Social Security Reform and Labor Formalization: Evidence from Domestic Workers in Spain *

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Abstract

Can public policy increase the formalization of labor and simultaneously improve working conditions in the formal sector? This paper studies the effects of the 2012 Spanish social security reform targeting domestic workers. The reform combined higher worker protection with lower minimum employer contributions. We find that the reform cut the informality rate by half in only six years, but it substantially reduced social security contributions per worker, including among pre-reform formal employees. Total employment and annual earnings in the sector declined gradually. Our results highlight the potential of tax-based incentives for increasing formalization at the cost of reduced benefit accrual.

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1 Introduction

Informal employment is not limited to labor markets in developing countries, but is a persistent feature of economies all around the world. Formalization is costly for both employers and workers, due to taxes, mandatory contributions, and administrative or bureaucratic requirements. The economic cost of formalization is relatively higher for small business-owners and households, who may lack the incentives or skills to comply with labor regulations (Farvaque, 2013). At the same time, legal and social norms that protect household privacy prevent the effective monitoring of labor regulation for the latter (Tomei & Belser, 2011), even in high-income countries with strong institutions and enforcement capacity.

For policymakers, high levels of informality reduce the tax base, limiting the state's capacity to finance redistribution and provide public services. As a consequence, many policies have been implemented to promote formalization, from simplified registration procedures to more frequent labor inspections. The literature studying these interventions has focused mainly on developing countries and on the formalization of firms rather than workers. Recent literature reviews find limited effectiveness when it comes to large-scale formalization and conclude that the magnitude of the welfare gains from formalization is unclear (see, e.g., Floridi, Demena, & Wagner, 2020; Ulyssea, 2020; Jessen & Kluve, 2021; Torm & Oehme, 2024). In this context, high-income countries have a wide array of tools to reduce the cost of labor formalization, such as tax subsidies for newly registered workers, but are also subject to strict standards regarding employee protection and working conditions. Therefore, the gap to bridge in order to incentivize employers to hire formally is substantially wider.

This paper examines whether social security regimes can promote labor formalization while strengthening workers' rights, and how. We study a Social Security reform implemented in Spain in 2012 that improved legal protection for domestic workers and reduced the transition cost to formal employment through the introduction of a lower minimum social security contribution bracket. We provide causal evidence of the impact of the reform on the sector's aggregate formalization rate, employment, earnings, and social security contributions, as well as the labor market outcomes for pre-reform formal domestic workers.

The domestic work sector has one of the highest informality rates worldwide, and its workers are among the most vulnerable. In the Domestic Workers Convention, 2011 (ILO Convention No. 189), domestic workers are defined as "any person performing work in or for a household or households within an employment relationship" (International Labour Organization, 2011). The tasks assigned to domestic workers encompass a wide range of activities, from cleaning and cooking to taking care of children or the elderly. Therefore, domestic workers may work for a single or several households, be employed for one or two hours a day / week by several households, be employed full-time by a single household, or even live in the household for which they work. According to the most recent ILO estimates, domestic workers account for 2.6% of all employees in high-income countries (4.5%

globally), of which 64.1% (76.2% globally) are women, with migrants being over-represented in the sector: they constitute 70.8% of all domestic workers in North America and 54.6% in Europe (International Labour Organization, 2021). Domestic work accounted for 3.7% of total employment in Spain in 2011, three times the EU average. The employer base is represented among a moderately wide range of socioeconomic groups, and the sector heavily relies on female immigrants. Prior to the reform, the informality rate in the sector reached around 60% .

The 2012 reform integrated domestic workers into the social security regime for salaried employees. Previously, the Special Social Security Regime for domestic workers offered very limited protection and applied its own calculation rules for payable social security contributions, a flat-rate contribution that was especially burdensome for low-wage domestic workers. The reform replaced it with a progressive contribution schedule tied to earnings, with the lowest bracket less than half the previous monthly rate. A temporary 20% tax deduction on employer-paid contributions, valid between 2012 and 2014, further encouraged registration. An extensive institutional communication campaign contributed to the broad perception that labor inspections would become more frequent and stringent after the reform.

The reform introduced major changes for employers and workers in the sector. We propose a simple theoretical framework to illustrate how it shifted incentives. First, the introduction of the earnings-based bracket system lowered the economic cost of formal employment. For workers previously earning below the flat rate, formalization became more attractive, and the reform reinforced incentives to maximize the number of days employed under a formal contract. Employers were incentivized to move to the lowest contribution bracket, reducing total social security contributions per worker despite the increase in employment on the intensive margin. At the same time, the reform increased the employers' "cognitive burden" through a more complex contribution schedule, frequent regulatory changes, and stricter inspections. These hassle costs may have discouraged some employers from hiring and, with stable demand for domestic services, led to a gradual decline in the number of employers, total employment, and hours per worker. We hypothesize that the reform opened space for intermediaries to serve households that are more sensitive to compliance requirements.

Building on this theoretical framework, we examine the reform's impact on employment and earnings in the domestic services sector. A challenge for identification is that no other sector in the Spanish economy is as female-dominated, has such a large share of immigrant workers, or features as many employers and contracts per worker as the domestic work sector. We adopt synthetic control and matching methods to obtain comparable control groups. Replacing the synthetic control method with a difference-in-differences approach using hospitality as a control group, as well as exploiting geographic variation in the pre-reform informality rate to determine treatment intensity, yields similar results. We further report estimates without matching and assess the robustness of our results to alternative sample definitions.

We analyze the reform's impact using sector-level employment data from the Spanish Labor Force Survey (*Encuesta de Población Activa*, EPA), household expenditures from the Household Budget Survey (*Encuesta de Presupuestos Familiares*, EPF) to proxy earnings, and aggregate formal employment, total social security contributions, and average contribution bases from Social Security records. Our synthetic difference-in-differences estimates show no significant change in total employment on the extensive margin; however, total employment declines over time relative to the synthetic control. Formal employment increased by roughly 118,000 workers, implying that the sector's informality rate roughly halved, with descriptive evidence from the Continuous Sample of Working Lives (*Muestra Continua de Vidas Laborales*, MCVL) suggesting these gains arose primarily from transitions from informal work or non-participation instead of from other formal sectors. On the intensive margin, average hours worked fell by 1.7 hours per week (6.3%), reducing sectoral earnings, and we show descriptively that fewer households hired domestic services.

The increase in formalization generated a 40% direct rise in fiscal revenues despite a 12.4% drop in the average contribution base, highlighting the tension between incorporating more workers into the formal workforce and lowering standards for formal employees, as contribution bases affect other benefits, including future retirement pensions. Using individual-level administrative data from the MCVL, we follow pre-reform domestic workers (incumbents) and compare them to matched controls with similar demographics who have only worked in retail, hospitality, or other cleaning and care services sectors, and who have never been registered in the Social Security regime for domestic workers. Our matched difference-in-differences estimates show minimal changes in employment on the extensive margin, but a 6% increase in days formally employed and a 12% decline in annual contribution bases, concentrated among younger and foreign-born workers.

This paper contributes to several strands of the literature on labor market regulation and informality.

First, we contribute to the literature on formalization policies by providing evidence of a reform targeting workers rather than firms in a high-income country. Consistent with prior studies showing that lower payroll taxes and employer contributions can increase formal employment (see, e.g., Betcherman, Daysal, & Pages, 2010; Bernal, Eslava, Meléndez, & Pinzón, 2017; Fernández & Villar, 2017), we find a large and persistent increase in formalization following the reform. Rocha, Ulyssea, and Rachter (2018) find that a formalization program for firms in Brazil led to a net loss in tax revenues, whereas our estimates show a substantial positive effect on revenue from social security contributions. Our reform of interest shifted enough employers into formal hiring to compensate for the decrease in contribution bases per worker, including those of workers who were employed formally prior to the reform. We identify these two margins in our theoretical framework and quantify both effects.

Second, we contribute to the literature on the labor market effects of extending labor rights in highly informal settings. Previous work emphasizes that stronger protections can attract workers to formality (Bergolo & Cruces, 2021), but higher labor costs discourage formal hiring (see, e.g.,

Heckman & Pagés, 2004; Mondragón-Vélez, Pe, Wills, & Kugler, 2010; Gavoille & Zasova, 2023). Therefore, the net employment effect of extending labor rights would be explained by how workers and employers value the additional benefits (Almeida & Carneiro, 2012) and the extent to which the policy is enforced (Ulyssea, 2018). Our findings show that incremental extensions of rights within a lagging sector primarily operate through the registration of previously informal workers, rather than by reallocating workers across formal sectors. Our findings show that it is possible, in a high-income setting, to reduce labor formalization costs alongside extending legal protections, at the cost of a decrease in average social security contributions for the incumbents.

Several studies in the formalization and working conditions literature have focused on domestic workers in developing countries (see, e.g., Dinkelman & Ranchhod, 2012; Costa, Russo, Hirata, & de Holanda Barbosa, 2023; Feld, 2024). The last two studies exploit broadly similar reforms in Brazil and Argentina, with the difference that the Spanish setting combines increased employer obligations with generous tax-based incentives. We disentangle the different mechanisms in our theoretical framework and show that substantial and long-lasting reductions in informality can be attained even in the absence of a strong enforcement component. At the same time, we find reductions in hours worked on the intensive margin, consistent with evidence from other contexts, highlighting common adjustment channels across institutional settings. Finally, we show that the reform impacted workers differently depending on their pre-reform status. We show that formalization gains are concentrated among younger and Spanish-born workers, while incumbents experience a decline in their average contribution bases. This highlights the limitations of tax-based incentives, despite a net positive effect on social security contributions: newly formalized workers benefit from being registered in the social security system, whereas incumbents contribute less, even with a positive employment effect.

This paper is structured as follows. Section 2 describes the domestic services sector in the Spanish context, together with the 2012 Social Security reform. Section 3 introduces a theoretical framework to understand how the reform changes incentives for the employers and the workers. Section 4 explains the baseline sample of formal domestic workers and incorporates the measures of informal employment and earnings. Section 5 lays out the empirical strategy to estimate the effect of the reform on the labor market outcomes of formal domestic workers and informal employment and earnings in the sector. Section 6 presents the estimation results. We evaluate different checks conducted to evaluate the robustness of our findings in Section 7. Section 8 reconciles the results with the predictions from the theoretical framework and concludes.

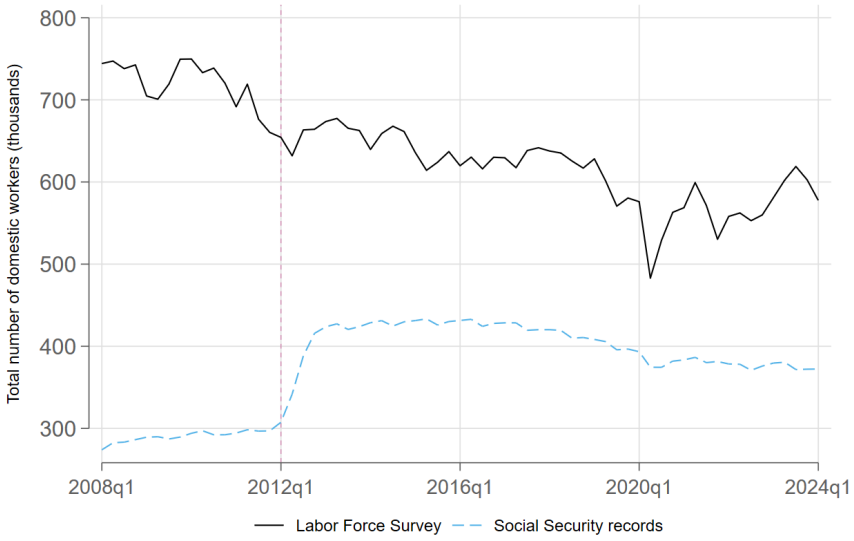
2 Institutional Setting

2.1 Domestic Workers in Spain

Spain is among the countries with the largest numbers of domestic workers in the EU: they represented around 3.5% of total employment in 2019, twice the EU average (Eurostat, 2019). A comparison between the figures of the EPA and Social Security data shows that over 30% of self-reported

domestic workers were not affiliated with the social security scheme for household employees by 2019 (Figure 1). Note that this figure does not capture workers who perform unregistered work for the same employer with whom they have a registered work contract.

Figure 1: Total Number of Domestic Workers



Note: This figure shows the quarterly total number of domestic workers between 2008 and 2024. It compares the figures reported in the Labor Force Survey, where employment and occupation are declared by the respondent, and the number of domestic workers registered in the social security system. Conventionally, the difference between these sources is considered indicative of informal employment in the sector.

In many countries, household tasks like cleaning are professionalized, and caregiving is publicly provided or subsidized. The configuration of the personal and household services sector in Spain followed a different path. First, the aftermath of the 2008 economic crisis led to severe budgetary constraints (Royo, 2020) along with record-high unemployment, reaching over 27% in 2012. These fiscal pressures weakened earlier attempts to strengthen support for dependent care. Second, cultural and social norms also played a role. In Spain, the home is traditionally seen as a space of privacy and autonomy (Moreno-Colom, Recio Càceres, Torns Martín, & Borràs Català, 2017), which helps explain why households prefer cash transfers to hire caretakers over the public provision of household services (Krüger & Jiménez, 2013).[1]

Meanwhile, the demand for domestic services increased due to population aging and rising female labor force participation. This increasing demand is met by a surge in low-skilled immigrant female labor, predominantly from Latin America (Farré, González, & Ortega, 2011). Latin American migrants face low language and cultural barriers, facilitating integration into Spanish households.

[1] According to the regulation, entitlements include a choice between access to subsidized weekly hours of home care provided by professional caregivers accredited by regional authorities (as well as day and night centers and residential services) or a financial compensation for informal caregivers (including social security contributions).

The share of foreigners in the domestic services sector rose sharply, from 6.9% in 1996 to around 62% by 2009 (Pajares, 2006). Many of these workers arrived as undocumented migrants and entered the formal labor market through the 2005 amnesty and other regularization programs (Elias, Monràs, & Vázquez-Grenno, 2024).[2] By 2012, most immigrant domestic workers were likely living in Spain legally.

2.2 The 2012 Social Security Reform

Domestic employment in Spain was regulated by its own, more flexible, Special Social Security Regime prior to the reform.[3] The scheme, introduced in 1985, prioritized the right to a private family life over workers' rights when the employers were private households. This meant that domestic workers lagged behind in terms of workers' rights, including job protection, wage growth, collective bargaining, and safeguards against abuse (León, 2010). For example, although domestic workers' salaries including in-kind payments had to reach at least the national minimum wage, live-in workers could have up to 45% of their cash salary deducted for food and accommodation. In addition, workers in this regime did not get unemployment insurance, were not required to have a written employment contract, and received a minimal retirement pension. Growing national awareness and increased international attention to the domestic services sector led the Spanish government to design a comprehensive reform of the Special Regime for domestic workers (Tomei & Belser, 2011). The new regulation came into force on January 1, 2012, and assimilated domestic workers into the general Social Security regime. We can summarize the reform as comprising four key elements: (1) the alignment of labor regulations and mandated benefits with other sectors, (2) the introduction of new calculation rules for social security contributions, (3) a temporary tax deduction for the employers, and (4) a comprehensive awareness campaign together with increased labor inspections to enforce compliance.

1) Labor regulations and mandated benefits. The new law recognized domestic workers' right to receive information about the content of their contract. If no written agreement existed, the contract was presumed to be full-time and for an indefinite period instead of one year. In-kind payments could not exceed 30% of the domestic worker's wage, and cash payments should always respect the minimum wage. Finally, the length and number of working days remained unchanged, although compulsory hours of rest increased from 10 to 12 hours. Regarding mandated benefits, the new regulation specifies the right to receive sick leave benefits from the 4th day of absence, as long as it is not due to a work accident. Prior to the reform, the worker was only compensated from the 29th day of absence. However, the employer is only responsible for the payment of sick leave benefits from days 4 to 8 of absence, and the benefit amount is restricted to paying 60% of

[2]Introduced in 2006, the Settlement program provided a systematic pathway to legal status for migrants who met certain criteria, including a minimum number of years of residence and possession of a valid employment contract. According to data from the Ministry of Social Security, over 80% of the female workers regularized through the Settlement program in 2013 were affiliated as domestic workers, although this share declined to around 60% by 2019. `https://expinterweb.inclusion.gob.es/jaxiPx/Datos.htm?path=/Arraigo/l0/&file=AF_SEX_GE_RA.px#!tabs-tabla`

[3]Other sectors that have their own special regimes are agriculture, mining, and fishing.

the worker's base compensation.[4] Lastly, the reform raised severance payment from 7 days to 12 days per year of service.

2) Calculation rules for social security contributions. The reform applied the general regulation on social security contributions to domestic workers: first, the employer is now always responsible for requesting the employee's registration to the Social Security system.[5] Second, contributions are calculated via a brackets system, mapping monthly earnings to a contribution base. Instead of a single, flat contribution, there are now 15 brackets, which additionally depend on the number of hours worked and are updated annually: from 90.20 euros for 14 hours/month up to 748.20 euros for 140–160 hours/month, to be updated once a year.

3) Temporary tax deduction for employers. The new regulation compensated for increased hiring costs with a 20% deduction on employer-paid Social Security contributions, up to 45% for larger families, between 2012 and 2014.[6]

4) Awareness campaign and labor inspections. To promote compliance, the government partnered with the main workers' union and launched a comprehensive communication campaign. It included information letters to workers and employers, training sessions, posters, and extensive media outreach (Díaz Gorfinkiel & Fernández López, 2016). Under the new regime, employers who failed to register their worker(s) had to retroactively pay missing Social Security contributions, interest on late payments, and a fine of 3,750 to 12,000 euros. According to the General Directorate of the Labor and Social Security Inspection, the number of inspections rose from 1,023 in 2011 to 2,859 in 2013 and declined thereafter. Even at its peak, labor inspections for non-compliance with domestic service regulations only reached 0.08% of all employer households. While the threat of strict enforcement did not materialize, the government's efforts still shaped the public's perception of the risks of informal hiring immediately after the reform.

Just one year after the reform was implemented, the government substantially amended the law in response to an early policy evaluation revealing a decline in social security contributions and difficulties among employers to meet their new obligations. The key elements of the new law, that came into force in 2013, were: (1) the responsibility for paying social security contributions was shifted back to workers with contracts of less than 60 hours per month; (2) the number of brackets to calculate social security contribution bases was reduced from 15 to 8; and (3) the minimum contribution was raised from €90.20 to €147, while the maximum increased from €748.20 to €790.

[4]Starting on the 9th day of sick leave, it is the Social Security that assumes the payment of the financial benefit.

[5]The former Special Regime distinguished between "continuous" and "discontinuous" domestic workers. The former worked exclusively and permanently (80 hours or more per month) for a single household head, who was responsible for registering the employee and paying the required Social Security contributions. The latter worked less than 20 hours per week for the same employer and paid the required Social Security contributions themselves, while usually working for multiple employers.

[6]This deduction only applies to contracts where the employee did not work for that employer between August 2 and December 31, 2011. We regard this is as an incentive for employers to register previously informal employment. At the same time, because employers are identified through their bank accounts, employers who were already compliant with registration requirements were able to benefit from the tax deduction by creating new accounts.

Trade unions and other associations have criticized these changes as "a setback for working and employment conditions"(Pla-Julián, 2014). Even though some reform elements were in the end less progressive than originally intended, the reform extended labor rights for formal domestic workers. However, it did not necessarily make formal employment more appealing to informal workers. By aligning domestic workers' rights with those in other sectors, it *a priori* didn't make the sector more attractive to other formal workers either. In addition, the effect of the reform on employment and earnings in the sector depends also on how the package of measures influences employer incentives, which remains unclear. The next section introduces a simple theoretical framework to think about how these changes may affect (1) the decision to formalize employment among previously informal employers, and (2) contract renegotiation by those who were already compliant before the reform.

3 Theoretical Framework

To guide our empirical analysis, we characterize domestic workers and their employers and break down how the Social Security reform changes their incentives.

3.1 Informal vs Formal Employers

Households that are willing to hire a domestic worker have a large enough need for care or personal services q. As a result, their decision margin is on whether to hire formally or informally. On the one hand, households dislike administrative costs A, which we broadly define as the weighted sum of the cognitive (A_C) and economic (A_E) burden of providing a formal contract, including paying social security contributions. On the other hand, households face an expected penalty P when hiring informally, determined by the mandated fine M and the probability of getting caught ϕ. Households differ in their risk preferences ρ and their sensitivity to the different types of administrative costs, with some households being more sensitive to the economic cost (γ_E), while others are to bureaucratic costs (γ_C). Then, households will hire a domestic worker formally whenever

$$\gamma A \leq \rho P, \text{ where } \gamma A = \gamma_C A_C + \gamma_E A_E \text{ and } P = \phi M$$

Prior to the reform, $q > \gamma A$ or $q > \rho P$ for all employers, and we can formalize labor demand as:

$$\begin{aligned} D_i &= q - \gamma A - \rho P, \quad i = \{F, I\} \\ D_F &= q - \gamma A, P = 0 \\ D_I &= q - \rho P, A = 0 \end{aligned}$$

$$\begin{aligned} D_F = 0, D_I = 0 \quad & \text{if } q < \gamma A \text{ and } q < \rho P \\ D_F = 1, D_I = 0 \quad & \text{if } q > \gamma A \text{ and } \gamma A \leq \rho P \\ D_F = 0, D_I = 1 \quad & \text{if } q > \rho P \text{ and } \gamma A > \rho P \end{aligned}$$

The reform affects hiring incentives in several ways. First, the awareness campaign and more frequent labor inspections increased P. Second, it increased the cognitive load for employers (A_C).

Qualitative studies indicate that employers faced considerable uncertainty regarding the new labor regulations and their subsequent modifications. In particular, the introduction of a bracket system for social security contributions in the 2012 reform made contract arrangements more complex.

Third, the reform effectively reduced the economic cost of hiring (A_E). Households could now place domestic workers in a lower contribution bracket than the single payment that applied before the reform and benefit from a 20% tax deduction. For illustration, in 2011, the single contribution base was €748.20 with a 22% rate, resulting in a monthly payment of €102.99. By contrast, under the 2013 bracket system, the lowest base was €148.60, corresponding to a contribution of €30.61. After applying the 20% deduction, the effective payment fell to €24.49—less than one-quarter of the previous flat rate, representing a 76% reduction. These financial incentives likely outweighed the modest additional costs introduced by new mandated benefits, such as 4 days' compensation for temporary sick leave.

Therefore, we model the reform as an increase in P with an ambiguous effect on A, depending on the relative weight of cognitive versus economic hiring costs (γ_E and γ_C).

Despite these changes, there will be a group of households for whom ρ is so high relative to γ that they will always hire formally, or else not hire at all. Likewise, there will be a group of households for whom γ is so high relative to ρ that they will never hire formally.

However, we can identify a group of employers for whom ρ and γ have close enough values so that the shocks to A and P may push a formal employer to hire informally, and vice versa. Employers who were hiring informally pre-reform will register their domestic worker if $\gamma A_{2012} < \rho P_{2012}$. Note that the administrative costs became both less economically costly and more cognitively demanding, and employers vary on the weight attached to these costs. Assuming that shocks to A_C and A_E are of similar magnitude, we can think of two different types of formalization responses:

a) $\gamma_{\mathbf{E}} \leq \gamma_{\mathbf{C}}$: Households that are sensitive to economic costs now find strong incentives to register their domestic workers. Given that $\rho P_{2012} > \rho P_{2011}$ and that $A_{2012} < A_{2011}$, we expect an increase in formal employment post-reform, driven by the registration of previously informal workers.

b) $\gamma_{\mathbf{E}} > \gamma_{\mathbf{C}}$: Households that are sensitive to cognitive costs might feel discouraged from switching to formal hiring despite the financial incentives. Given that increased inspections have made informal hiring more costly, these households could now hire through an employment agency in order to reduce their bureaucratic burden. As a result, we expect overall employment in the sector to decline as reliance on employment agencies becomes more prevalent.

Finally, employers who were hiring formally pre-reform would switch to hiring informally if $\gamma A_{2012} > \rho P_{2012}$. We deem this scenario unlikely given that households that were already hiring formally before the reform likely have a lower baseline sensitivity to cognitive costs.

Overall, the reform strengthens incentives to formalize employment, particularly for employers

previously on the margin between formal and informal hiring. However, these same changes may also induce some employers—especially those unable or unwilling to navigate the new administrative requirements—to withdraw from the market altogether. This withdrawal can trigger second-order effects, leading to adjustments along several margins. First, the total size of the sector may shrink as displaced domestic workers transition into other areas of the labor market. Second, there may be a contraction along the intensive margin, with workers supplying fewer hours in response to reduced demand. Third, increased competition among workers for a diminished pool of jobs may exert downward pressure on hourly wages.

In the empirical section, we assess the evidence supporting each of these three mechanisms.

3.2 Incumbent Workers

We identify three relevant choices from the workers' side. First, they choose whether to participate in the formal labor market, and how to combine it with informal employment. For simplicity, we will assume that domestic workers are employed only formally or only informally. Second, the worker chooses their contract duration, that is, how many days to work during the week/year. Third, conditional on being in formal employment, the worker chooses whether to search for an employer who is willing to register them in the social security system, or to be responsible for their own registration and contributions. Regarding the first decision, we regard the change in mandated benefits as too small to encourage informal workers to formalize. Since the policy only improves working conditions from the worker's side, we rule out the possibility of transitions to informality being worker-driven. In its initial formulation, the policy removed the third adjustment margin. Therefore, in what follows we focus on how the reform may influence formal contract duration and social security contributions [7], that is, the second dimension.

Prior to 2012, Spain's domestic work sector was subject to a flat-rate contribution scheme, whereby workers and employers paid a fixed monthly amount to Social Security, scaled according to the number of days worked but decoupled from actual wages. This design obscures the underlying pre-reform wage distribution, as observed contributions do not reflect true heterogeneity in wages. Consequently, post-reform changes in reported daily contributions may simply capture improved alignment between earnings and declared payments.

Beyond this mechanical effect, however, the reform may have also influenced labor supply behavior at the intensive margin among already formalized (incumbent) workers. To capture this channel, consider a simple model of a domestic worker who chooses how many days $l \in [0, \bar{l}]$ to supply formal labor in a given period. Her utility is given by:

$$\max_{l} \; u(w \cdot l - C(l)) - v(l) \tag{1}$$

[7] Note that, in a framework where workers cannot combine formal and informal work, the reform cannot impact contract duration nor pay in the informal sector from the workers' side

Here, w is the daily wage from formal employment, $C(l)$ is the total social security contribution paid by the worker when working l days, and $v(l)$ captures the disutility of work or opportunity cost. We assume standard properties: $u' > 0$, $u'' < 0$, $v' > 0$, $v'' > 0$.

The first-order condition for utility maximization is:

$$\frac{dU}{dl} = u'(w \cdot l - C(l)) \cdot (w - C'(l)) - v'(l) = 0 \tag{2}$$

This condition equates the marginal benefit of formal work, $u'(y) \cdot (w - C'(l))$, to its marginal cost $v'(l)$, where $y = w \cdot l - C(l)$ is income net of contributions. The term $(w - C'(l))$ represents the marginal return from an additional day of formal work after accounting for the increase in social security payments.

Prior to the reform, workers faced a flat monthly contribution amount (e.g., 100 euros) that was roughly proportional to the number of days worked, but based on an imputed wage $\tilde{w}$ rather than actual earnings. We approximate this as:

$$C(l) = \tau \cdot \tilde{w} \cdot l \Rightarrow C'(l) = \tau \cdot \tilde{w} \tag{3}$$

In this case, the marginal return to formal work is $MR_{\text{pre}} = w - \tau \cdot \tilde{w}$. Note that for workers with $w < \tilde{w}$, this marginal return could be low or even negative, discouraging additional formal work.

After the reform, contributions were aligned with actual earnings using a piecewise-linear bracket system. We simplify this as a continuous function:

$$C(l) = \tau(w \cdot l) \Rightarrow C'(l) = \tau'(w \cdot l) \cdot w \tag{4}$$

The new marginal return becomes $MR_{\text{post}} = w - \tau'(w \cdot l) \cdot w = w \cdot (1 - \tau'(w \cdot l))$. This expression reveals that the marginal return to formal work now depends directly on the worker's actual income.

Under the post-reform schedule, the marginal cost of working formally is lower for low-wage incumbents with $w < \tilde{w}$:

$$C'\text{post}(l) = \tau'(w \cdot l) \cdot w < C'\text{pre}(l) = \tau \cdot \tilde{w} \tag{5}$$

In other words, the reform reduced the marginal cost of formal work for a broad segment of low-wage incumbents.

Overall, the bracket-based reform affects labor market outcomes for incumbents along two dimensions. First, by replacing the flat-rate regime with earnings-linked contributions, the reform reduced

average daily payments for many low-wage workers who moved into lower contribution brackets. This adjustment brought social security obligations more in line with actual earnings, easing the financial burden of formality. Second, the reform increased the marginal return to formal work. Under the pre-reform system, contributions were effectively fixed per day worked and based on an imputed wage, imposing a high marginal "tax" on additional days of formal employment for those earning below the imputed threshold. The new earnings-based schedule lowered the marginal cost of formality for these workers, strengthening the incentive to supply more days of formal labor.

3.3 Predictions

Based on this framework, we expect the following outcomes:

1) Limited inflows from other formal sectors into domestic work, reflecting the modest improvement in mandated benefits introduced by the reform.

2) A reduction in the number of employers in the sector, as households particularly sensitive to administrative burdens exit the market—potentially shifting toward the use of employment agencies.

3) Adjustments to lower demand along three possible margins: fewer hours supplied per worker, lower hourly wages, or a reduced number of workers providing domestic services.

4) Increased registration of previously informal workers, driven by financial incentives, lower contribution thresholds, and intensified labor inspections.

5) A decline in the average contribution base, as newly formalized workers are often registered at the lowest tier of the Social Security bracket system.

6) A reduction in reported wages for incumbent workers, reflecting a more accurate distribution of earnings following the introduction of the earnings-based contribution system.

7) An increase in the number of days worked under formal contracts among low-wage incumbents, as the reform lowers the marginal cost of extending formal work arrangements.

Overall, the reform has ambiguous effects on public revenue. Tax incentives and increased enforcement are likely to boost formalization, but they can also lower the average tax contribution and reduce contract stability. The next sections describe the empirical approach used to quantify these effects.

4 Data

4.1 Domestic Workers' Panel

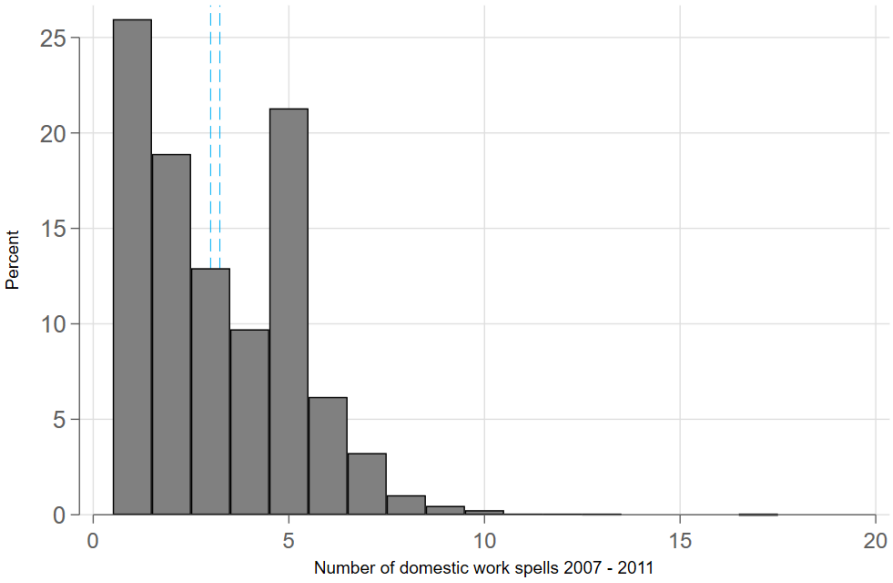
To estimate the reform's impact on incumbent domestic workers, we use the MCVL, an administrative dataset containing longitudinal information from social security, income tax, and census records. The MCVL covers a 4% non-stratified random sample of the population who have any

relationship with Spain's Social Security at the time of sampling. This includes both affiliation and benefits spells. Note that these administrative data do not include any information on informal economic activity, nor are we able to link these records to other data sources. An affiliation spell may refer to periods of employment or unemployment when the individual is perceiving unemployment benefits. As a result, we can observe whether an individual is employed, unemployed, or inactive, and for how many days, within a year. In what follows, we will define employment in a broad and strict sense: an individual is employed in a broad sense each year if they have a work contract for at least one day in that year. Equivalently, an individual is employed in a strict sense each year if they have a work contract for at least 110 days in that year. This is less than one third of a calendar year and half of the expected days of effective work for a worker who is under a contract all year round.

Using this information, we prepared a panel with yearly observations tracking the working life of domestic workers in the sample, that is, those with a formal employment contract. Our outcome variables are the number of days employed with a formal contract and the sum of the monthly contribution bases (i.e., the "annual" contribution base). In the general Social Security scheme, the contribution base is the average monthly earnings excluding overtime pay. Under the pre-reform scheme for domestic workers, the contribution base was set by the government at the minimum level allowed in the general scheme, regardless of actual pay. To the extent to which the pre-reform base reflected the actual earnings of domestic workers, the sum of the monthly contribution bases can approximate annual labor income. Even if this were not the case, this variable is still informative of (1) the state's revenue per domestic worker and (2) the amount counted towards retirement pension and other benefits for that domestic worker.

We can identify domestic workers in the formal sector in the data through their social security regime. However, to leave out of the study individuals who had a contract as a domestic worker at a given point in time but for whom it is not their main occupation, we define a domestic worker as someone who has had at least three employment spells under the Social Security regime specific to domestic workers. This is the average number of spells for all individuals in the MCVL who had at least one domestic services contract between 2007 and 2011 (see Figure 2). We report the results for alternative definitions of domestic workers in Section 7.

Figure 2: Number of Domestic Work Spells



Note: This figure shows the distribution of the total domestic work spells between 2007 and 2011 for individuals in the MCVL, conditional on having at least one domestic services contract. The dotted lines correspond to the mean (3.24) and the median (3) spells, the value chosen for our definition of a domestic worker.

4.2 Other Data Sources

In addition to the MCVL, we expand the analysis to the sector level using aggregate data from Social Security records on registered employment. Our main measure of formal employment is the total number of affiliates by sector. Note that, since we are using cross-sectional data, the definition of domestic worker we use to study the effects on the incumbents no longer applies. The sector disaggregation follows the Statistical classification of economic activities in the European Community (NACE rev. 2). We perform the analysis both for sections and divisions (2-digit industry codes). While we gain precision from using divisions, we have less industry characteristics available to include in the estimation as controls. At the section level, we have information on the share of part-time workers, the proportion of workers aged 16 to 30, and the average effective hours worked per week. We identify domestic workers by the total number of affiliates under the special regimes designated to the domestic service sector.

We complement registered employment with data from the EPA. The quarterly EPA is conducted by the National Statistics Institute and is representative of the country's population. We use data on the total number of employed workers in each sector from 2008, regardless of whether they are registered with Social Security. In this case, we identify domestic workers by the two-digit industry code (97) specifically for activities where the employer is a household, even when using information

at the section (one-digit) level from other economic sectors.[8] Following Elias et al. (2024), we consider the difference between employment in the EPA and in the Social Security records as a proxy for informal employment.

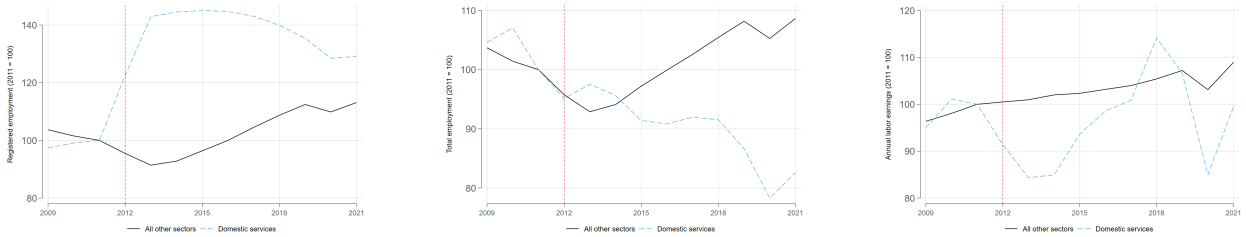
The EPA does not cover earnings, which are deferred to the Annual Survey of Labor Costs (*Encuesta Anual de Coste Laboral*, EACL). The EACL uses a representative sample of workplaces, which is stratified by economic activity and by the size of the workplace, and collects information on regular earnings and other means of compensation. We use data on regular earnings at the two-digit industry level. However, as this survey only targets companies, it excludes earnings for domestic workers, who are employed directly by households. Instead, we follow Farré et al. (2011) and make use of the EPF. The EPF contains self-reported annual data on household expenditures. This would include any compensation for informal domestic services. We calculate the annual labor cost of a domestic worker by dividing the total annual expenditure on domestic services by the total number of employed domestic workers, as reported by the EPA.

4.3 Descriptive Statistics

We start by analyzing recent trends in the domestic services sector. Figure 3a shows that formal employment in the sector rose immediately after the 2012 reform but began to gradually decline within two years, returning to pre-reform levels by 2021. On the other hand, average annual social security contribution bases declined sharply from 2012 onward (see Figure 4), consistent with prediction number 5 in our model (newly formalized workers are registered in the lowest contribution bracket). The employment pattern stands out in contrast with other sectors, where employment contracted sharply during the 2008 - 2014 economic downturn and recovered thereafter. As shown in Figure 3b, total (i.e., formal and informal) employment in the domestic services sector has steadily declined since 2010. Demand dropped during the 2008 crisis due to falling household income, but employment in the sector did not recover with the broader economy. Taken together, these developments suggest that the 2012 reform may have discouraged informal hiring and led some employers to exit the market in the long run. Supporting this interpretation, data from the EPF show a notable decrease in the share of households reporting non-zero spending on domestic services - from 30% in 2012 to 20% in 2015. This is consistent with prediction number 2 in our model. As a result, Figure 3c indicates that average household spending per domestic worker declined after the reform and only began to recover three years later, remaining below pre-reform levels.

[8]The reason for this is that NACE Section T, which includes domestic workers, also encompasses other activities like "activities of households as producers of goods and services for own use"

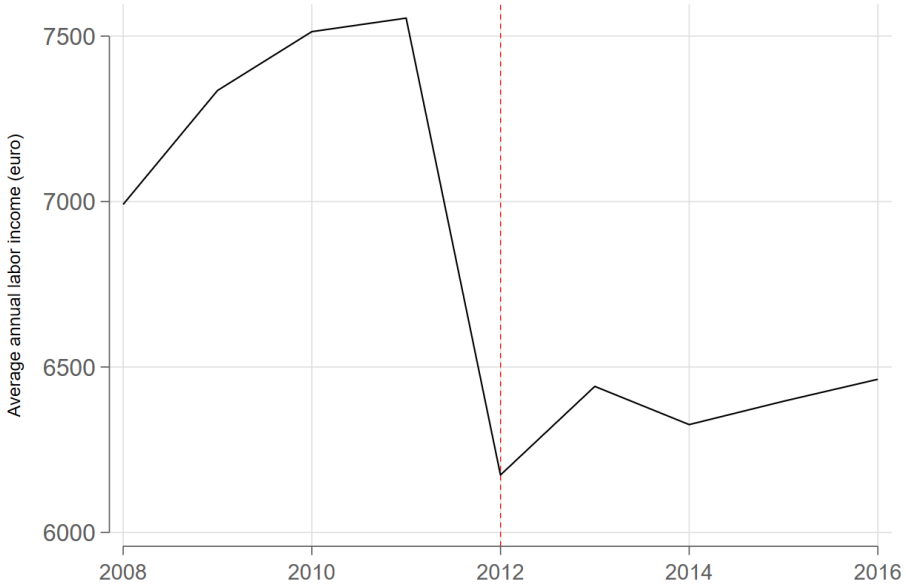
Figure 3: Trends in the Domestic Services Sector



(a) Formal Employment (b) Total Employment (c) Average Labor Earnings

Note: This figure compares registered (formal) employment, total employment and average annual labor earnings in the domestic services sector over time with an unweighted average of all other sectors in the economy. The aggregate time series of registered employment by sector is available in the social security records. Figures for total employment come from the EPA. Average labor earnings for domestic workers are proxied by household spending in domestic services from the EPF. We use the EACL for all other sectors. See Section 4 for more detail.

Figure 4: Average Social Security Contribution Base in the Sector



Note: This figure includes the social security contribution base for all domestic services contracts in a given year, from the MCVL. Therefore, the data reflects contributions paid by all employers in the sector and is not restricted to the individuals under our definition of a domestic worker.

Table 1 provides a description of our sample of formal domestic workers. Applying our definition of a domestic worker to the MCVL, we find 22,960 domestic workers, 96.3% of them women. Over half (59.0%) of them were born outside the EU, many of them in Latin America, although 76.8% had the Spanish nationality by the time they entered the sample. There are large differences be-

tween domestic workers born in vs. outside the EU: domestic workers born in the EU are on average older, less educated, and contribute less throughout their working lives. However, when we compare the two to the general population, conclusions are very similar. Table 1 shows the average annual contribution base of domestic workers in the sample at different age brackets. Compared to aggregate data from Spanish Social Security, domestic workers' contribution bases are approximately one third of those of the general population in the same age bracket. The individuals in our sample are consistently on the lower end of the income distribution, even if they are not employed as domestic workers during their entire working lives. Finally, individuals with only compulsory education are overrepresented among domestic workers. According to the Survey on the Involvement of the Adult Population in Learning Activities from the National Statistics Institute, 33.4% of Spanish-born adults aged 18–69 had completed at most compulsory education by 2022. This compares to 26.0% among EU-born immigrants and 47.0% among those born outside the EU. Overall, the share of lower-educated individuals among domestic workers is more than twice the national average.

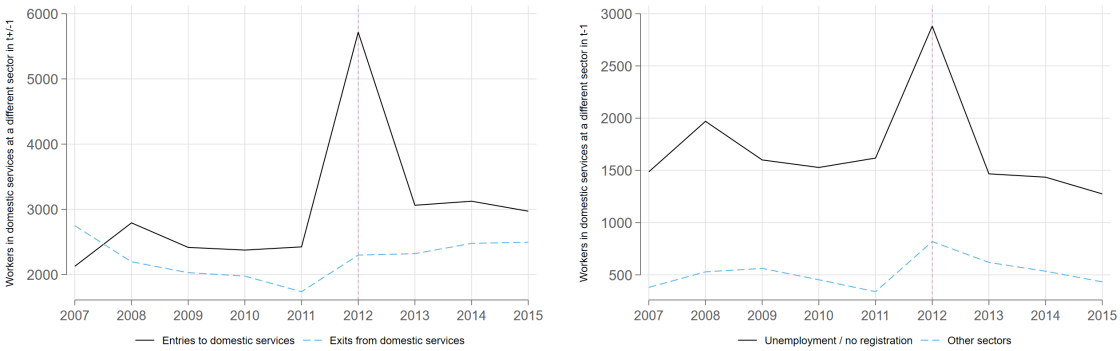
Table 1: Descriptive Statistics: Incumbents

	Country of birth		
	Spain or other EU	Outside of EU	Total
N	9,407 (41.0%)	13,553 (59.0%)	22,960 (100.0%)
Gender			
Male	150 (1.6%)	688 (5.1%)	838 (3.7%)
Female	9,257 (98.4%)	12,851 (94.9%)	22,108 (96.3%)
Age as of 01.10.2018 / 2023	62.578 (13.533)	50.711 (10.589)	55.802 (13.308)
Country of nationality as of 01.10.2023			
Spain or other EU	9,396 (99.9%)	7,208 (53.2%)	16,604 (72.3%)
Outside of EU	11 (0.1%)	6,345 (46.8%)	6,356 (27.7%)
Cohabitants under age 18	0.208 (0.552)	0.638 (0.907)	0.454 (0.804)
Cohabitants over age 65	0.307 (0.599)	0.220 (0.500)	0.257 (0.546)
Annual contribution base, ages under 25	2,766 (1,685)	4,393 (2,017)	3,426 (1,994)
Annual contribution base, ages 26 to 45	4,380 (2,250)	5,883 (2,301)	5,546 (2,374)
Annual contribution base, ages 46 to 65	4,976 (1,972)	6,318 (2,188)	5,916 (2,212)
Annual contribution base, ages over 65	2,301 (685)	6,070 (4,022)	5,532 (3,953)
Compulsory education or less			
No	1,358 (14.4%)	5,159 (38.1%)	6,517 (28.4%)
Yes	8,049 (85.6%)	8,394 (61.9%)	16,443 (71.6%)
Has a college degree			
No	9,165 (97.4%)	12,488 (92.1%)	21,653 (94.3%)
Yes	242 (2.6%)	1,065 (7.9%)	1,307 (5.7%)

Note: This table shows some characteristics for our sample of domestic workers from the MCVL, split by region of birth. We combine individuals from the 2017 and 2021 MCVL waves. Share of the total or standard errors in parentheses for categorical and numerical variables, respectively. Values for the average annual contribution base are only indirectly reflective of their formal labor earnings. Family composition and education level are measured at the time of entering the sample, namely 2018 or 2023. Salaries are measured in the year when each individual was in the corresponding age group.

When using the cross-section of all workers with a domestic services contract, the MCVL data replicates the trends at the sector level. Figure 5a shows the number of individuals who were on the first (entries) vs. their last (exits) domestic services contract each year. Both inflows and outflows increase after 2012, but the clear spike in 2012 is consistent with a net increase in formal employment. However, it is not clear whether the increase in formal employment comes from within or from outside the formal labor market. Figure 5b divides new entrants by their pre-reform registration history. While there is a very modest increase in inflows from other sectors, the graph suggests that the increase in formal employment was largely driven by individuals outside the formal labor market. This is consistent with proposition number 1 in our model.

Figure 5: Movement to and from the domestic services sector



(a) Inflows vs. Outflows

(b) Breakdown of inflows

Note: Figure 5a shows the entries and exits to/from the domestic services sector between 2007 and 2015. Inflows (outflows) are defined as the total number of individuals with a domestic services contract in a given year for whom this was their first (last) contract in this regime. Individuals who had no previous (next) social security registration are included in the figures. Figure 5b shows the previous employment status for all entries to the domestic services sector. Individuals who were in registered unemployment or had no prior affiliation to the social security system are included in the "unemployment / no registration" category. The sum of both categories is less than the total from Figure 5a because individuals who had a missing or unknown (zero) sector of previous employment but who do not fit in the "no registration" category are excluded.

Table 2 reports the same characteristics as Table 1 for the individuals who got their first domestic services contract in 2012. Compared to our sample of incumbents, there are more men among the new entrants. They are five years younger on average, and Spanish-born individuals are more represented. This is consistent with the group of individuals who may face lower incentives to work formally in this sector.

Table 2: Descriptive Statistics: New Entrants

	Total
N	5,675
Gender	
Male	1,038 (18.3%)
Female	4,632 (81.7%)
Age as of 01.10.2018 / 2023	49.239 (11.259)
Country of birth	
Spain or other EU	3,761 (66.3%)
Outside of EU	1,914 (33.7%)
Nationality as of 01.10.2018 / 2023	
Spain or other EU	4,601 (81.1%)
Outside of EU	1,074 (18.9%)
Cohabitants under age 18	0.497 (0.838)
Cohabitants over age 65	0.232 (0.528)
Annual contribution base, ages under 25	4,388 (2,851)
Annual contribution base, ages 26 to 45	6,079 (3,668)
Annual contribution base, ages 46 to 65	4,918 (3,141)
Annual contribution base, ages over 65	3,700 (3,001)
Compulsory education or less	
No	1,886 (33.2%)
Yes	3,789 (66.8%)
Has a college degree	
No	5,063 (89.2%)
Yes	612 (10.8%)

Note: This table shows some characteristics for the individuals who had their first domestic services contract in 2012. Share of the total or standard errors in parentheses for categorical and numerical variables, respectively. Values for the average annual contribution base are only indirectly reflective of their formal labor earnings. Family composition and education level are measured at the time of entering the sample, namely 2018 or 2023. Salaries are measured in the year when each individual was in the corresponding age group.

5 Identification Strategy

Building on the theoretical framework presented in Section 3, we will use two empirical approaches to analyze the effect of the 2012 social security reform, first at the sector level and then for the incumbents. We use annual data from the whole universe of employment spells to examine the effects of the reform on formal employment at the sector level. We use a synthetic difference-in-differences estimation procedure following Arkhangelsky, Athey, Hirshberg, Imbens, and Wager (2021), where the control group is a weighted combination of all other economic sectors, as defined

by their two-digit industry code, that were not directly affected by the policy (i.e., all but 97). This approach will in fact estimate both time- and unit-specific weights, λ_t and ω_c. We estimate the previous equation

$$Y_{ct} = \alpha + \beta D_c + \gamma_2 f_{2_t} + ... + \gamma_9 f_{9_t} + \boldsymbol{X'_{ct}}\boldsymbol{\eta} + \sum_{s=1}^{3} \delta_s (D_c * f_{s_t}) + \sum_{s=5}^{9} \delta_s (D_c * f_{s_t}) + \varepsilon_{ct},$$

with the difference that the vector of controls $\boldsymbol{X'_{ct}}$ now includes the share of women employed in the sector, the share of part-time workers, and the share of workers with a fixed-term contract. Note that, for the domestic services sector, these variables are not available in the Social Security records. We impute them from the MCVL using information on the type of contract, Social Security contribution bases and reason for contract termination for all individuals in the sample with a domestic services contract in a given year. This relies on the assumption that the domestic workers in the MCVL are similar enough to the general population of formal domestic workers. Finally, our outcome of interest Y_{ct} is the total number of individuals employed in sector c in year t.

Third, we follow the same procedure with annual data from the EPA to estimate the impact on total (formal and informal) employment. We include the share of women in the sector, the share of part-time workers, the share of workers aged between 16 - 30 years, the unemployment rate in the sector (i.e., the share of workers in sector c who were not employed in the reference week) and the average effective hours worked per week as controls. Mirroring our baseline analysis, we report both the average treatment effect on the treated (ATT) and the dynamic treatment effects in an event-study fashion. The unit-specific weights ω_c for each sector estimated are reported in Table A4 in the Appendix. Lastly, we replicate the analysis for total (formal and informal) earnings using data from the EPF and the EACL.

We define as incumbents all domestic workers that were already in the formal economy to some extent before 2011, that is, a subsample of the domestic workers in our main data set. We further restrict the sample to only include workers of age 55 or lower in 2012, so that individuals are not eligible to retire during our period of analysis, implying that any employment response would be unrelated to retirement decisions.

Given that the 2012 reform affected all workers within this Social Security regime, we use workers from other sectors as a control group and estimate a difference-in-differences model. There is no other sector in the Spanish economy with similar rates of female, immigrant, and low-earning workers, which we believe to be stronger determinants of labor market attachment. Consequently, we use a nearest-neighbors algorithm that matches each domestic worker in our dataset with another individual who shares identical demographic characteristics – gender, country of birth, and education level – and displays the closest values of age and pre-reform experience. Note that we can only see work experience in Spain and in the formal labor market. As a result, experience can be interpreted as a proxy for time in the host country in the case of immigrant domestic workers.

When not employed in the domestic services sector, our group of domestic workers is either in unemployment or in the retail, hospitality, and other cleaning and care services sectors. Therefore, we require that individuals in the control group have exclusively worked in these sectors for comparability, and that they have never been affiliated to the Social Security regime for domestic workers to ensure lack of treatment. Note that these sectors, in particular hospitality, employ a large share of the workforce in Spain. As a result, we expect a potential transition from domestic workers to these sectors to have very limited to no effects on employment and earnings at the sector level except for very few, selected subsectors.

However, similar work experience does not imply similar earnings, even when restricting our choice of economic sectors. In particular, this may be due to the fact that wage growth and labor regulations that define wage increases may differ across sectors. As a result, we replace the matching criteria of pre-reform experience for pre-reform labor earnings when estimating post-reform earnings.

Our baseline specification can be summarized as follows

$$Y_{ict} = \alpha + \beta D_i + \delta W_{it} + \gamma_2 f_{2_t} + ... + \gamma_{10} f_{10_t} + \boldsymbol{X'_{ict}}\boldsymbol{\eta} + \boldsymbol{\lambda_c} + \varepsilon_{ict},$$

where D_i takes value 1 if individual i is a domestic worker and W_i takes value 1 if the individual i is a domestic worker and t corresponds to the post-reform period. f_{2_t} to f_{10_t} are year dummies (2007 to 2016), $\boldsymbol{X'_{ict}}$ are controls for gender, age, country of birth, and education level, and λ_{ct} are sector dummies. δ is thus the treatment effect (pre-post difference).

We can estimate the effect of the reform over time using an event-study methodology, where 2011 is the reference period. This requires extending the previous equation as follows

$$Y_{ict} = \alpha + \beta D_i + \gamma_2 f_{2_t} + ... + \gamma_9 f_{9_t} + \boldsymbol{X'_{ict}}\boldsymbol{\eta} + \boldsymbol{\lambda_c} + \sum_{s=1}^{3} \delta_s (D_i * f_{s_t}) + \sum_{s=5}^{10} \delta_s (D_i * f_{s_t}) + \varepsilon_{ict},$$

where the coefficients of interest are now δ_6 to $\delta_1 0$, and δ_1 to δ_4 will serve as a test for parallel trends.

Our main outcomes of interest (Y_{ict}, for individual i in sector c at time t) are employment in the strict sense, contract duration, and labor earnings, measured as described in Section 5. We estimate the results for stronger matching requirements and alternative matching criteria for robustness.

6 Results

6.1 Sector-level Effects

Tables 3–5 present our main estimates of the reform's impact on employment and earnings outcomes at the sector level. We report two sets of difference-in-differences estimates: (1) conventional DiD coefficients, where domestic services is the treated sector and all other economic sectors are included in the control group with equal weights, and (2) synthetic DiD estimates, which compare the domestic sector with a synthetic control. For each estimation strategy, we include specifications both with and without covariates. Whenever possible, we use alternative levels of disaggregation for the untreated sectors. All regressions include industry-by-year fixed effects, and standard errors are clustered at the sector level. Figure 6 complements these results with event-study plots for the main outcomes.

Table 3: Sector-Level Results: Effects on Employment

	Panel A: Formal employment (number of registered workers)							
	Sector-level				2-digit industry level			
	DID		SDID		DID		SDID	
Treatment	108.19**	119.27	71.72	111.77	113.70***	131.08***	102.96***	118.21***
	(32.76)	(82.69)	(73.16)	(62.70)	(4.73)	(32.21)	(17.23)	(10.65)
Dep. var. mean	293.14	293.14	293.14	293.14	293.14	293.14	293.14	293.14
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	260	260	260	260	1131	1131	1131	1131
	Panel B: Total employment (number of workers)							
	Sector-level				2-digit industry level			
	DID		SDID		DID		SDID	
Treatment	-86.21*	-35.93	-71.92	-26.80	-92.82***	-92.82***	-55.99	-55.94
	(33.31)	(87.79)	(47.86)	(83.95)	(5.17)	(5.21)	(37.47)	(31.17)
Dep. var. mean	713.63	713.63	713.63	713.63	713.63	713.63	713.63	713.63
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	260	260	260	260	1092	1092	1092	1092

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. Controls include the share of female workers, the share under age 30, the share employed part-time, average weekly hours and the unemployment rate in the sector. The only exception is the regression at the 2-digit industry level in Panel B, where we only control for the share of female workers due to the lack of data availability. The DID column reports the difference-in-differences estimates, where the treatment group is the domestic services sector and the control group consists of all other sectors with equal weights. The SDID column reports the treatment effect using a synthetic control group from all other sectors. All coefficients and pre-reform averages are expressed in thousands.

Table 4: Sector-Level Results: Effects on Earnings

	Panel A: Average annual net income							
	Sector-level				2-digit industry level			
	DID		SDID		DID		SDID	
Treatment	-1626.65**	1102.10	-1047.92	-927.65	-1657.84***	-1620.39***	-1411.44	-1358.86
	(507.96)	(551.71)	(1211.43)	(1003.33)	(203.25)	(215.81)	(1502.77)	(1464.16)
Dep. var. mean	8274.30	8274.30	8274.30	8274.30	8274.30	8274.30	8274.30	8274.30
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	247	247	247	247	1014	1014	1014	1014
	Panel B: Average annual social security contributions							
	Sector-level				2-digit industry level			
	DID		SDID		DID		SDID	
Treatment	-20.42***	-11.01	-13.14	-22.91*	-22.44***	-29.33	-15.87	-23.4*
	(2.72)	(8.91)	(9.62)	(10.16)	(2.14)	(15.78)	(10.64)	(11.41)
Dep. var. mean	189.13	189.13	189.13	189.13	189.13	189.13	189.13	189.13
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	240	240	240	240	708	708	708	708

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. In Panel A, controls include: the share of female workers, share under age 30, the share employed part-time and the average weekly hours worked for the sector-level analysis, and the share of female workers fo the industry-level analysis. In Panel B, controls include the share of female workers, share under age 30, the share employed part-time, the share on a temporary contract and the average number of days worked in the year. The DID column reports the difference-in-differences estimates, where the treatment group is the domestic services sector and the control group consists of all other sectors with equal weights. The SDID column reports the treatment effect using a synthetic control group from all other sectors. All values are expressed in euros.

Table 5: Sector-level results: Effects on Weekly Hours and Hourly Earnings

	Average number of hours worked				**Hourly earnings**			
	DID		SDID		DID		SDID	
Treatment	-1.62***	-0.33	-1.43	-1.70	-0.63	0.79	-0.21	-1.00
	(0.20)	(0.46)	(1.14)	(1.02)	(0.79)	(0.97)	(3.25)	(3.02)
Dep. var. mean	26.85	26.85	26.85	26.85	0.46	0.46	0.46	0.46
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	260	260	260	260	247	247	247	247

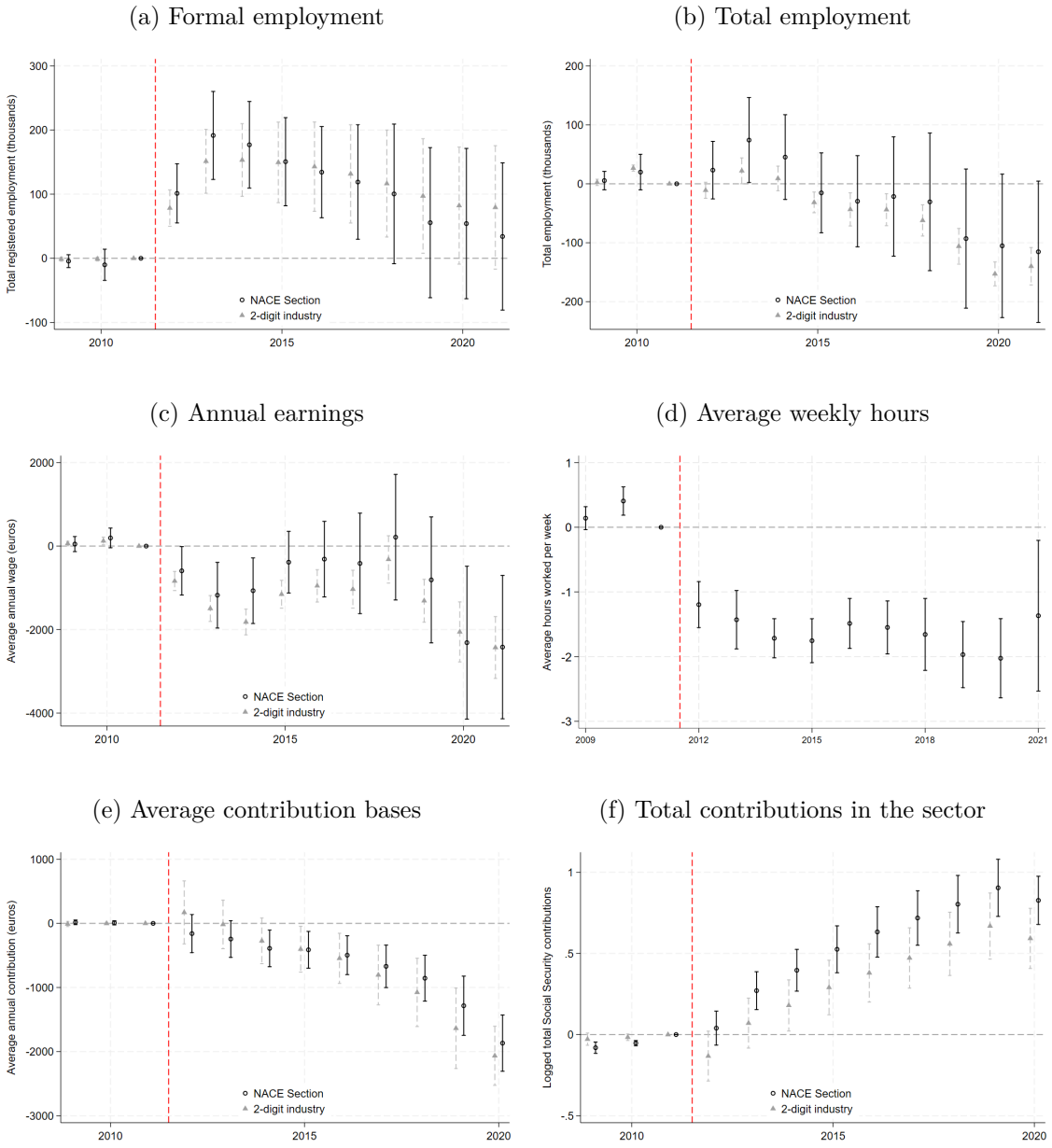
Note: * p < 0.05, ** p < 0.01, *** p < 0.001. Standard errors in parentheses. The analysis is only at the sector level. Controls include the share of female workers, the share under age 30, the share employed part-time and the unemployment rate in the sector. The DID column reports the difference-in-differences estimates, where the treatment group is the domestic services sector and the control group consists of all other sectors with equal weights. The SDID column reports the treatment effect using a synthetic control group from all other sectors. Values for hourly earnings are expressed in euros.

Table 6: Sector-level results: Effects on Government Revenue

	Log total social security contributions							
	Sector-level				2-digit industry level			
	DID		SDID		DID		SDID	
Treatment	0.59***	0.30**	0.33**	0.25*	0.57***	0.51**	0.41***	0.42
	(0.03)	(0.12)	(0.17)	(1.02)	(0.35)	(0.24)	(0.07)	(0.06)
Dep. var. mean	-1.77	-1.77	-1.77	-1.77	-1.77	-1.77	-1.77	-1.77
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	260	260	260	260	240	240	240	240

Note: * p < 0.05, ** p < 0.01, *** p < 0.001. Standard errors in parentheses. The analysis is only at the sector level. Controls include the share of female workers, share under age 30, the share employed part-time, the share on a temporary contract and the average number of days worked in the year. The DID column reports the difference-in-differences estimates, where the treatment group is the domestic services sector and the control group consists of all other sectors with equal weights. The SDID column reports the treatment effect using a synthetic control group from all other sectors.

Figure 6: Sector-Level Results: Synthetic Difference-in-Differences Estimates



Note: The graphs report estimates of the dynamic treatment effects of the reform on our main outcomes, using a synthetic difference-in-differences methodology. Each graph combines the analyses using a one- vs. two-digit industry classification, when possible. The reference period is 2011, one year before the reform. The effects are estimated including the controls described in Tables 3, 4 and 5.

Employment

Table 3 documents the impact of the reform on employment in the domestic services sector. Formal (registered) employment increased by approximately 118,000 workers relative to a pre-reform average of 293,000, representing a 40.3% rise. This effect is robust across alternative specifications, levels of industry disaggregation, and persists for up to seven years post-reform. In contrast, total employment in the sector remained broadly unchanged, implying a substantial decline in the informality rate—from 66.49% to 52.35%, a reduction of 14.14 percentage points.

However, the dynamic analysis in Figure 6 reveals a contraction in total employment beginning in 2015, coinciding with the phasing out of the tax deduction. By 2021, the sector had shed roughly as many workers as it had added by 2014 (around 150,000, based on 2-digit industry estimates), suggesting a declining role of the sector in the broader economy and labor market over the past decade. These findings align with prediction 2 of our model. Table 5 further shows that average weekly hours worked declined by approximately 1.7 hours relative to the pre-reform mean of 26.85 hours, corresponding to a 6.3% reduction in hours worked per week.

Taken together, these findings suggest that while the reform had limited effects on employment along the extensive margin in the short to medium run, it produced a substantial and lasting shift toward formal employment relationships. This pattern is consistent with Prediction 4 of our theoretical framework, which posits that increases in registration are driven primarily by previously informal workers responding to stronger financial incentives, lower contribution thresholds, and intensified labor inspections. The observed reductions in average hours worked point to modest but statistically significant adjustments along the intensive margin, in line with prediction 3 of our model. Overall, the reform appears to have been successful in achieving a key policy goal: increasing the formalization of domestic employment without triggering large-scale job losses.

Earnings

Table 4 presents the estimated effects of the reform on both the annual earnings of domestic workers and their reported annual social security contribution bases. On average, contribution bases declined by approximately 12% in the aftermath of the reform. Consistent with Prediction 6 of our model, this decline reflects the entry of newly registered workers into the Social Security system at the lowest permissible income brackets. It is important to note that, prior to the reform, reported contribution bases were largely decoupled from actual earnings. As a result, changes in contribution bases provide limited information about the evolution of true labor income, particularly for workers in the informal sector.

To better approximate actual earnings, we construct a measure of average annual earnings as total household expenditure on domestic services—excluding social security contributions—divided by the number of individuals employed in the sector. This measure captures earnings regardless of employment formality, as it includes spending reported by households that hire informal workers but

declare positive expenditures in the EPF. As shown in Panel A, the estimated average treatment effects on earnings are generally negative, although statistical significance varies across specifications. A dynamic analysis reveals an immediate post-reform decline of approximately €1,000 in annual earnings, followed by a gradual recovery to pre-reform levels within seven years.[9]

6.2 Effects on the Incumbents

We next examine the impact of the reform on labor market outcomes for incumbent domestic workers using our detailed administrative panel. Table 7 presents estimates across specifications that include and exclude controls, as well as industry-by-year fixed effects. We find an almost negligible effect on extensive-margin employment: the likelihood of being employed at least one day during the year increases by 0.17 pp. In contrast, we detect a modest but significant increase along the intensive margin, with an average rise of 19.75 additional days under an employment contract annually. In line with Prediction 7 in Section 3, this increase is consistent with enhanced marginal returns to formal employment for workers earning below the imputed wage threshold associated with the pre-reform flat-rate contribution system. Interestingly, the increase in days worked is in addition to a 27% decrease in the number of contracts and a 20% decrease in the number of employers. One possible explanation is that the reform encouraged the consolidation of more stable and less fragmented employment relationships. By reducing the fixed cost of formalization for employers—particularly those offering only a few hours of work—the reform may have made it easier for some households to formalize more hours with a single worker, rather than sharing her with other households through multiple short contracts. For the workers, this translates into fewer employers and contracts, but more contributed days per relationship.

In parallel, we observe a decline in total annual Social Security contribution bases of approximately 12%. Crucially, this reduction coincides with an increase in days worked, ruling out an interpretation based on lower labor supply. Instead, this result suggests that the reform induced a closer alignment between declared and actual earnings, particularly among lower-income workers.

Heterogeneity analyses presented in Tables 8–10 reveal that these effects are largely driven by younger and foreign-born workers. This pattern is consistent with the view that these groups were disproportionately concentrated below the flat-rate contribution threshold prior to the reform and faced stronger incentives to formalize employment, particularly given the importance of accumulating documented workdays to meet legal residency requirements.

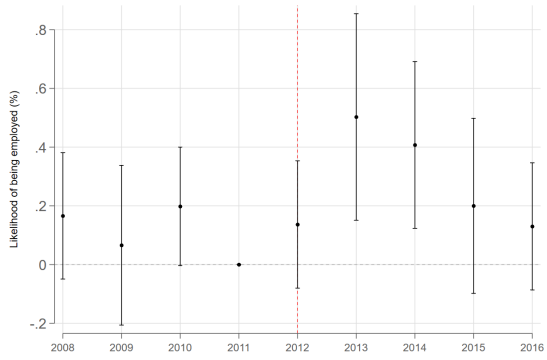
[9]The sharp earnings drop observed in 2020 and 2021 likely reflects the disproportionate impact of the COVID-19 crisis on domestic work.

Table 7: Incumbent Workers: Main Results

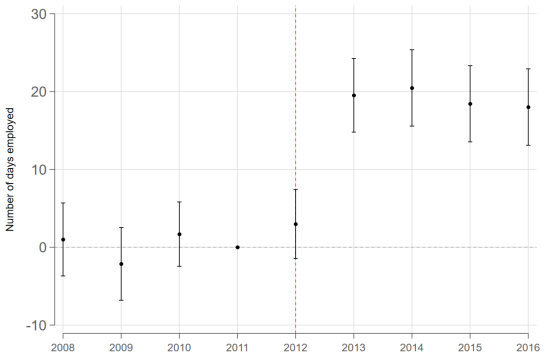
	Panel A: Employment outcomes					
	Employed at least one day (%)			Employed at least 110 days (%)		
Treatment	-3.35***	0.19**	0.17*	-1.10*	2.15***	1.43***
	(0.36)	(0.07)	(0.07)	(0.46)	(0.38)	(0.38)
Dep. var. mean	96.28	96.28	96.28	92.57	92.57	92.57
Sector - Year FE	No	Yes	Yes	No	Yes	Yes
Controls	No	No	Yes	No	No	Yes
Observations	252969	244647	244647	252969	244647	244647
R-squared	0.028	0.045	0.045	0.033	0.064	0.084
	Panel B: Contribution base and contract duration					
	Log annual contribution base			Days worked in a year		
Treatment	-0.07***	-0.04*	-0.12***	6.54***	24.55***	19.75***
	(0.01)	(0.02)	(0.01)	(1.67)	(1.42)	(1.43)
Dep. var. mean	8.92	8.92	8.92	327.47	327.47	327.47
Sector - Year FE	No	Yes	Yes	No	Yes	Yes
Controls	No	No	Yes	No	No	Yes
Observations	90635	90603	90603	252969	244647	244647
R-squared	0.027	0.062	0.439	0.052	0.109	0.169
	Panel C: Multiple job-holding					
	Number of contracts			Number of employers		
Treatment	-0.18***	-0.48***	-0.39***	-0.06***	-0.28***	-0.25***
	(0.03)	(0.04)	(0.04)	(0.01)	(0.02)	(0.02)
Dep. var. mean	1.45	1.45	1.45	1.22	1.22	1.22
Sector - Year FE	No	Yes	Yes	No	Yes	Yes
Controls	No	No	Yes	No	No	Yes
Observations	243571	243571	243571	243571	243571	243571
R-squared	0.004	0.011	0.036	0.018	0.046	0.105

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. The table reports the treatment effect estimates for incumbent workers, using a difference-in-differences methodology with a matched control group. Controls include gender, age, country of birth, and education level. The number of days under an employment contract in each given year are included as a control in the regression for log annual contribution base. The values for number of contracts and employers are both conditional on working. Year fixed-effects are included in all models.

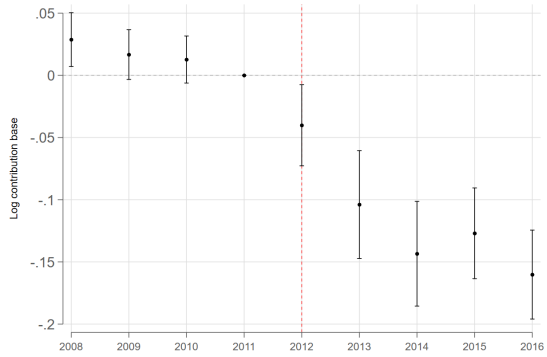
Figure 7: Incumbent Workers: Difference-in-Differences Estimates



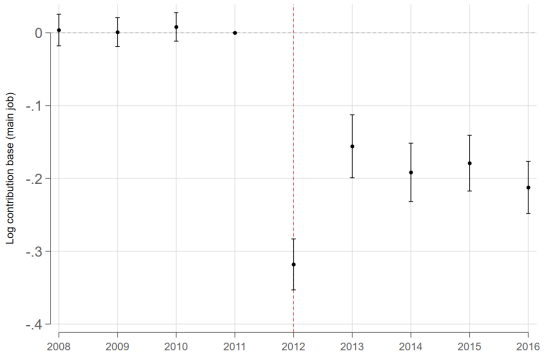
(a) Employment



(b) Days worked in a year



(c) Log annual contribution base



(d) Log annual contribution base (main job)

Note: The graphs report the difference-in-differences estimates of the dynamic treatment effects of the reform on our main outcomes for incumbent workers, using a matched control group. Controls include age, gender, country of birth, education level and sector fixed effects.

Table 8: Heterogeneity Analysis: By Age Group

	Employed at least one day (%)	Days worked in a year	Log annual contribution base
Treatment	0.43**	32.73***	-0.15***
	(0.14)	(2.76)	(0.02)
Treatment x age 35 - 50	-0.23	-14.59***	0.03
	(0.15)	(2.98)	(0.02)
Treatment x age 50 - 55	-0.58**	-20.39***	0.06*
	(0.19)	(3.29)	(0.03)
Dep. var. mean	99.56	338.61	8.92
Sector - Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	244647	244647	90603
R-squared	0.045	0.168	0.439

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. The table reports the treatment effect on employment for incumbent workers, using a difference-in-differences methodology with a matched control group. The relevant dimension of heterogeneity is age at the time of the reform. By definition of our sample (see Section 5), no individuals are older than 55 in 2012. Controls include gender, country of birth, and education level. In the regression for log annual contribution bases, the number of days worked in each given year is included as an additional control. Year fixed effects are included in all models.

Table 9: Heterogeneity Analysis: By Country of Origin

	Employed at least one day (%)	Days worked in a year	Log annual contribution base
Treatment	0.29***	25.25***	-0.13***
	(0.07)	(1.56)	(0.01)
Treatment x Spanish-born	-0.43***	-18.79***	0.01
	(0.12)	(2.11)	(0.02)
Dep. var. mean	99.56	338.61	8.92
Sector - Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	244647	244647	90603
R-squared	0.045	0.170	0.439

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. The table reports the treatment effect on employment for incumbent workers, using a difference-in-differences methodology with a matched control group. The relevant dimension of heterogeneity is country of birth: Spain vs outside of Spain. Controls include gender, age, and education level. In the regression for log annual contribution base, the number of days worked in each given year is included as an additional control. Year fixed effects are included in all models.

Table 10: Heterogeneity Analysis: By Education Level

	Employed at least one day (%)	Days worked in a year	Log annual contribution base
Treatment	0.20	24.78***	-0.12***
	(0.12)	(2.20)	(0.02)
Treatment x Dropped out of education	-0.04	-6.88**	-0.01
	(0.12)	(2.27)	(0.02)
Dep. var. mean	99.56	338.61	8.92
Sector - Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	244647	244647	90603
R-squared	0.045	0.169	0.439

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. The table reports the treatment effect on employment for incumbent workers, using a difference-in-differences methodology with a matched control group. The relevant dimension of heterogeneity is education level: finished vs. dropped out of compulsory education (in Spain, 10 years of completed education). Controls include gender, age, and country of birth. In the regression for log annual contributions, the number of days worked in each given year is included as an additional control. Year fixed effects are included in all models

6.3 Welfare Analysis

As a final step, we examine the fiscal implications of the reform by estimating its net effect on public revenue. The sharp increase in the number of registered domestic workers must be weighed against the simultaneous decline in the average contribution per worker, driven by the introduction of a progressive bracket system with lower entry thresholds.

We approximate fiscal revenues using individual-level administrative records due to the unavailability of administrative data on total contributions by sector and regime. Specifically, we aggregate annual contribution bases at the sector level from our panel data and apply the statutory contribution rates for common contingencies to unaffected sectors and the applicable domestic worker rates (see Table A1 in the Appendix). This allows us to construct a consistent measure of Social Security revenues across sectors based on observed earnings in our sample.

To assess the causal impact of the reform, we replicate this procedure using the synthetic control for the domestic sector and compare the evolution of estimated revenues between the treated and counterfactual sectors. Importantly, because we rely on sample data rather than complete population-level figures, our estimates do not capture the absolute level of contributions. We therefore log-transform the revenue variable and interpret the results in terms of percentage changes.

Table 6 shows that fiscal revenues from the domestic services sector increased by approximately 40%, indicating a positive fiscal impact of the reform. However, the event-study design displayed in Figure 6f reveals important dynamics. In the year immediately following the reform, the estimated effects on revenues were negative—though not statistically significant. This pattern aligns with the official justification for the reform's subsequent adjustment [10]: the newly established lower contribution brackets were too low, and the full shift of registration responsibility to employers created barriers to formalization.

7 Robustness Checks and Extensions

7.1 Sector-Level Results Using Geographic Variation in Pre-Reform Informality

Data from the EPA and social security records are available by province - Spain is divided in autonomous communities (regions), with provinces being the second, more granular territorial division. There are 50 provinces in Spain and 2 autonomous cities, Ceuta and Melilla. Following recommendations from the National Statistics Institute about the representativeness of the sample for Ceuta and Melilla, we limit our analysis to the 50 provinces.

We calculate the pre-reform informality rate by province in the same way we do at the national level: as the difference between total employment and registered employment in the domestic services sector. The prevalence of informal employment in the sector in 2011 varied widely across provinces,

[10] The Spanish government amended the law to, among other changes, raise the minimum contribution and partly return the responsibility to register to the worker

ranging from 35 to 88% (see Figure A6 in the Appendix). This variation is still present when taking population size into account: the largest provinces, Madrid and Barcelona, are below the median pre-reform informality rate, whereas Valencia, Sevilla, or Alicante (the 3rd to 5th largest) have higher informality rates, especially for the latter, at around 80%. We define a binary treatment as being above the median pre-reform informality rate. Alternatively, we use a continuous treatment using the pre-reform informality rate for each province. Therefore, the treatment effect we capture is the result of the change in incentives for informal employers.

The results are consistent with our main findings. Estimates using the continuous treatment indicate that average contribution bases declined while formal employment increased following the reform. Total employment and weekly hours worked fell, suggesting an overall contraction in sectoral activity. In contrast, the binary treatment estimates yield similar qualitative patterns but are not statistically significant for weekly hours worked or monthly contribution bases.

7.2 Sector-Level Results Using Hospitality as the Control Group

Due to the importance of tourism for the Spanish economy, the hospitality sector employs a substantial share of the workforce. According to the EPA, the hospitality sector represented an average 8% of total employment in our period of analysis. Therefore, a small increase in worker flows from the domestic services sector to hospitality as a result of the reform is very unlikely to affect employment nor earnings at the sector level.

While the sectors evolved similarly in most dimensions over time (see Figure A8 in the Appendix), annual social security contributions in each sector were on very different paths prior to the reform. This is likely due to the decoupling of earnings and contribution bases in the pre-reform domestic services sector, and it underscores the advantages of using a synthetic control group.

The difference-in-difference estimates for total employment and average contribution bases using hospitality as a control group are consistent with our main results (see Table A6 in the Appendix). This reinforces the idea that lowering entry barriers to formal employment fosters formalization. We find somewhat larger employment losses in domestic services relative to hospitality, which may reflect the comparatively strong post-crisis recovery of the tourism sector. Finally, we find no significant evidence of adjustment along the margins of wages or hours worked.

7.3 Effects on the Incumbents with Different Definitions of a Domestic Worker

We report the difference-in-differences estimates using the same matching procedure for variations of our definition of domestic worker, changing the number and timing of required domestic services contracts between 2007 and 2011. Across all these definitions, the results remain consistent with our main findings (see Table A7 in the Appendix). Incumbent domestic workers experienced a decline in both the number of employers and their average contribution bases following the reform, accompanied by positive effects on the intensive margin of employment and no significant effects on

the extensive margin.

7.4 Difference-in-Differences Without Matching

Our final robustness check for the sample of incumbent workers replicates the difference-in-differences analysis using as the control group all registered workers not affected by the reform, instead of a matched sample selected based on demographic similarity.

The results are broadly consistent with those obtained using the matched sample (see Table A8 in the Appendix). The reform has a negligible but statistically significant effect on the probability of being employed at least one day (less than 0.1 percentage points). However, it yields a positive and significant effect on the intensive margin, increasing the number of days worked per year by 5.42—similar to the 3.63-day increase estimated in the matched specification. Annual and daily social security contribution bases also decline significantly following the reform, further reinforcing our main conclusions.

Prior to the reform, the trends in the treatment and control groups are somewhat less similar than with the matched sample, but the dynamic treatment effects remain directionally consistent with our main results (see Figure A9 in the Appendix).

8 Conclusion

This paper studies whether and how social security reforms can increase labor formalization while improving worker conditions. To do so, we use the 2012 Spanish Social Security reform in the domestic services sector, characterized by high informality, low wages, and a predominantly female workforce. To identify the causal effects of the reform, we use a synthetic control approach at the sector level with an analysis of incumbent formal domestic workers using rich administrative panel data matched to comparable workers in unaffected sectors.

We show that the reform led to a substantial decline in the average Social Security contribution base. This effect is driven by the replacement of a flat-rate monthly contribution with a progressive schedule starting below the former rate, together with a temporary employer tax deduction. These changes sharply reduced the marginal cost of formality and improved the correspondence between reported contributions and earnings.

Consistent with these incentives, and somewhat reinforced by increased labor inspections and information campaigns, formal registrations in the sector rose sharply and persistently after the reform. Descriptive evidence indicates that these gains were primarily due to the formalization of previously informal domestic workers rather than to inflows from other sectors. Overall, the reform resulted in the formal registration of approximately 118,000 domestic workers.

The reform also illustrates a central trade-off in the design of formalization policies. By substantially lowering upfront contribution costs, it expanded formal coverage among low-wage workers but likely

reduced future benefit generosity for both newly registered and incumbent workers. From a fiscal perspective, however, the reform was successful, increasing Social Security revenues from the sector by about 40% over the following seven years.

Administrative costs play an important role in shaping these outcomes. Because employers in the domestic services sector are typically private households with limited familiarity with labor regulations, increased oversight and administrative complexity appear to have discouraged some households from participating in the formal market. Consistent with this interpretation, we observe a decline in the number of households reporting domestic service expenditures in the EPF. The exit of some employers underscores the heterogeneity in sensitivity to administrative versus economic costs.

These changes translated into adjustments in working arrangements. Average weekly hours declined by 1.7 hours after the reform, while incumbent formal domestic workers experienced modest increases in the number of days employed under formal contracts. We find no significant effects on hourly wages, suggesting limited adjustment along the wage margin. Finally, total employment in the domestic services sector declined gradually following the reform, in contrast to the nationwide recovery in aggregate employment after 2014. This pattern is consistent with some substitution away from direct household hiring toward alternative arrangements.

Taken together, our results highlight the importance of both contribution schedules and administrative design in formalization reforms targeting low-wage, household-based labor markets. Policies that reduce monetary barriers to formality can substantially expand coverage, but their effectiveness depends critically on limiting administrative burdens and accounting for heterogeneous employer responses. Future research could extend this analysis in two key directions. First, linking domestic workers to their employing households through matched employer–employee data would allow a richer assessment of how household characteristics—such as income, education, or familiarity with labor regulations—mediate the response to changes in contribution rates and administrative requirements. Second, cross-sectoral or cross-country comparisons of similar formalization initiatives in low-wage, household-based labor markets could help identify the institutional features most effective at expanding coverage while preserving job quality.

References

Almeida, R., & Carneiro, P. (2012, July). Enforcement of labor regulation and informality. *American Economic Journal: Applied Economics*, *4*(3), 64–89. Retrieved from https://www.aeaweb.org/articles?id=10.1257/app.4.3.64 doi: 10.1257/app.4.3.64

Arkhangelsky, D., Athey, S., Hirshberg, D. A., Imbens, G. W., & Wager, S. (2021, December). Synthetic difference-in-differences. *American Economic Review*, *111*(12), 4088–4118. Retrieved from https://www.aeaweb.org/articles?id=10.1257/aer.20190159 doi: 10.1257/aer.20190159

Bergolo, M., & Cruces, G. (2021). The anatomy of behavioral responses to social assistance when informal employment is high. *Journal of Public Economics*, *193*, 104313. Retrieved from https://www.sciencedirect.com/science/article/pii/S0047272720301778 doi: https://doi.org/10.1016/j.jpubeco.2020.104313

Bernal, R., Eslava, M., Meléndez, M., & Pinzón, A. (2017). Switching from payroll taxes to corporate income taxes: Firms' employment and wages after the 2012 colombian tax reform. *Economia*, *18*(1), 41–74.

Betcherman, G., Daysal, N. M., & Pages, C. (2010). Do employment subsidies work? evidence from regionally targeted subsidies in turkey. *Labour Economics*, *17*(4), 710-722. Retrieved from https://EconPapers.repec.org/RePEc:eee:labeco:v:17:y:2010:i:4:p:710-722

Costa, J., Russo, F., Hirata, G., & de Holanda Barbosa, A. L. N. (2023). Effects of labor market regulation for underprivileged workers: Evidence from brazil [Article]. *Journal of Labor Research*, *44*(3-4), 261 – 293. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-85173520494&doi=10.1007%2fs12122-023-09348-3&partnerID=40&md5=bc8deac4f1b72b587f77ed4a4fc11dc6 doi: 10.1007/s12122-023-09348-3

Dinkelman, T., & Ranchhod, V. (2012). Evidence on the impact of minimum wage laws in an informal sector: Domestic workers in south africa. *Journal of Development Economics*, *99*(1), 27-45. Retrieved from https://www.sciencedirect.com/science/article/pii/S0304387811001210 doi: https://doi.org/10.1016/j.jdeveco.2011.12.006

Díaz Gorfinkiel, M., & Fernández López, C. (2016). Impacto de las reformas legislativas en el sector del empleo del hogar en españa. *Serie condiciones de trabajo y empleo OIT*, *82*.

Elias, F., Monràs, J., & Vázquez-Grenno, J. (2024). Understanding the effects of granting work permits to undocumented immigrants. *Journal of Labor Economics*.

Eurostat. (2019). *Eu labour force survey (eu-lfs).* https://ec.europa.eu/eurostat/web/lfs/database?node_code=lfsa. (Accessed: 2024-03-11)

Farré, L., González, L., & Ortega, F. (2011). Immigration, family responsibilities and the labor supply of skilled native women. *The BE Journal of Economic Analysis & Policy*, *11*(1).

Farvaque, N. (2013, January). *Developing personal and household services in the eu* (Report for the DG Employment, Social Affairs and Social Inclusion). Report for the DG Employment, Social Affairs and Social Inclusion.

Feld, B. (2024). Direct and spillover effects of enforcing labor standards. *Journal of Human*

Resources, *59*(5), 1503–1534. Retrieved from https://jhr.uwpress.org/content/59/5/1503 doi: 10.3368/jhr.0221-11490R2

Fernández, C., & Villar, L. (2017). The impact of lowering the payroll tax on informality in colombia. *Economía*, *18*(1), 125–155. Retrieved 2024-10-30, from https://www.jstor.org/stable/90017437

Floridi, A., Demena, B., & Wagner, N. (2020). Shedding light on the shadows of informality: A meta-analysis of formalization interventions targeted at informal firms. *Labour Economics*, *67*(101925).

Gavoille, N., & Zasova, A. (2023). What we pay in the shadows: Labor tax evasion, minimum wage hike and employment. *Journal of Public Economics*, *228*, 105027. Retrieved from https://www.sciencedirect.com/science/article/pii/S0047272723002098 doi: https://doi.org/10.1016/j.jpubeco.2023.105027

Heckman, J. J., & Pagés, C. (Eds.). (2004). *Law and employment: Lessons from latin america and the caribbean*. Chicago: University of Chicago Press.

International Labour Organization. (2011). *Domestic workers convention, 2011 (no. 189)*. Adopted at the 100th Session of the International Labour Conference, Geneva, 16 June 2011. Retrieved from https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C189 (ILO Convention No. 189)

International Labour Organization. (2021). *Making decent work a reality for domestic workers.* https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed$_protect$/@$protrav$/@$travail$/$documents$/

Jessen, J., & Kluve, J. (2021). The effectiveness of interventions to reduce informality in low-and middle-income countries. *World Development*, *138*(105256).

Krüger, K., & Jiménez, E. (2013). La ley de dependencia ¿un cambio en el régimen de bienestar español? familiarización versus profesionalización. *Revista electrónica de geografía y ciencias sociales*, *17*(463).

León, M. (2010). Migration and care work in spain: The domestic sector revisited. *Social Policy and Society*, *9*(3), 409–418.

Mondragón-Vélez, C., Pe, X., Wills, D., & Kugler, A. (2010). Labor market rigidities and informality in colombia [with comment]. *Economía*, *11*(1), 65–101. Retrieved 2024-10-30, from http://www.jstor.org/stable/25800055

Moreno-Colom, S., Recio Càceres, C., Torns Martín, T., & Borràs Català, V. (2017). Long-term care in spain: Difficulties in professionalizing services. *Journal of Women & Aging*, *29*(3).

Pajares, M. (2006). El proceso de regularización 2005. sus efectos posteriores sobre la inserción laboral de la población inmigrada. *Anuario de la Inmigración en España*, 212–225.

Pla-Julián, I. (2014). Addressing informality, gender and ethnicity in domestic labour: lessons from recent spanish legislation. *Transfer: European Review of Labour and Research*, *20.4*, 559-575.

Rocha, R., Ulyssea, G., & Rachter, L. (2018). Do lower taxes reduce informality? evidence from brazil. *Journal of Development Economics*, *134*, 28-49. Retrieved from https://www.sciencedirect.com/science/article/pii/S0304387818303560 doi: https://doi.org/10

.1016/j.jdeveco.2018.04.003

Royo, S. (2020). From boom to bust: The economic crisis in spain 2008–2013. In *Why banks fail: The political roots of banking crises in spain* (pp. 119–140). Palgrave Macmillan. doi: 10.1057/978-1-137-53228-2_4

Tomei, M., & Belser, P. (2011). New ilo standards on decent work for domestic workers: A summary of the issues and discussions. *International Labour Review*, *150*, 431-438.

Torm, N., & Oehme, M. (2024). Social protection and formalization in low- and middle-income countries: A scoping review of the literature. *World Development*, *181*, 106662. Retrieved from https://www.sciencedirect.com/science/article/pii/S0305750X24001323 doi: https://doi.org/10.1016/j.worlddev.2024.106662

Ulyssea, G. (2018, August). Firms, informality, and development: Theory and evidence from brazil. *American Economic Review*, *108*(8), 2015–47. Retrieved from https://www.aeaweb.org/articles?id=10.1257/aer.20141745 doi: 10.1257/aer.20141745

Ulyssea, G. (2020). Informality: Causes and consequences for development [Journal Article]. *Annual Review of Economics*, *12*(Volume 12, 2020), 525-546. Retrieved from https://www.annualreviews.org/content/journals/10.1146/annurev-economics-082119-121914 doi: https://doi.org/10.1146/annurev-economics-082119-121914

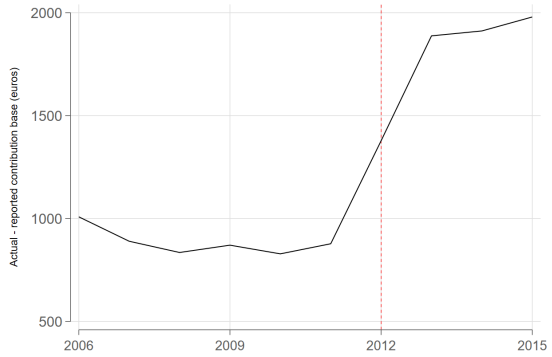
Online Appendix

Table A1: Comparison of Social Security Contribution Rates

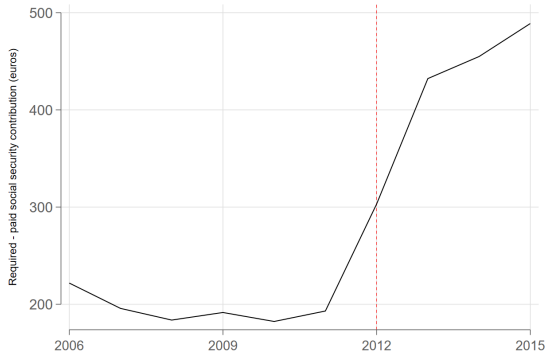
Year	Source	Employees		Domestic workers	
		Total	Employer-paid	Total	Employer-paid
2007	BOE-A-2007-1113	28.30	23.60	22.00	18.30
2008	BOE-A-2008-1466	28.30	23.60	22.00	18.30
2009	BOE-A-2009-1169	28.30	23.60	22.00	18.30
2010	BOE-A-2010-729	28.30	23.60	22.00	18.30
2011	BOE-A-2011-1009	28.30	23.60	22.00	18.30
2012	BOE-A-2012-1791	28.30	23.60	22.00	18.30
2013	BOE-A-2013-835	28.30	23.60	22.90	19.05
2014	BOE-A-2014-1051	28.30	23.60	23.80	19.85
2015	BOE-A-2015-847	28.30	23.60	24.70	20.60
2016	BOE-A-2016-886	28.30	23.60	25.60	21.35
2017	BOE-A-2017-1369	28.30	23.60	26.50	22.10
2018	BOE-A-2018-1142	28.30	23.60	27.40	22.85
2019	BOE-A-2019-1366	28.30	23.60	28.30	23.60
2020	BOE-A-2020-14965	28.30	23.60	28.30	23.60
2021	BOE-A-2021-20075	28.30	23.60	28.30	23.60

Note: This table contains the social security contribution rates for all employees in the general social security regime vs. workers in the domestic services sector. These are updated annually and published by the Spanish government in the Official State Gazette (see second column). The difference between the total and employer-paid social security contributions is paid for by the employee.

Figure A1: Estimated Base and Social Security Contributions from Household Expenditure Data



(a) Actual vs reported contribution base



(b) Paid vs payable social security contributions

Note: In the EPF microdata, each household reports their spending in domestic services and social security contributions for domestic workers. From the reported spending in domestic services, we obtain the actual contribution base following table A2. This allows us to compute the corresponding payable social security contributions, which we can then compare to the amount that the household reports having paid (Figure A1b). We can do a similar exercise starting from the reported social security contributions: we back out the corresponding contribution base, and compare it to the contribution base from the amount paid by the household (Figure A1a). Both figures provide suggestive evidence of the magnitude of undeclared employment.

Table A2: Social Security Contribution Bases and Rates

Year	Source	Income bracket	Contribution base	Contribution rate	Contributions
2007	BOE-A-2007-1113	All	7988.4	22.0	1757.4
2008	BOE-A-2008-1466	All	8398.8	22.0	1847.7
2009	BOE-A-2009-1169	All	8737.2	22.0	1922.2
2010	BOE-A-2010-729	All	8866.8	22.0	1950.7
2011	BOE-A-2011-1009	All	8978.4	22.0	1975.2
2012	BOE-A-2012-1791	0 to 898.0	1082.4	22.0	238.1
		898.1 to 1475.2	1186.7		261.1
		1475.3 to 2052.2	1763.8		388.0
		2052.3 to 2629.3	2340.8		515.0
		2629.4 to 3206.4	2917.9		641.9
		3206.5 to 3783.6	3495.1		768.9
		3783.7 to 4360.8	4072.3		895.9
		4360.9 to 4938.0	4649.5		1022.9
		4938.1 to 5515.2	5226.7		1149.9
		5515.3 to 6092.4	5803.9		1276.9
		6092.5 to 6669.6	6381.1		1403.8
		6669.7 to 7246.8	6958.3		1530.8
		7246.9 to 7824.0	7535.5		1657.8
		7824.1 to 8401.2	8112.7		1784.8
		From 8401.3	8978.4		1975.2
2013	BOE-A-2013-835	0 to 2064.6	1774.3	22.9	406.3
		2064.7 to 3225.6	2935.4		672.2
		3225.7 to 4387.2	4096.8		938.2
		4387.3 to 5548.8	5258.0		1204.1
		5548.9 to 6709.2	6419.4		1470.0
		6709.3 to 7870.8	7580.8		1736.0
		7870.9 to 9036.0	9036.0		2069.2
		From 9036.1	9487.8		2172.7
2014	BOE-A-2014-1051	0 to 2064.6	1774.3	23.8	422.3
		2064.7 to 3225.6	2935.4		698.6
		3225.7 to 4387.2	4096.8		975.0
		4387.3 to 5548.8	5258.0		1251.4
		5548.9 to 6709.2	6419.4		1527.8
		6709.3 to 7870.8	7580.8		1804.2
		7870.9 to 9036.0	9036.0		2150.6
		From 9036.1	9487.8		2258.1
2015	BOE-A-2015-847	From 0 to 2074.9	1783.2	24.7	440.5
		2075.0 to 3241.2	2950.1		728.7
		3241.3 to 4408.8	4117.2		1016.9
		4408.9 to 5576.4	5284.3		1305.2
		5576.5 to 6742.8	6451.6		1593.5
		6742.9 to 7900.8	7618.7		1881.8
		7900.9 to 9079.2	9079.2		2242.6
		From 9079.3	9535.2		2355.2

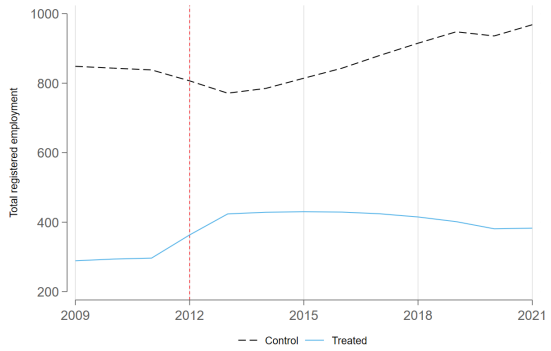
Note: This table reports the bases and rates used to calculate social security contributions in the domestic services sector. While monthly labor earnings are used, we report annual amounts (monthly values x 12) for convenience. Contribution bases and rates are updated annually and published by the Spanish government in the Official State Gazette (see second column for reference).

Table A3: Descriptive Statistics, Pre- and Post-Reform

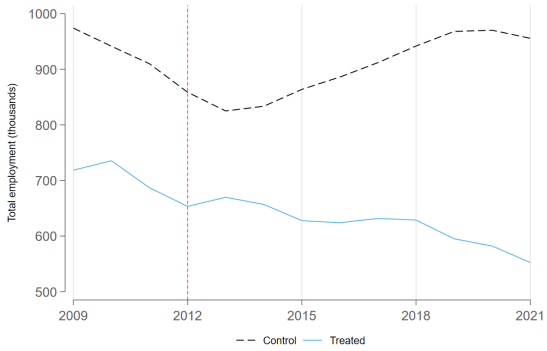
	Year		
	2011	2013	Test
N	10,092	14,043	
Gender			
Male	688 (6.8%)	775 (5.5%)	<0.001
Female	9,403 (93.2%)	13,264 (94.5%)	
Age	44.437 (11.718)	44.209 (10.952)	0.122
Country of birth			
Spain or other EU	4,685 (46.4%)	7,193 (51.2%)	<0.001
Outside of EU	5,407 (53.6%)	6,850 (48.8%)	
Cohabitants under age 18	0.461 (0.822)	0.473 (0.818)	0.268
Cohabitants over age 65	0.309 (0.558)	0.266 (0.545)	<0.001
Annual contribution base - main job	7,332 (2,501)	5,737 (3,349)	<0.001
Total annual contribution base	7,554 (2,454)	6,442 (3,406)	<0.001
Compulsory education or less			
No	2,642 (26.2%)	3,741 (26.6%)	0.424
Yes	7,450 (73.8%)	10,302 (73.4%)	
Has a college degree			
No	9,567 (94.8%)	13,266 (94.5%)	0.262
Yes	525 (5.2%)	777 (5.5%)	

Note: This table shows some characteristics for all individuals in the MCVL with a domestic services contract in 2011 vs. 2013, pre- and post-reform. Share of the total or standard errors in parentheses for categorical and numerical variables, respectively. We combine individuals from the 2017 and 2021 MCVL waves. Values for the annual contribution base are only indirectly reflective of their formal labor earnings. Family composition and education level are measured at the time of entering the sample, namely 2018 or 2023. The third column reports the p-values of a t-test comparing both sample means.

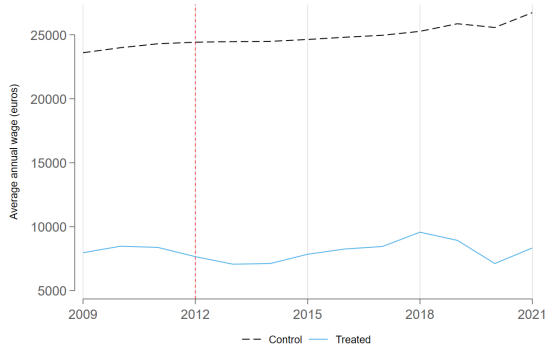
Figure A2: Sector-Level Synthetic Control Trends



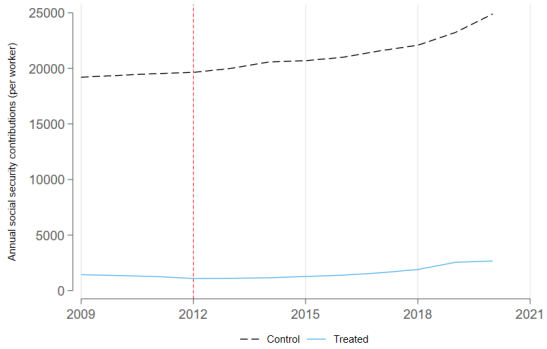
(a) Formal employment



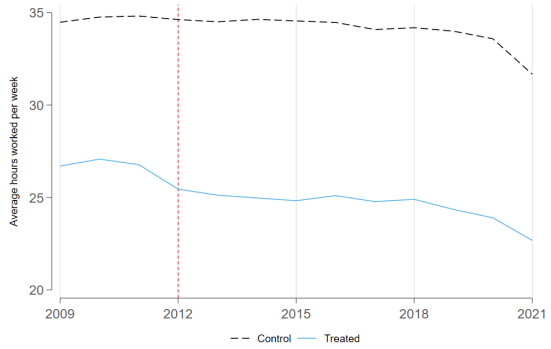
(b) Total employment



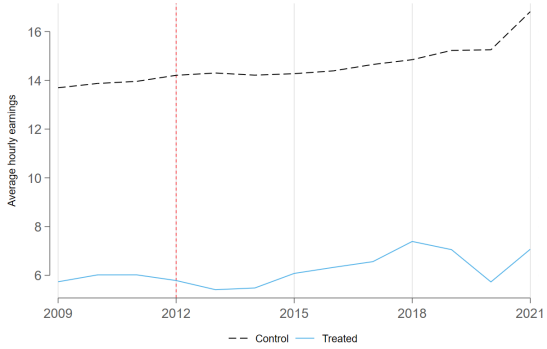
(c) Annual earnings



(d) Annual contributions



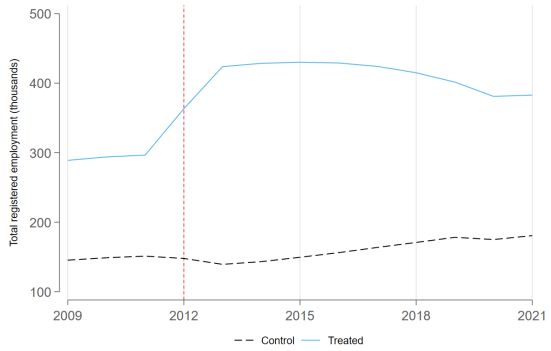
(e) Average weekly hours



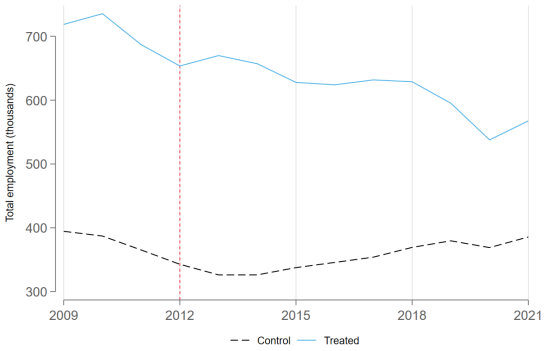
(f) Hourly earnings

Note: This figure shows the evolution of our main outcomes in the domestic services sector compared to our synthetic control (one-digit) sector. The weights for each sector and outcome to form the synthetic control are reported in Figure A4. The aggregate time series of registered employment by sector is available in the social security records. Figures for total employment and weekly hours worked come from the LFS. Average annual labor earnings for domestic workers are proxied by household spending in domestic services from the EFP, and we use the EACL for all other sectors. Annual contributions are obtained with the average annual contribution from the MCVL times the number of registered workers. Equivalently, hourly earnings are calculated from annual earnings and weekly hours worked.

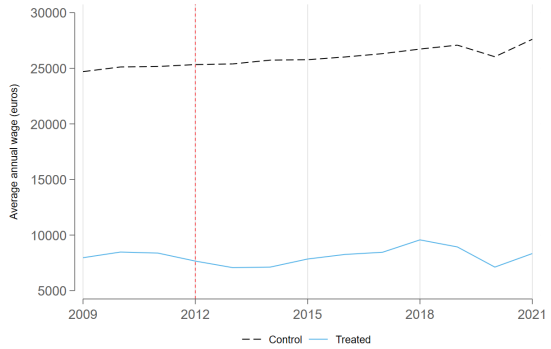
Figure A3: Industry-Level Synthetic Control Trends



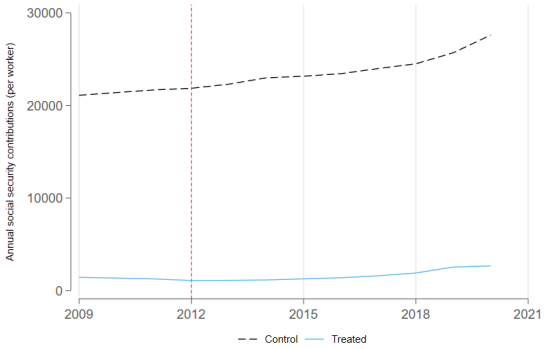
(a) Formal employment



(b) Total employment



(c) Annual earnings



(d) Annual contributions

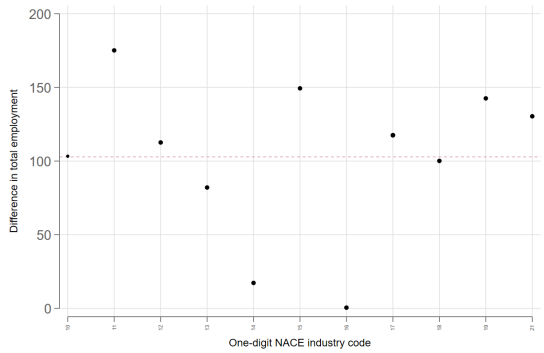
Note: This figure shows the evolution of our main outcomes in the domestic services sector compared to our synthetic control (two-digit) sector. The weights for each sector and outcome to form the synthetic control are reported in Figure A5. The aggregate time series of registered employment by sector is available in the social security records. Figures for total employment come from the LFS. Average annual labor earnings for domestic workers are proxied by household spending in domestic services from the EFP, and we use the EACL for all other sectors. Annual contributions are obtained with the average annual contribution from the MCVL times the number of registered workers.

Table A4: Sector-Specific Unit-Weights

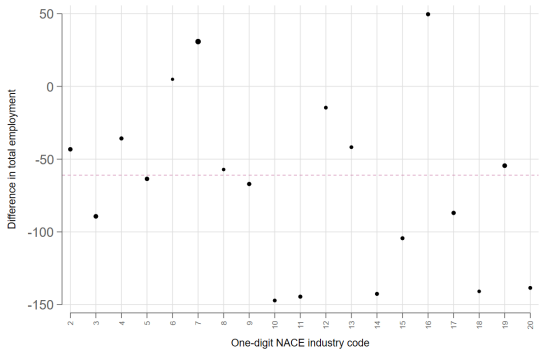
Sector	Wages	Contribution Bases	Average Contr. per Worker	Total Employment	Average Hours Worked	Formal Employment
Agriculture	.	0.064	0.058	0.057	0.033	0.052
Extractive industries	0.052	0.075	0.030	0.061	0.041	0.048
Manufacturing	0.054	0.000	0.052	0.052	0.055	0.047
Energy supply	0.008	0.075	0.061	0.061	0.097	0.049
Water supply	0.053	0.082	0.033	0.042	0.090	0.059
Construction	0.052	0.000	0.036	0.087	0.056	0.027
Wholesale trade	0.055	0.002	0.047	0.042	0.070	0.053
Transport	0.055	0.048	0.044	0.052	0.066	0.055
Accommodation	0.056	0.041	0.068	0.049	0.069	0.053
ICT	0.060	0.070	0.029	0.052	0.042	0.055
Finance	0.067	0.020	0.080	0.048	0.020	0.057
Real estate	0.063	0.070	0.052	0.045	0.009	0.057
R&D	0.058	0.075	0.026	0.052	0.051	0.056
Administrative	0.051	0.037	0.058	0.050	0.068	0.054
Public administration	0.066	0.044	0.123	0.052	0.052	0.051
Education	0.066	0.078	0.052	0.053	0.051	0.057
Social services	0.065	0.079	0.057	0.042	0.054	0.061
Arts and entertainment	0.058	0.068	0.056	0.056	0.033	0.055
Other services	0.061	0.072	0.038	0.047	0.043	0.054

Note: This table reports the weights assigned to each (one-digit) section for the synthetic difference-in-differences analysis. Each column corresponds to a dependent variable. Note that the National Statistics Institute does not report wages for the agriculture sector. Other services here refers to all industries typically included in this category except for domestic services.

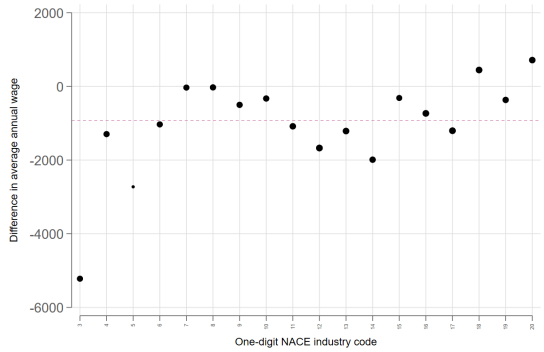
Figure A4: Sector-Level Unit-Specific Weights from Synthetic Difference-in-Differences.



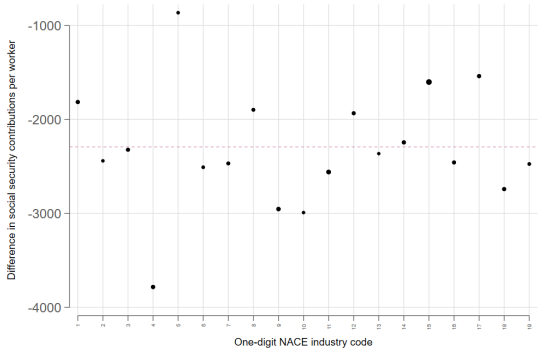
(a) Formal employment



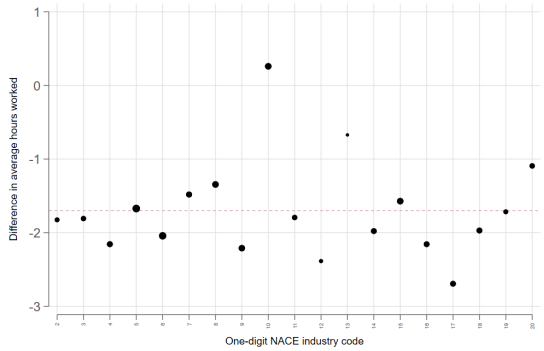
(b) Total employment



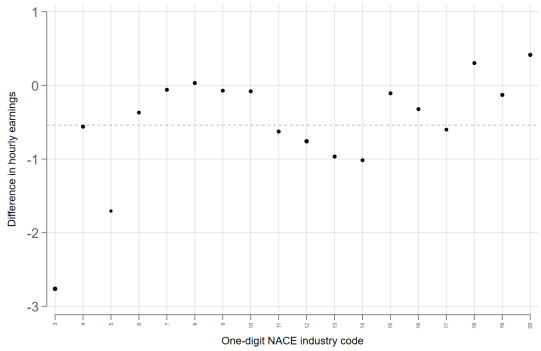
(c) Annual earnings



(d) Annual contributions



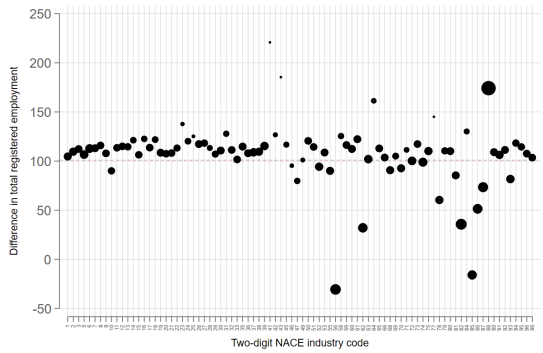
(e) Average weekly hours



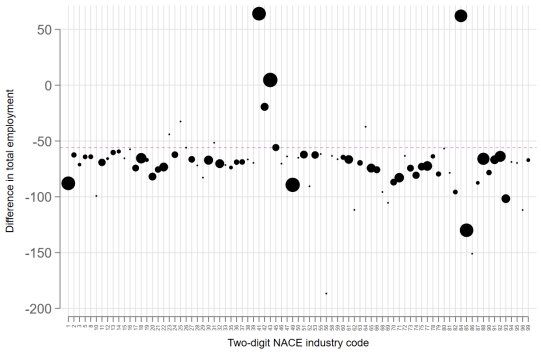
(f) Hourly earnings

Note: This figure reports the weights assigned to each (one-digit) sector to build the synthetic control for our main outcomes, as well as the estimated effect for each sector, that is, the adjusted outcome difference.

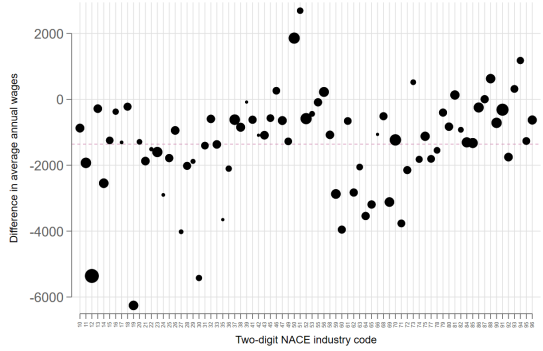
Figure A5: Industry-Level Unit-Specific Weights from Synthetic Difference-in-Differences.



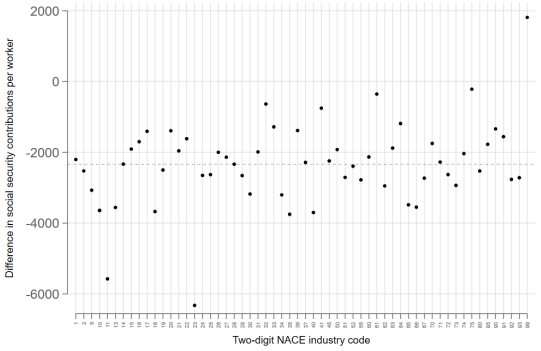
(a) Formal employment



(b) Total employment



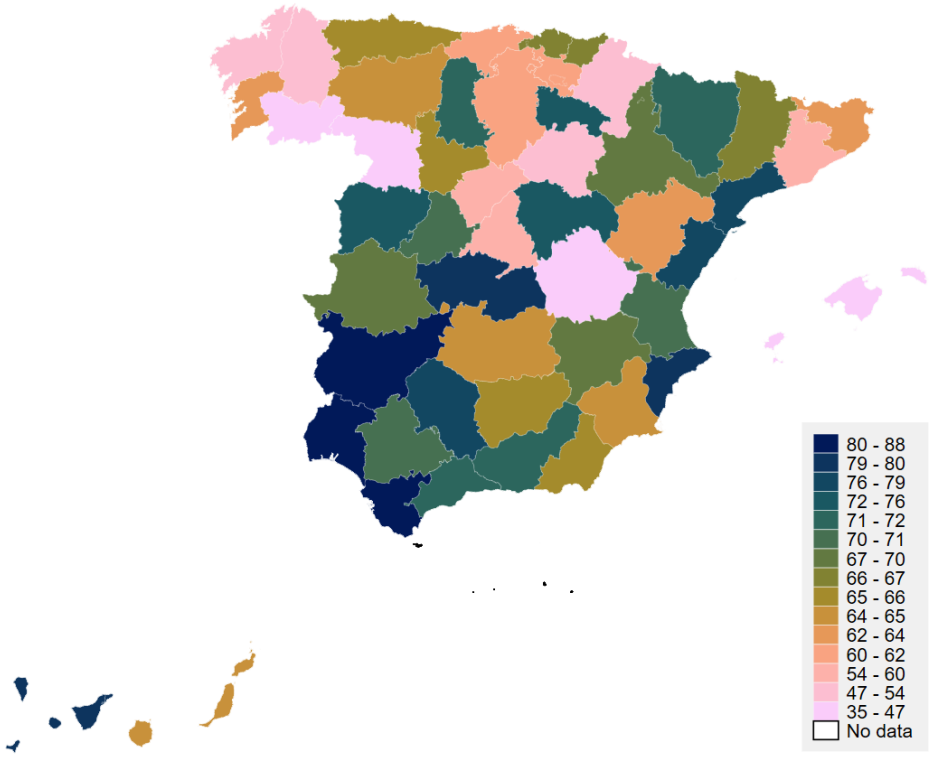
(c) Annual earnings



(d) Annual contributions

Note: This figure reports the weights assigned to each (two-digit) industry to build the synthetic control for our main outcomes, as well as the estimated effect for each industry, that is, the adjusted outcome difference.

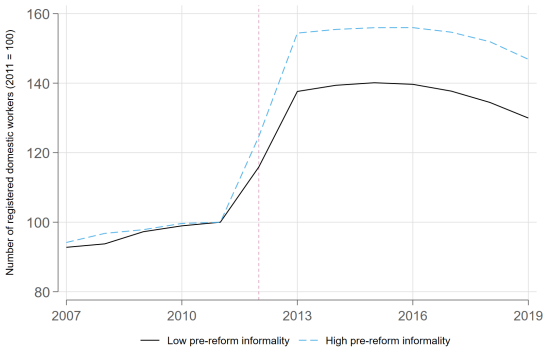
Figure A6: Pre-Reform Informality Rate, by Province



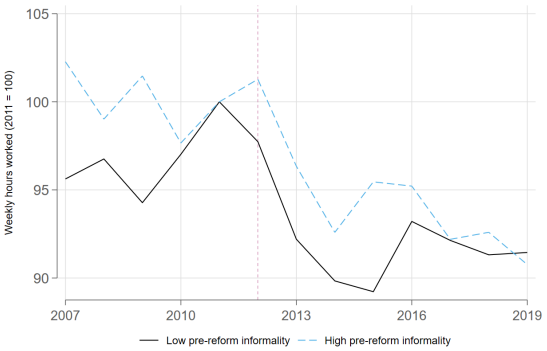
Note: This figure shows the variation in the pre-reform informality rate across all Spanish provinces. The informality rate is measured in 2011 and calculated as the difference between total employment in the domestic services sector from the EPA and registered employment from the social security records. Note that the coordinates of the Canary Islands have been modified for convenience.

Figure A7: Sector-Level Results: Variation in Pre-Reform Informality

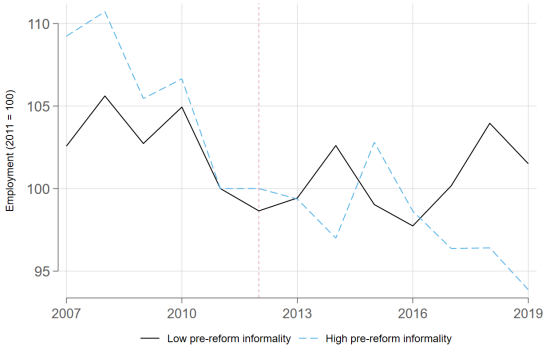
(a) Formal employment



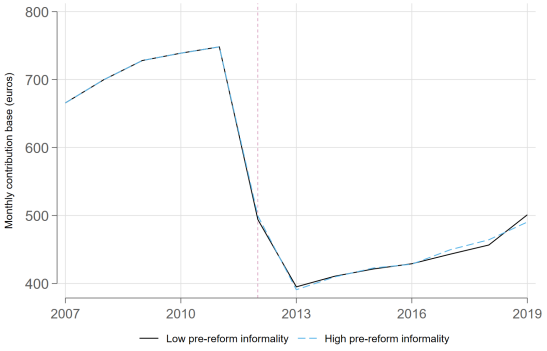
(b) Weekly hours worked



(c) Total employment



(d) Monthly contribution base



Note: This figure shows the evolution of our main outcomes in provinces with high (above-median) vs. low (below-median) informality rates prior to the reform. The time series of registered employment by province is available in the social security records. Figures for total employment and average hours worked come from the LFS. Monthly contribution bases by province are calculated from the MCVL. Note that the values are very similar pre-reform because there was a single contribution base. Since the policy introduced between 8 and 15 different contribution bases, the similarity post-reform is not purely due to institutional design.

Table A5: Sector-Level Results: Difference-in-Differences Estimates, Across Provinces

	Panel A: Employment outcomes							
	Formal employment				Total employment			
	Continuous treatment		Binary treatment		Continuous treatment		Binary treatment	
Treatment	0.00***	0.00***	0.08***	0.08***	-15.84***	-13.58***	-238.50*	-231.84*
	(0.00)	(0.00)	(0.01)	(0.01)	(3.72)	(3.82)	(98.50)	(98.38)
Dep. var. mean	8.19	8.19	8.19	8.19	6226.60	6226.60	6226.60	6226.60
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2600	2600	2600	2600	2600	2600	2600	2600
	Panel B: Hours worked and social security contribution base							
	Weekly hours worked				Monthly contribution base			
	Continuous treatment		Binary treatment		Continuous treatment		Binary treatment	
Treatment	-0.05**	-0.05**	-0.18	-0.13	-0.39**	-0.32*	0.56	1.70
	(0.02)	(0.02)	(0.32)	(0.32)	(0.14)	(0.14)	(2.70)	(2.61)
Dep. var. mean	29.39	29.39	29.39	29.39	548.78	548.78	548.78	548.78
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2600	2600	2600	2600	2600	2600	2600	2600

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. The table reports the treatment effect of the reform on selected outcomes, exploiting the variation in the pre-reform informality rate across provinces in a difference-in-differences framework. We report the estimates for a continuous vs. a binary (above the median pre-reform informality rate) treatment. The selection of outcomes is driven by data availability: there is no data for the EPF at the province level. The controls included are the same as for the synthetic difference-in-differences (see Tables 3, 4, 5). Time and province fixed effects are included in all models.

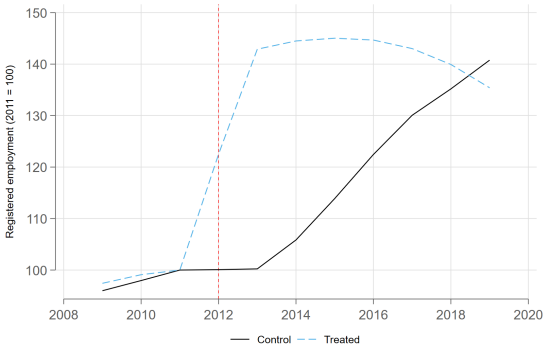
Table A6: Sector-Level Results: Difference-in-Differences Estimates

	Panel A: Employment outcomes					
	Formal employment		Total employment		Weekly hours worked	
Treatment	-57.36	308.99***	-199.01***	-150.69***	0.63*	0.32
	(33.79)	(82.89)	(38.33)	(26.25)	(0.27)	(0.24)
dep. var. mean	736.83	736.83	1078.33	1078.33	30.98	30.98
Controls	No	Yes	No	Yes	No	Yes
Observations	88	88	96	96	96	96
	Panel B: Earnings and social security contribution base					
	Contribution base		Annual labor earnings		Hourly earnings	
Treatment	-593.69*	-2275.76	25.28	-163.49	-0.07	-0.12
	(226.75)	(1757.79)	(228.51)	(183.31)	(0.17)	(0.70)
Dep. var. mean	1898.04	1898.04	11140.30	11140.30	6.81	6.81
Controls	No	Yes	No	Yes	No	Yes
Observations	30	30	24	24	24	24

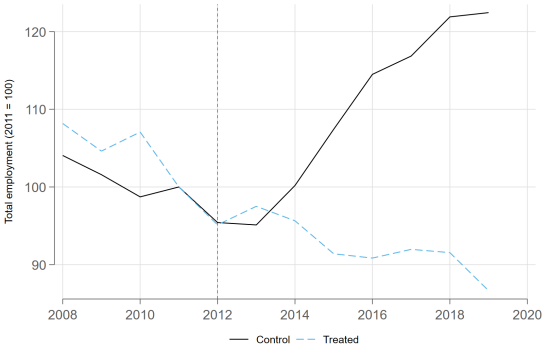
Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. The table reports the treatment effect of the reform on our main outcomes, using a difference-in-differences approach with the (one-digit) hospitality sector as control group. Outcomes are measured the same way and the controls included are the same as for the synthetic difference-in-differences approach (see Tables 3, 4, 5). Time fixed effects are included in all models.

Figure A8: Sector-Level Results: Comparison with Hospitality

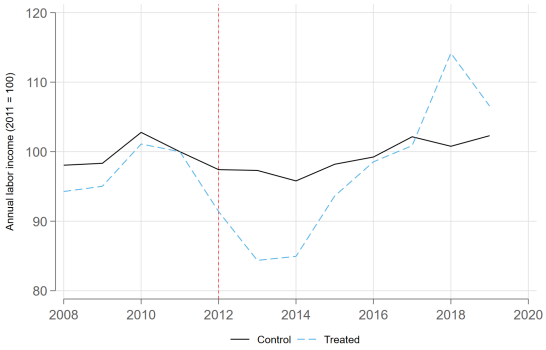
(a) Formal employment



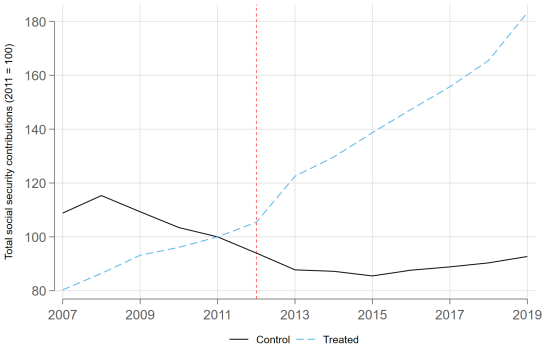
(b) Total employment



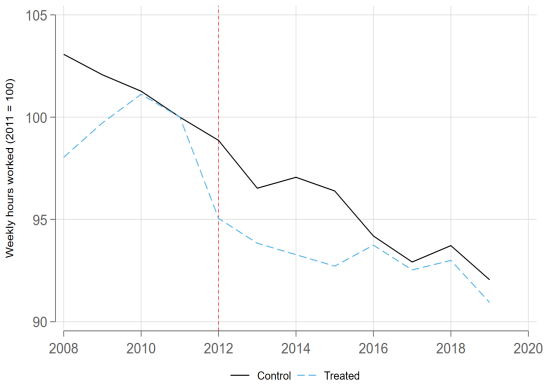
(c) Annual earnings



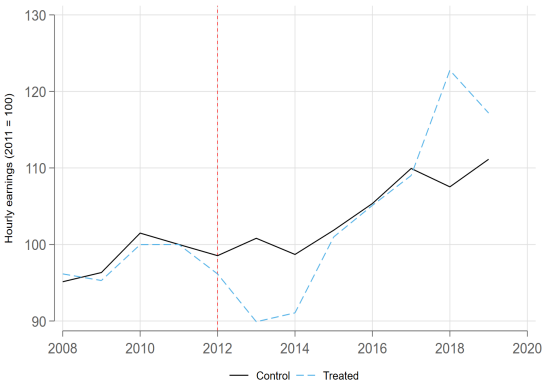
(d) Annual contributions



(e) Average weekly hours

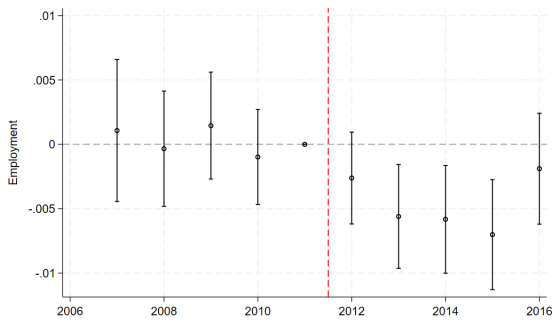


(f) Hourly earnings

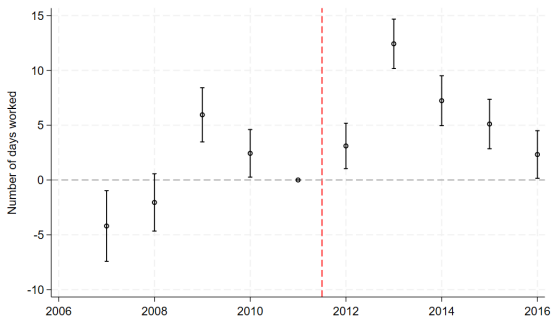


Note: This figure shows the evolution of our main outcomes in the domestic services sector compared to food and accommodation services (hospitality). The aggregate time series of registered employment by sector is available in the social security records. Figures for total employment and weekly hours worked come from the LFS. Average annual labor earnings for domestic workers are proxied by household spending in domestic services from the EPF, and we use the EACL for hospitality. Annual contributions are obtained with the average annual contribution from the MCVL times the number of registered workers. Equivalently, hourly earnings are calculated from annual earnings and weekly hours worked.

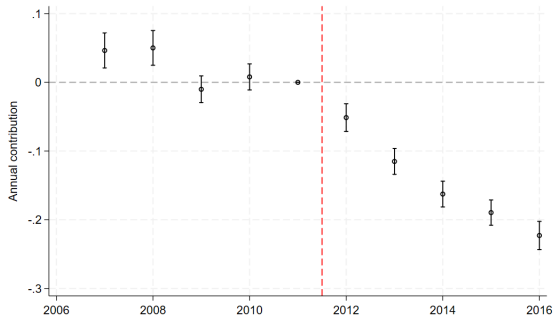
Figure A9: Difference-in-Differences Estimates for Incumbents (No Matching)



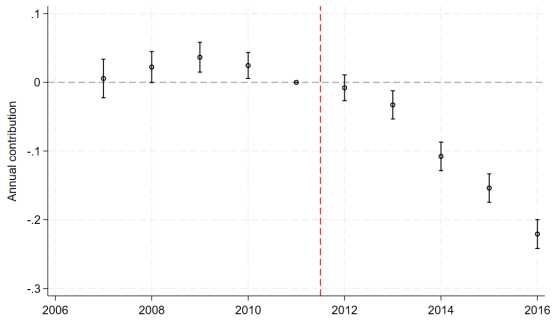
(a) Employment



(b) Days worked in a year



(c) Log annual contribution base



(d) Log annual contribution base - main job

Note: The graphs report estimates of the dynamic treatment effects of the reform on our main outcomes for incumbent workers, using a difference-in-differences methodology. Here, all individuals employed exclusively in retail, hospitality, and other cleaning and care services, but never in the treated sector prior to the reform, are in the control group without matching. Controls include gender, country of birth, education level, age and lagged contract type, and sector - year fixed effects.

Table A7: Difference-in-Differences Estimates for Incumbents (Alternative Definitions)

Panel A: Employment (pp)				
	Lower bound (1 spell)	Main sample (3 spells)	Upper bound (5 spells)	Alternative definition (3 years w/ spells)
Treatment	0.07	0.17*	0.07	0.13
	(0.08)	(0.07)	(0.06)	(0.07)
Dep. var. mean	93.64	96.28	98.07	96.69
Sector - Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	320589	244647	212201	238664
R-squared	0.043	0.045	0.051	0.047
Panel B: Contract duration (days/year)				
	Lower bound (1 spell)	Main sample (3 spells)	Upper bound (5 spells)	Alternative definition (3 years w/ spells)
Treatment	18.65***	19.75***	10.79***	18.61***
	(1.16)	(1.43)	(1.43)	(1.44)
Dep. var. mean	304.82	327.47	341.95	330.69
Sector - Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	320589	244647	212201	238664
R-squared	0.188	0.169	0.150	0.163
Panel C: Multiple job-holding (number of employers)				
	Lower bound (1 spell)	Main sample (3 spells)	Upper bound (5 spells)	Alternative definition (3 years w/ spells)
Treatment	-0.33***	-0.25***	-0.15***	-0.21***
	(0.01)	(0.02)	(0.01)	(0.01)
Dep. var. mean	1.33	1.22	1.16	1.20
Sector - Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	318841	243571	211341	237630
R-squared	0.114	0.105	0.109	0.111
Panel D: Log annual contribution base				
	Lower bound (1 spell)	Main sample (3 spells)	Upper bound (5 spells)	Alternative definition (3 years w/ spells)
Treatment	-0.08***	-0.12***	-0.15***	-0.13***
	(0.01)	(0.01)	(0.01)	(0.01)
Dep. var. mean	8.94	8.92	8.95	8.92
Sector - Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	141422	90603	72171	86843
R-squared	0.409	0.439	0.453	0.446

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. The table reports the treatment effect estimates for incumbent workers under four alternative definitions, using a difference-in-differences methodology with a matched control group. The lower bound definition considers a domestic worker to be anyone with at least one domestic services contract between 2007 and 2011. The upper bound definition requires at least 5 domestic services contracts between 2007 and 2011. This is the 75th percentile of the total spell distribution (see Figure 2). The alternative definition, instead of requiring 3 contracts in this period, requires at least one contract in at least 3 years between 2007 and 2011. Controls include gender, age, country of birth, and education level. Year fixed-effects are included in all models.

Table A8: Difference-in-Differences Estimates for Incumbents (No Matching)

	Panel A: Employment outcomes					
	Employed at least one day (%)			Number of days worked		
Treatment	0.00	-0.00**	-0.00**	9.27***	7.39***	5.42***
	(0.00)	(0.00)	(0.00)	(0.71)	(0.82)	(0.72)
Dep. var. mean	0.525	0.525	0.525	155.75	155.75	155.75
Sector-Year FE	No	Yes	Yes	No	Yes	Yes
Controls	No	No	Yes	No	No	Yes
Observations	1754662	1754662	1596101	1754662	1754662	1596101
R-squared	0.002	0.023	0.105	0.002	0.139	0.340
	Panel B: Social security contribution base					
	Log annual contribution base			Log daily contribution base		
Treatment	-0.12***	-0.12***	-0.13***	-0.19***	-0.18***	-0.16***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Dep. var. mean	8.694	8.694	8.694	3.247	3.247	3.247
Sector-Year FE	No	Yes	Yes	No	Yes	Yes
Controls	No	No	Yes	No	No	Yes
Observations	1698971	1698971	1543375	1684141	1684141	1529350
R-squared	0.045	0.174	0.299	0.064	0.151	0.306

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors in parentheses. The table reports the treatment effect estimates for incumbent workers, using a difference-in-differences methodology. Here, all individuals employed exclusively in retail, hospitality, and other cleaning and care services, but never in the treated sector prior to the reform, are in the control group, without matching. Controls include gender, country of birth, education level, age and lagged contract type. In the regression for log daily contributions, log annual contributions is the dependent variable and the number of days worked in each given year is included as a control. Year fixed-effects are included in all models.