effects and restricting the sample to eligible employees. Panel B compares the evolution of annual earnings of eligible employees earnings just below the upper eligibility threshold and similar non-eligible employees with earnings just above the upper eligibility threshold. The treatment group includes individuals with annual earnings between €20,000 and €24,000 while the control group includes individuals with annual earnings between €26,000 and €30,000. Earnings levels are normalized to 0 for both groups in the reference year (2013). All monetary variables are expressed in Euros.

Figure 4: **Firm-Level Variation in Pre-Reform Share of Eligible Workers**



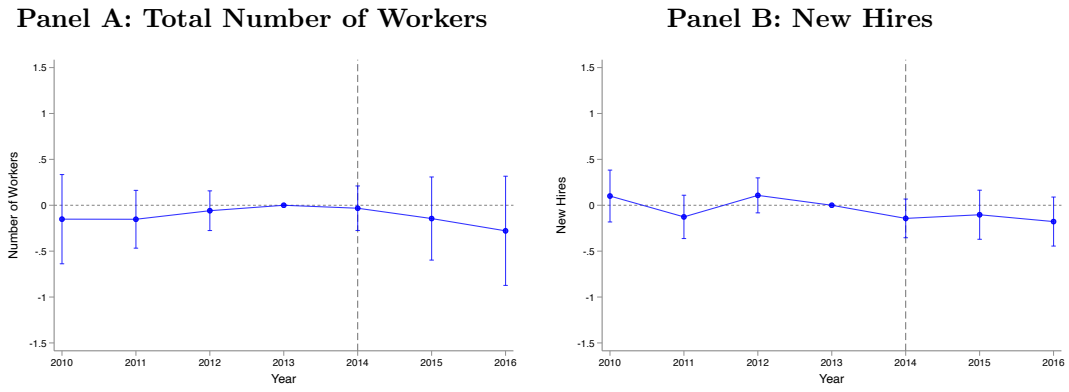
Notes: Panel A depicts the average share of eligible workers in each year for the four groups of firms defined by the quartiles of share of eligible employees in 2013. The spike around 2013 is due to mean reversion: firms with a high share of eligible employees in 2013 tend to have a lower share before and after. The opposite is true for firms with a lower share of eligible employees in 2013. There is substantial persistence in the share of eligible employees across years. Panel B depicts the distribution of share of eligible workers across firms in 2013. A large fraction of firms employs either zero eligible workers or only eligible workers. Note that the spikes in the distribution between 0 and 1 are driven by the fact that I do not observe the universe of workers but only a random sample.

Figure 5: **Firm-Level Results: Annual Earnings**



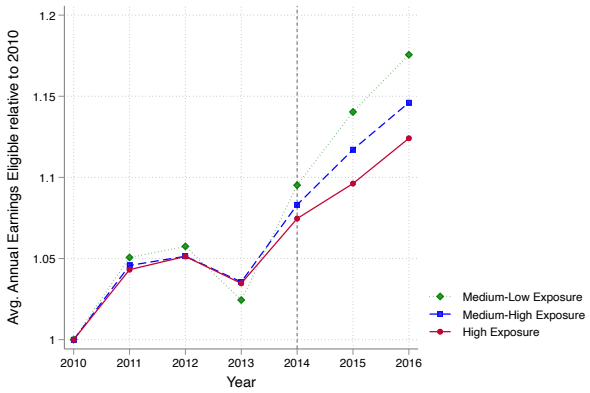
Notes: These figures show the results from a difference-in-differences specification (equation 1) comparing firms with a high share of eligible employees in the last pre-reform year to firms with a medium-high share of eligible employees in the last pre-reform year (*High* and *Medium-High* exposure firms in Figure 4 Panel A). Panel A shows the results when the outcome is average annual earnings at the firm-level. Panel B reports the results for firm-level average annual earnings per eligible worker. Panel C reports the results for firm-level average annual earnings per non-eligible worker. Standard errors are clustered at the firm-level. Quantitative estimates of the effects are reported in Table 3 and Table A1. All monetary variables are expressed in Euros.

Figure 6: **Firm-Level Results: Employment**



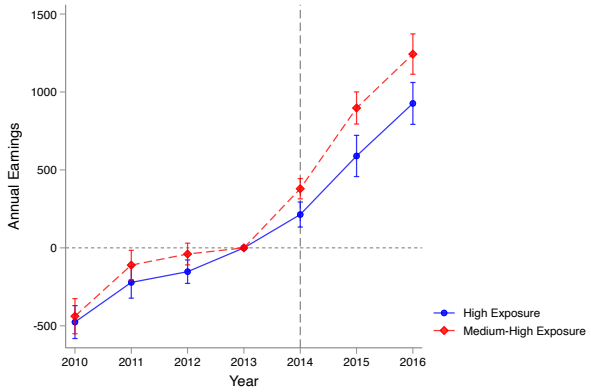
Notes: These figures show the results from a difference-in-differences specification (equation 1) comparing firms with a high share of eligible employees in the last pre-reform year to firms with a medium share of eligible employees in the last pre-reform year (*High* and *Medium-High* exposure firms in Figure 4 Panel A). Panel A shows the results for total number of employees observed and Panel B shows the results for numbers of new hires. Standard errors are clustered at the firm-level. Quantitative estimates of the effects are reported in Table 3 and Table A1.

Figure 7: **Firm-Level Results: Monotonicity**



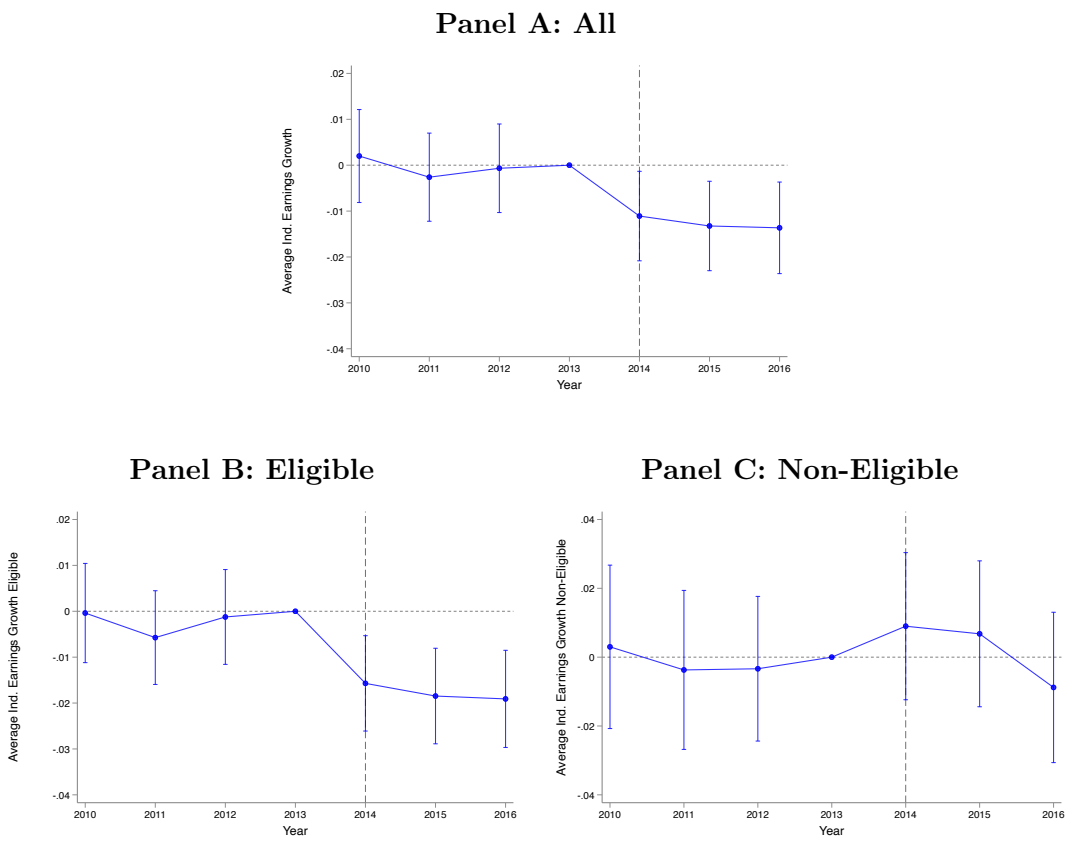
Notes: This figure traces out annual earnings per eligible worker (relative to 2010) across a balanced sample of firms over time by groups of firms. I consider three groups of firms: (i) firms in the top quartile of share eligible in 2013 (High Exposure) (ii) firms in the third quartile of share eligible in 2013 (Medium-High Exposure) and (iii) firms in the second quartile of share eligible in 2013 (Medium-Low Exposure). The figure shows that the larger the concentration of eligible employees the slower the increase in average annual earnings per eligible worker.

Figure 8: **Individual-Level Evolution of Earnings by Group of Firms**



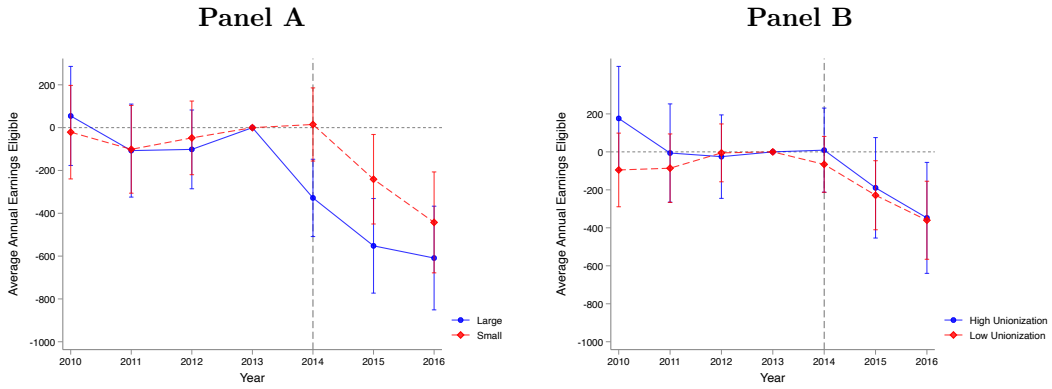
Notes: This figure reports the results of the estimation of equation 2, separately for workers in high exposure firms and workers in medium-high exposure firms where the dependent variable is the annual earnings of eligible individuals. The figure shows that although eligible workers in high exposure firms experience a slower growth in annual earnings after the introduction of the tax credit relative to workers in medium-high exposure firms, the level of annual earnings do not decrease for workers in either group of firms. All monetary variables are expressed in Euros.

Figure 9: **Firm-Level Results: Annual Earnings Growth**



Notes: These figures show the results from a difference-in-differences specification (equation 1) comparing firms with a high share of eligible employees to firms with a medium-high share of eligible employees in the last pre-reform year (*High* and *Medium-High* exposure firms in Figure 4, Panel A). Panel A shows the results when the outcome is the firm-level average of individual earnings growth, defined as $g_{f,t} = \frac{\sum_{i=1}^{N_{f,t}} \log(w_{i,f,t}) - \log(w_{i,f,t-1})}{N_{f,t}}$. Panel B reports the results when the outcome is the firm-level average of individual earnings growth for eligible workers. Panel C reports the results when the outcome is the firm-level average of individual earnings growth for non-eligible workers. Standard errors are clustered at the firm-level. Quantitative estimates are reported in Table 4 and Table A2.

Figure 10: **Firm-Level Results: Heterogeneity**



Notes: These figures show the results from specification 1 comparing firms with a high share of eligible employees in the last pre-reform year to firms with a medium-high share of eligible employees in the last pre-reform year run separately for different groups of firms. Panel A reports the results dividing firms by their size: small (less than 50 employees) and large (more than 50 employees). Panel B reports the results dividing firms by their unionization level: above the median degree of unionization (high) or below the median degree of unionization (low). Standard errors are clustered at the firm-level. All monetary variables are expressed in Euros.

Table 1: **Summary Statistics**

	Full Sample		**Eligible**	
	Mean	Std. Dev	Mean	Std. Dev
Annual Earnings	24,410.84	17,959.39	17,562.2	5,115.55
Weeks Worked	48.07	7.70	47.57	7.81
Age	42.4	9.54	41.09	9.54
Male	0.59	0.49	0.55	0.50
Temporary Contract	0.11	0.31	0.13	0.34
Working in Firm 50+	0.50	0.49	0.41	0.49
Eligible	0.57	0.49		
Observations	780,487		443,655	

Notes: This table shows summary statistics for the sample of workers used in the analysis in 2013. The first two columns report descriptive statistics (mean and standard deviation) for the full sample while the last two columns report descriptive statistics for the subsample of individuals eligible for the tax credit (i.e. whose annual gross earnings are between €8,000 and €26,000). All monetary variables are expressed in Euros.

Table 2: **Firm Descriptive Statistics by Share of Eligible Employees in 2013**

	Low (1)	**Medium-Low** (2)	**Medium-High** (3)	**High** (4)
Share Eligible	0.10	0.42	0.69	0.95
Annual Earnings	37,834.80	26,042.81	20,068.22	16,628.63
Annual Earnings Eligible	19,091.89	18,416.70	17,296.86	16,358.11
Temporary Workers	0.05	0.10	0.12	0.14
Unionization	0.32	0.30	0.29	0.29
Large (50+)	0.83	0.81	0.79	0.76
Industries				
Agriculture and Mining	0.03	0.008	0.009	0.008
Manufacturing	0.60	0.57	0.50	0.41
Construction	0.04	0.07	0.07	0.08
Wholesale and Retail	0.08	0.08	0.06	0.04
Services	0.12	0.10	0.16	0.18
Observations	10,891	5,854	6,555	5,631

Notes: This table provides summary statistics for a balanced panel of firms active in every year from 2010 to 2016 and with more than 3 employees sampled each year. The table provides statistics for four groups of firms based on their share of eligible employees in 2013. Column 1 considers firms whose share of eligible employees is in the first quartile (0-25) or equal to zero in 2013 (Low Exposure), column 2 considers firms whose share of eligible employees is in the second quartile (25-50) in 2013 (Medium-Low Exposure), column 3 considers firms whose share of eligible employees is in the third quartile in 2013 (50-75) (Medium-High Exposure) and column 4 considers firms whose share of eligible employees in 2013 is in the top quartile (High Exposure). All statistics are for year 2013. All monetary variables are expressed in Euros.

Table 3: **Firm-Level Regression Results**

	(1) Annual Earnings	(2) Annual Earnings Eligible	(3) Annual Earnings Eligible (rel. 2013)	(4) Annual Earnings Non-Eligible	(5) Number of Employees	(6) New Hires
$T_f \cdot Post$	-191.9**	-240.1***	-0.0095***	-99.88	0.133	0.295
	(80.93)	(59.24)	(0.0036)	(312.4)	(0.330)	(0.516)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	91,923	91,923	91,923	40,237	91,923	91,923

Notes: This table shows the results of a variant of specification 1 where I collapse periods in pre and post 2013. The dependent variable in column 1 is the firm-level average of annual earnings, while column 2 restricts to eligible individuals. Column 3 reports the results using as dependent variable firm-level average annual earnings of eligible individuals normalized by its value on 2013. Column 4 shows the results for annual earnings of non-eligible individuals. Columns 5 and 6 look at employment effects. Standard errors are clustered at the firm-level. All monetary variables are expressed in Euros.

Table 4: **Firm-Level Regression Results: Earnings Growth**

	(1) Earnings Growth	(2) Earnings Growth Eligible	(3) Earnings Growth Non-Eligible	(4) Annual Earnings Eligible Low	(5) Annual Earnings Eligible High
$T_f \cdot Post$	-0.0124***	-0.0202***	-0.00407	-0.0089	-0.0101***
	(0.00274)	(0.00282)	(0.00609)	(0.00603)	(0.00333)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	82,292	82,292	33,900	79,391	82,292

Notes: This table shows the results of a variant of specification 1 where I collapse periods in pre and post 2013. The dependent variable in column 1 is the firm-level average of individual-level earnings growth, column 2 reports the results using as dependent variable the firm-level average of individual-level earnings growth for eligible individuals. Column 3 reports the results using as dependent variable the firm-level average of individual-level earnings growth for non-eligible individuals. Standard errors are clustered at the firm-level. All monetary variables are expressed in Euros.

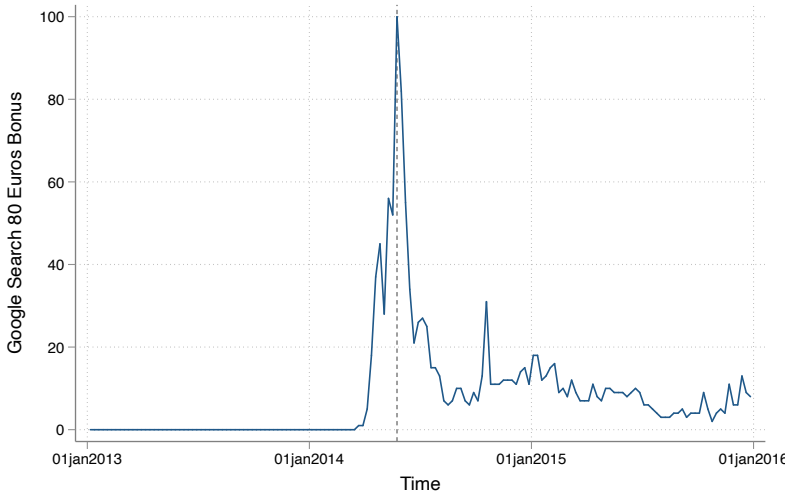
Table 5: **Firm-Level Regression Results: High vs Low Eligible Earners**

	(1) Annual Earnings Eligible Low	(2) Annual Earnings Eligible High	(3) Earnings Growth Eligible Low	(4) Earnings Growth Eligible High
$T_f \cdot Post$	-0.0089	-0.0011***	-0.0172***	-0.0151***
	(0.00603)	(0.00337)	(0.00403)	(0.00306)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	79,391	87,645	79,391	87,645

Notes: This table shows the results of a variant of specification 1 where I collapse periods in pre and post 2013. The dependent variable in column 1 is firm-level annual earnings for low eligible earners (normalized to their 2013 value) while the dependent variable in column 2 is the firm-level annual earnings for high eligible earners (normalized to their 2013 value). To define low and high eligible earners I split the sample of eligible workers by relative earnings groups within their employer. I consider two groups: eligible workers with earnings above the firm median for eligible workers (high earners) and eligible workers with earnings below the firm median for eligible workers. Column 3 and 4 report the results using as dependent variable the firm-level average of individual-level earnings growth for low eligible earners (column 3) and high eligible earners (column 4). Standard errors are clustered at the firm-level. All monetary variables are expressed in Euros.

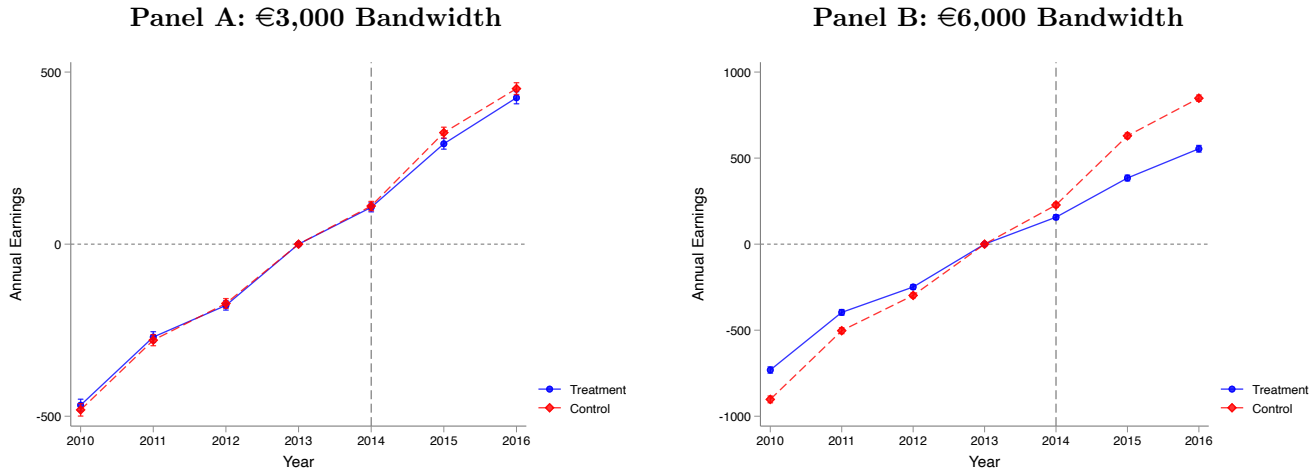
Appendix A: Supplementary Figures and Tables

Figure A1: **Google Searches "80 Euros Bonus" and related terms**



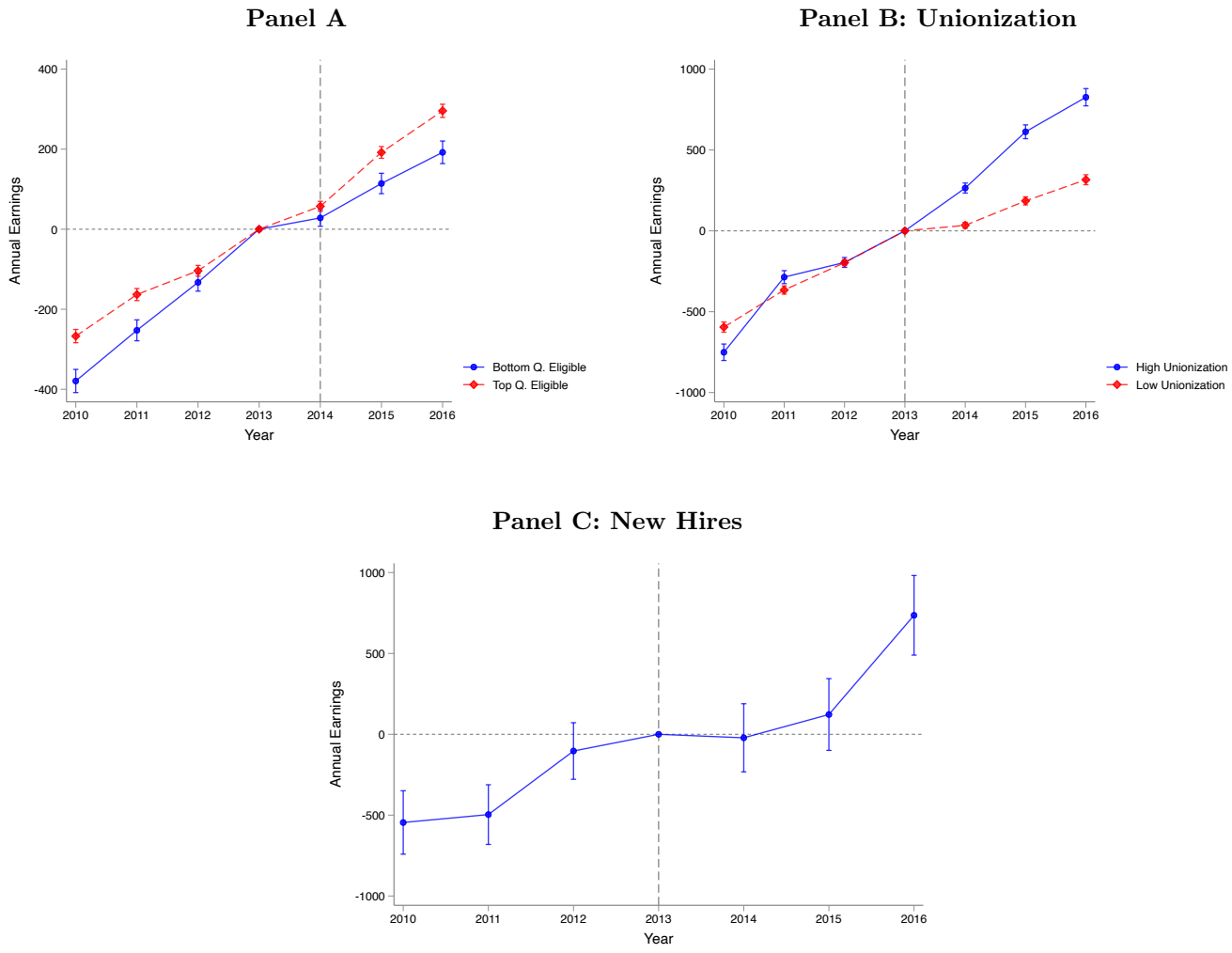
Notes: This figure shows the Google searches of "80 Euros Bonus" and equivalent terms around the time of the introduction of the policy. It shows that the introduction of the policy was relatively unexpected.

Figure A2: **Evolution of Earnings of Eligible and Non-Eligible Individuals: Robustness Checks**



Notes: These figures report the results of different robustness checks to the definition of treatment and control groups used in Figure 3, Panel B. Panel A reports the results using a smaller bandwidth of €3,000 while Panel B uses a larger bandwidth of €6,000. The results of these robustness checks overall reflect the main trade-off in selecting the treatment and control group: using a larger bandwidth increases the likelihood of having dissimilar earning trends between the treated and control workers, as reflected in Panel B.

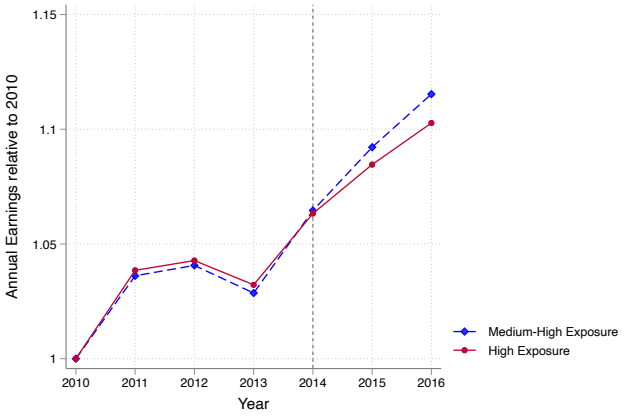
Figure A3: **Sources of Wage Rigidities**



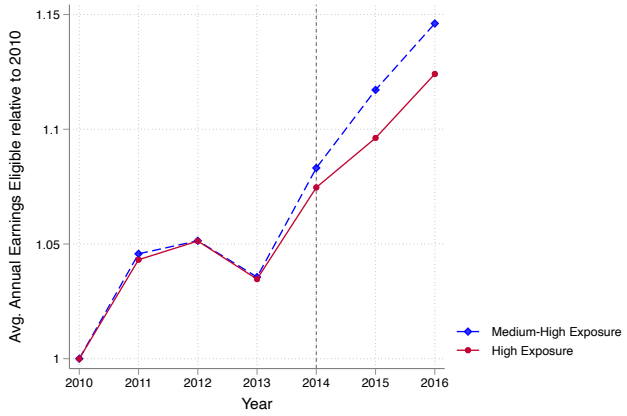
Notes: These figures explore the heterogeneity in the evolution of annual earnings for eligible individuals in terms of earnings level, unionization and tenure. Panel A plots the evolution of annual earnings separately for workers in the bottom and top quartile of the earnings distribution conditional on eligibility. Panel B plots the evolution of annual earnings for eligible workers distinguishing between employees working in high unionization sectors (above the median) and low unionization sectors (below the median). Panel C plots the evolution of annual earnings for new hires that are eligible for the tax credit.

Figure A4: **Firm-Level Results: Graphical Evidence**

Panel A: Annual Earnings

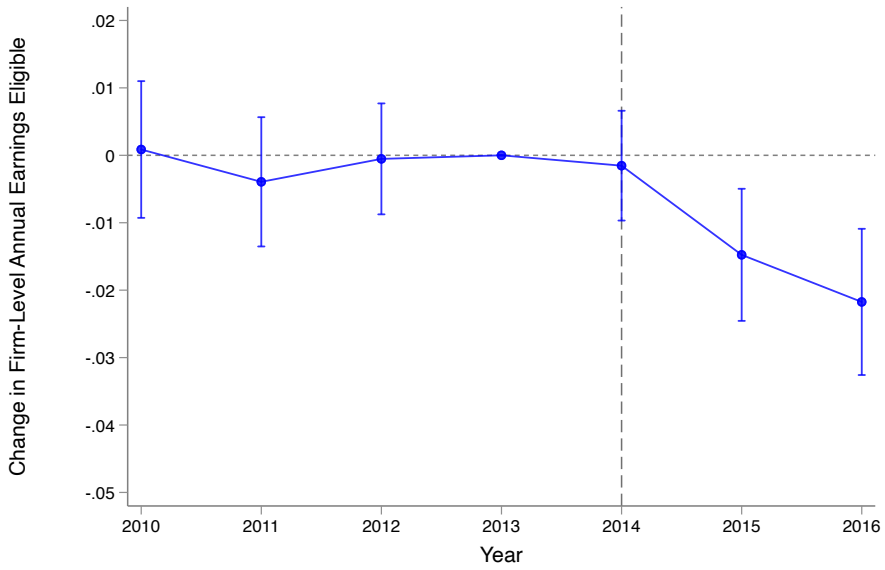


Panel B: Annual Earnings Eligible



Notes: These figures show the evolution of average annual gross earnings relative to 2010 (Panel A) and average annual gross earnings for eligible workers (Panel B) across a balanced sample of firms (operating in all years from 2010 to 2016 with more than three employees in each year) by groups of firms. In each panel, I consider two groups of firms: (i) firms in the third quartile of share of eligible employees in 2013 (*Medium-High Exposure*) and (ii) firms in the top quartile of share of eligible employees in 2013 (*High Exposure*). Both panels show that the two groups of firms have relatively parallel pre-reform trends and the group with the largest share of eligible employees experiences slower average annual earnings growth at the firm-level.

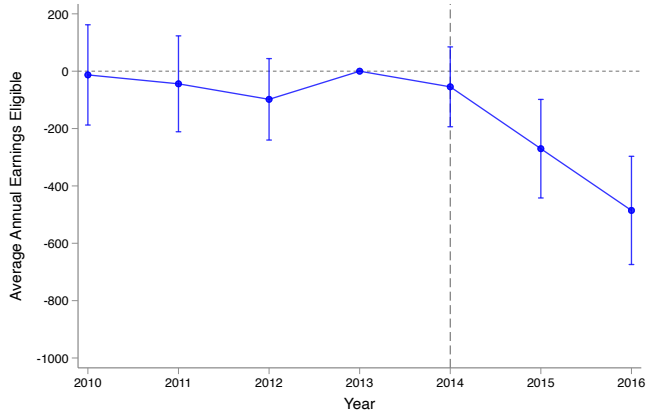
Figure A5: **Firm-Level Results: Specification using Earnings Change relative to 2013**



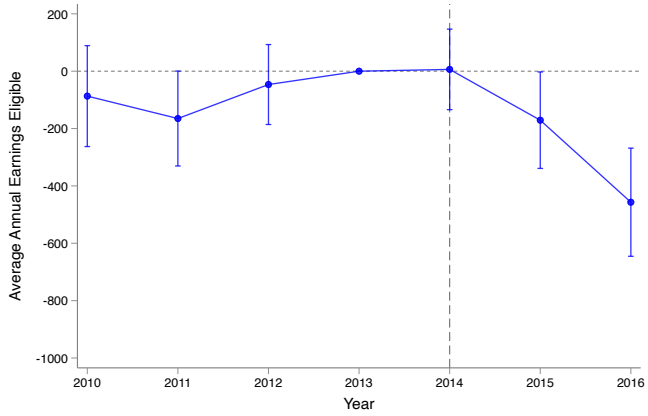
Notes: This figure shows the results from a difference-in-differences specification (equation 1) comparing firms with a high share of eligible employees in the last pre-reform year to firms with a medium-high share of eligible employees in the last pre-reform year (*High* and *Medium-High* exposure firms in Figure 4 Panel A). The outcome is change in firm-level annual earnings for eligible individuals relative to 2013. Standard errors are clustered at the firm-level.

Figure A6: **Firm-Level Results: Different Group Definitions**

Panel A: 70-90 vs 50-70

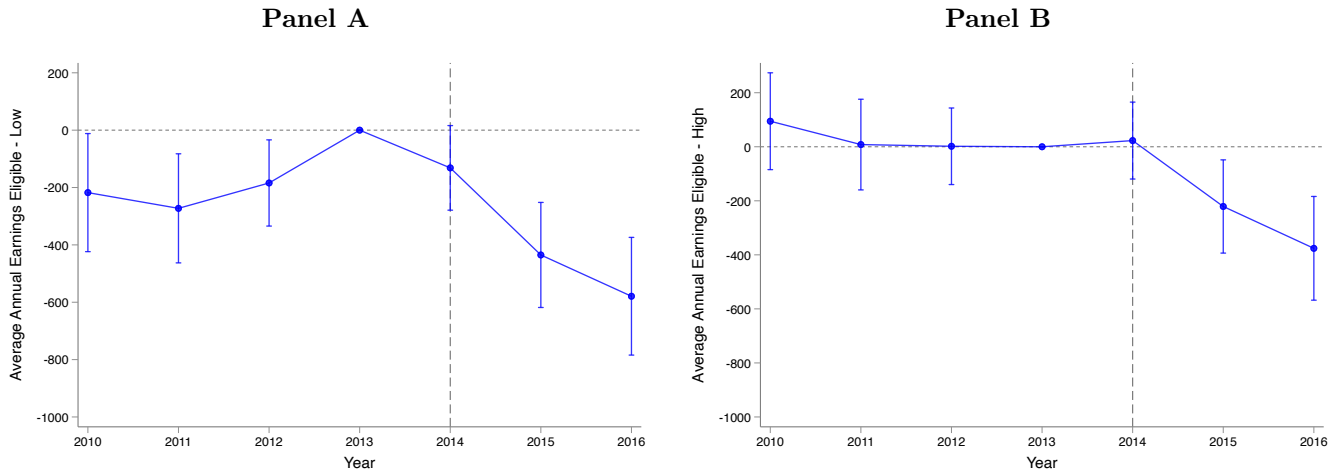


Panel A: 90-100 vs 80-90



Notes: Panel A reports the result of the estimation of equation 1 using as treatment group firms between the 70th and 90th percentile of the pre-policy distribution of share of eligible employees and as control group firms between the 50th and 70th percentile. Panel B reports the results of an additional robustness check where the treatment group is composed by firms in the top 10% of the share eligible distribution (firms whose share of eligible in 2013 is equal to 1) and the control group is composed by firms between the 80th and 90th percentile of the distribution. Standard errors are clustered at the firm-level.

Figure A7: **Firm-Level Results: High vs Low Eligible Earners**



Notes: These figures show the results from a difference-in-differences specification (equation 1) comparing firms with a high share of eligible employees in the last pre-reform year to firms with a medium-high share of eligible employees in the last pre-reform year (*High* and *Medium-High* exposure firms in Figure 4 Panel A). Panel A shows the results when the outcome is average annual earnings at the firm-level for low eligible earners and Panel B shows the results for high eligible earners. To define low and high eligible earners I split the sample of eligible workers by relative earnings groups within their employer. I consider two groups: eligible workers with earnings above the firm median for eligible workers (high earners) and eligible workers with earnings below the firm median for eligible workers. Standard errors are clustered at the firm-level. Quantitative estimates of the effects are reported in Table 5.

Table A1: **Dynamic Firm-Level Regression Results**

	(1) Annual Earnings	(2) Annual Earnings Eligible	(3) Annual Earnings Eligible (rel. 2013)	(4) Annual Earnings Non-Eligible	(5) Number of Employees	(6) New Hires
$T_f \cdot 2010$	-25.27	-16.32	0.000892	332.1	-0.0233	-0.266*
	(100.2)	(80.55)	(0.00517)	(398.3)	(0.284)	(0.153)
$T_f \cdot 2011$	-110.9	-99.15	-0.00392	549.0	-0.207	-0.276*
	(90.92)	(75.67)	(0.00489)	(354.2)	(0.171)	(0.162)
$T_f \cdot 2012$	-110.5	-50.72	-0.000518	209.0	-0.636	-0.113
	(71.07)	(63.94)	(0.00420)	(299.1)	(0.629)	(0.126)
$T_f \cdot 2014$	-88.64	-94.20	-0.00155	258.2	0.170	-0.00896
	(72.91)	(63.41)	(0.00415)	(304.3)	(0.250)	(0.108)
$T_f \cdot 2015$	-218.1**	-334.9***	-0.0148***	298.8	0.0795	0.116
	(95.14)	(77.62)	(0.00500)	(374.3)	(0.334)	(0.526)
$T_f \cdot 2016$	-285.4***	-488.7***	-0.0218***	267.9	0.108	0.494
	(108.9)	(86.38)	(0.00553)	(425.1)	(0.514)	(1.343)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	91,923	91,923	91,923	40,237	91,923	91,923

Notes: This table shows the results from a difference-in-differences specification (equation 1) comparing firms with a high share of eligible employees in the last pre-reform year to firms with a medium-high share of eligible employees in the last pre-reform year (*High* and *Medium-High* exposure firms in Figure 4 Panel A). Column 1 reports the results using as dependent variable firm-level annual earnings, while column 2 restricts to eligible individuals. Column 3 reports the results using as dependent variable firm-level average annual earnings of eligible individuals normalized by its value on 2013. Column 4 shows the results for annual earnings of non-eligible individuals. Columns 5 and 6 look at employment effects. Standard errors are clustered at the firm-level. All monetary variables are expressed in Euros.

Table A2: **Dynamic Firm-Level Regression Results: Earnings Growth**

	(1) Earnings Growth	(2) Earnings Growth Eligible	(3) Earnings Growth Non-Eligible
$T_f \cdot 2010$	-0.00177	-0.000409	0.00296
	(0.00559)	(0.00551)	(0.0121)
$T_f \cdot 2011$	-0.00344	-0.00576	-0.00384
	(0.00533)	(0.00521)	(0.0118)
$T_f \cdot 2012$	-0.00220	-0.00124	-0.00336
	(0.00557)	(0.00527)	(0.0107)
$T_f \cdot 2014$	-0.0100*	-0.0157***	0.00894
	(0.00551)	(0.00530)	(0.0109)
$T_f \cdot 2015$	-0.0130**	-0.0185***	0.00679
	(0.00510)	(0.00531)	(0.0108)
$T_f \cdot 2016$	-0.0140***	-0.0191***	-0.00879
	(0.00524)	(0.00540)	(0.0111)
Firm FE	Yes	Yes	Yes
Observations	82,292	82,292	33,900

Notes: This table shows the results from a difference-in-differences specification (equation 1) comparing firms with a high share of eligible employees in the last pre-reform year to firms with a medium-high share of eligible employees in the last pre-reform year (*High* and *Medium-High* exposure firms in Figure 4 Panel A). The dependent variable in column 1 is the firm-level average of individual-level earnings growth, column 2 reports the results using as dependent variable the firm-level average of individual-level earnings growth for eligible individuals. Column 3 reports the results using as dependent variable the firm-level average of individual-level earnings growth for non-eligible individuals. Standard errors are clustered at the firm-level. All monetary variables are expressed in Euros.