

DUAL LABOR MARKETS IN SPAIN:
A FIRM-SIDE PERSPECTIVE

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Abstract

Using comprehensive balance-sheet data for Spain, we document the use of fixed-term and open-ended contracts by firms over the period 2004-2019. We show that the use of temporary contracts is very heterogeneous across firms, with the distribution of the temporary share being severely right-skewed: the median share of temporary employment is only 3%, while the average is 18%. Part of this variation is related to the sector and region where firms operate as well as to the macroeconomic cycle. However, around 80% of the variation reflects differences across firms operating in the same industry, in the same location and at the same point of the business cycle. At the individual level, even after controlling for sector and region, we observe that larger and younger firms make more extensive use of temporary contracts.

Keywords: dual labor markets, temporary contracts, unemployment.

JEL classification: D83, E24, J41, L11.

Resumen

Usando microdatos contables, en este trabajo documentamos el uso de los contratos temporales e indefinidos por las empresas españolas entre 2004 y 2019. Mostramos que el uso de contratos temporales es muy heterogéneo entre distintas empresas y que la distribución de la tasa de temporalidad está muy sesgada hacia la derecha: la ratio de temporalidad mediana es de tan solo el 3 %, mientras que la tasa media es del 18 %. Parte de esta variación está asociada con el sector y la región en los que opera la empresa, así como con el ciclo macroeconómico. Sin embargo, aproximadamente el 80 % de la variación viene explicada por diferencias entre empresas pertenecientes al mismo sector, la misma región y el mismo punto del ciclo. Individualmente, incluso tras controlar por el sector y la región, observamos que las empresas más grandes y las más jóvenes son las que hacen un mayor uso de los contratos temporales.

Palabras clave: mercado de trabajo dual, contratos temporales, desempleo.

Códigos JEL: D83, E24, J41, L11.

1 Introduction

Many European labor markets are characterized by a two-tier structure, with the co-existence of fixed term (FT) contracts, of short duration, and open-ended (OE) contracts with large separation costs. As of 2019, for instance, the share of FT contracts across workers was 26.3% in Spain, 21.8% in Poland, 20.7% in Portugal, and 20.3% in the Netherlands.¹

The effects of a dual labor market structure have been widely studied from the worker side. FT contracts are more frequent among females, among younger workers, and among lower skilled workers (Felgueroso, García-Pérez, Jansen and Troncoso-Ponce (2018) and Bentolila, Dolado and Jimeno (2020)). In addition, jobs held with FT contracts are associated with higher job instability, shorter tenure at the firm, more frequent unemployment spells, and higher uncertainty in earnings (Lagrosa (2022)). This may in turn lead to lower human capital accumulation and lower wage growth (Cabrales, Dolado and Mora (2017), García-Pérez, Marinescu and Vall (2019), Bratti, Conti and Sulis (2021), and Garcia-Louzao, Hospido and Ruggieri (2022)). Yet, little is known about what determines the choices of FT versus OE contracts by firms, and about how the use of different types of contracts may be heterogeneous across different types of firms.

In this paper, we present new evidence on the use and sources of variation of FT and OE contracts in Spain for the period 2004-2019. Unlike previous literature, we offer a firm-side perspective. To do so, we rely on firm-level balance-sheet data on the quasi-universe of Spanish firms. We characterize empirically both the aggregate and the firm-level determinants of the *temporary share*, namely the share of employees within the firm that are employed with an FT contract.² Using these data, we explore the sources of variation in the distribution of the temporary share in the Spanish economy in order to identify those sectors, regions and firm types that rely more on the use of temporary employment.

We start by showing that the use of FT contracts is very heterogeneous across firms, and the distribution of the temporary share is very right-skewed. The mean of the temporary share across all firms and years is 18.3%. However, 45% of firms have no FT contract, the median is only 2.7%, and the 75th and 90th percentiles are 29.4% and 59.1%, respectively.

Next, we explore the aggregate sources of variation in the distribution of temporary workers across firms and document a large time, sectoral, and regional variation. First, we find that the temporary share is pro-cyclical, exhibiting a large and negative correlation with the aggregate unemployment rate. On average across firms, the temporary share experiences a large decline (from 24% to 16% on average) during the Great Recession, and a mild increase in the aftermath of the crisis. Second, we find large differences between sectors, with some industries (such as real estate) having rates as low as 8% on average, and

¹These numbers are taken from OECD data, available at stats.oecd.org.

²Particularly, we extend the empirical analysis in Pijoan-Mas and Roldan-Blanco (2022), who additionally provide a theory of why larger firms tend to employ a higher share of workers under FT contracts, and the consequences for aggregate productivity, unemployment, and labor market policy.

some other industries (such as construction) with rates as high as 30% or more, on average. Finally, there are large regional differences in the share of temporary workers, with firms in Southern regions (such as Huelva, Almería or Cádiz) showing average temporary rates between 32% to 39%, and firms in some other regions (such as Barcelona, Madrid or La Rioja) displaying much lower temporary rates, in the range of 12-14%. We show that these temporal, sectoral, and regional average differences exist both unconditionally, as well as on average once we control for various other sources of variation. Yet, in combination, the time-sector-region variation explains no more than 15% of the total variation in the temporary share across firms, with the remaining variation being due to firm-specific factors.

Next, we proceed to analyze how firms with different observable characteristics differ in their use of temporary versus permanent employment. Across different firm characteristics, we find that both younger and larger firms rely substantially more on temporary contracts, and that firms that are on average more productive exhibit slightly lower temporary rates, although the magnitude of this latter relationship is small. Instead, there is no statistically significant relationship between the temporary share and the degree of financial constraints (as measured by the firm's indebtedness). All of these findings are robust observations in our data, holding true after controlling for industry, time and regional fixed effects, i.e. when making same-year comparisons between firms that belong to the same industry and operate in the same region.

Finally, when focusing on within-firm variation (controlling for firm fixed effects), we find that both the positive correlation between firm size and the temporary share, and the negative correlation between firm age and the temporary share, become stronger and remain statistically significant. This suggests that firms use FT contracts to grow in size along their life-cycle, and that as they age they rely less on the use of temporary contracts. To our knowledge, no prior evidence exists for other countries of these types of relationships between the temporary share and firm characteristics. These facts are therefore a contribution of this study.

2 Data

Our data cover the period 2004-2019, and come from an unbalanced panel of administrative and confidential firm-level information from the Spanish Commercial Registry (*Registro Mercantil Central*), which is collected and processed by the *Central de Balances*, a department within the Banco de España. The dataset is exhaustive in its coverage, including the quasi-universe of firms from all non-financial sectors of the economy, and is comprehensive in its information, as it includes the complete list of balance sheet items of companies.³ Overall, the data is highly representative of the market economy (see Almunia,

³In the data, the unit of observation, which we generically call “firm” in the rest of the paper, is an incorporated business (in Spanish, *sociedad*). For large corporations with multiple incorporated businesses (subsidiaries), we observe each subsidiary separately. Moreover, the data do not include self-employed individuals.

López-Rodríguez and Moral-Benito (2018)). After our cleaning filters, the final dataset has 7,153,669 firm-year observations, with 447,104 firms per year on average, and 705,879 unique firms over the whole sample. Sector information of the firm is at the 4-digit NACE Rev. 2 level. In our cleaning process, we omit the public sector in order to keep our focus on the market economy. The agricultural sector is also omitted, due to missing information or lack of representativeness in the dataset.

Among other things, the dataset provides various measures of firm size, such as total number of employees, total sales, total assets (both tangible and intangible capital), as well as firm age and other measures of cost (such as intermediate inputs, materials, and other operating expenses).⁴ It also provides information on the wage bill of a firm (from which one can obtain the wage rate paid by the firm within a year, on average across workers) and the location (up to the ZIP code level) of the headquarters of the firm. Importantly for our purposes, the *Central de Balances* data also reports the total number of workers employed on OE and FT contracts. Using this information, we can define the temporary share of firm f at time t as follows:

$$TempSh_{ft} = \frac{n_{FT,ft}}{n_{FT,ft} + n_{OE,ft}}$$

where $n_{i,ft}$ denotes the number of workers with a contract of type $i = FT, OE$.

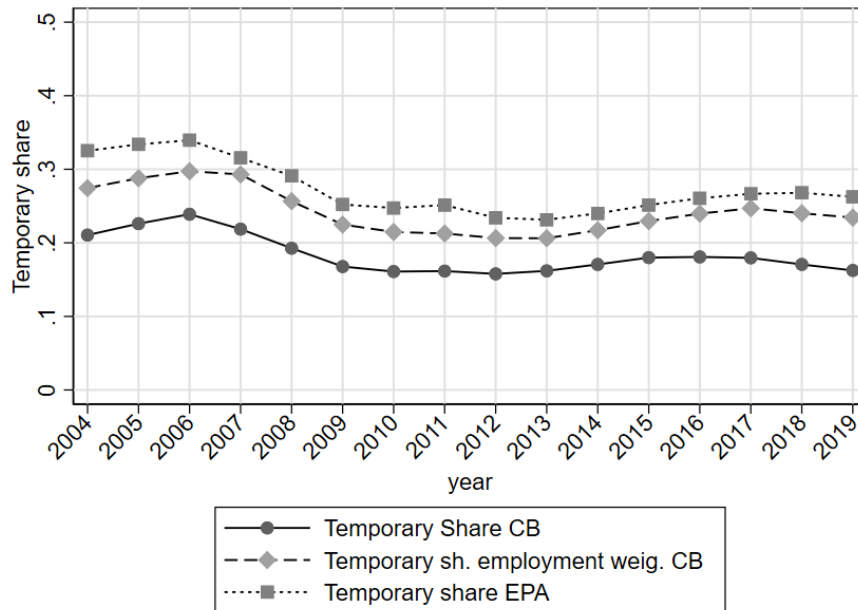
2.1 Comparison to the Labor Force Survey

Our use of firm-level data to study the share of FT contracts is novel. Studies of temporary employment have typically used data from labor force surveys, social security registers, and other worker-level data. It then becomes relevant to understand how well our firm-level data can capture the temporary share at the macro level coming from aggregate level data. For this, we compare both the level and the evolution of the average temporary share relative to the *Encuesta de Población Activa* (EPA), the Spanish Labor Force Survey. Figure 1 plots the average temporary share across firms in our data, the average temporary share across workers in the EPA, as well as an employment-weighted average temporary share coming also from our data. By weighting firm-level observations by employment, this latter measure reflects the average temporary share across workers instead of firms, and is therefore more comparable to the aggregate time series from EPA.

The figure shows a small level difference between the temporary share obtained from the two datasets, with a smaller gap relative to the employment-weighted series. The mean temporary employment share is 27.3% in EPA, and the employment-weighted average share in *Central de Balances* is 24.3%. However, these gaps stay constant in time: all in all, our firm-level data tracks well the evolution of the temporary share from the labor force survey.

⁴In the data, firm-level employment is a within-year average of full-time equivalent employees.

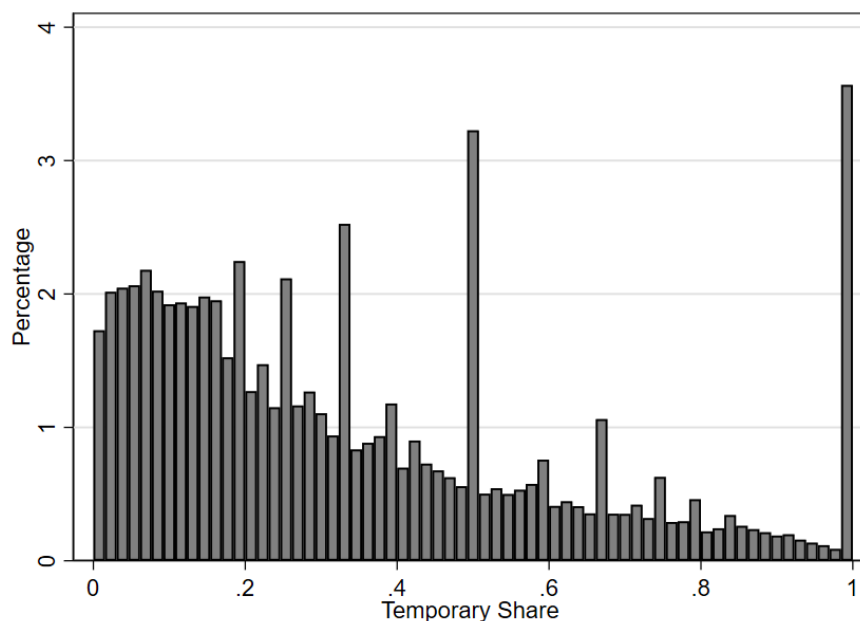
Figure 1: Evolution of the Temporary Share (2004-2019)



2.2 The distribution of the temporary share across firms

In the remainder of this document, we will uncover a large degree of heterogeneity in the share of temporary employment among Spanish firms. As a first pass to unveil these differences, Figure 2 displays the distribution of the temporary share across firm-year observations. To improve readability, we drop observations with a temporary share of zero, which represents about 45% of the sample (see Table 2). The main takeaway from this histogram is that there is a large amount of heterogeneity in the usage of FT contracts

Figure 2: Temporary share distribution



across firms and years and that the distribution is very rightly-skewed: in the sub-sample of observations with a positive share, the average rate of temporary employment is 34.9%, and the median of the distribution is 27.4%. For the whole sample (including those observations with zero temporary employment), the median and average rates are 2.7% and 18.5%, respectively. In other words, the vast majority of firms have a very small share of their overall worker base employed under a FT contract, and a small share of firms have high temporary shares.⁵

3 Aggregate effects

In this section, we investigate how the share of temporary workers across firms varies with some aggregate variables: time, industry, and province. Our main framework of analysis is the use of multivariate regressions of the firm-level temporary share against the aggregate determinants. In particular, let α_t , α_i , α_p and α_f be year, 2-digit industry,

Table 1: Temporary share regressions

	(1)	(2)	(3)	(4)	(5)	(6)
Year FE	Yes	No	No	Yes	No	No
Industry FE	No	Yes	No	Yes	No	No
Province FE	No	No	Yes	Yes	No	No
Year \times Industry \times Province FE	No	No	No	No	Yes	No
Firm FE	No	No	No	No	No	Yes
R ²	0.008	0.079	0.052	0.131	0.152	0.602

Notes: Each column corresponds to an OLS regression of the share of temporary workers against several controls.

province, and firm fixed effects. Then, we regress:⁶

$$TempSh_{ft} = \alpha_t + \alpha_i + \alpha_p + \alpha_f + \varepsilon_{ft} \quad (1)$$

The result of running this regression without firm fixed effects (α_f) is that time variation, industry variation, and province variation explain, respectively, 1%, 8%, and 5% of the overall variation in the temporary share when added one by one, and 13% when added together (see columns (1)-(4) in Table 1). If we interact the three fixed effects together to allow for three-way time-sector-province variation, the R^2 of the regression increases

⁵We notice an accumulation of mass at temporary shares of 1, 1/2, 1/3, 2/3, and so on. By and large, this reflects the discrete nature of the employment variable, with these bins being mostly populated by small firms, which are very abundant in our sample. If we plot the distribution of temporary share with employment weights, these peaks are smoothed out.

⁶We index each data point by ft instead of $ipft$ because there is no variation in industry i and hardly any variation in province p at the firm level, as the headquarters location of firms hardly ever change over time.

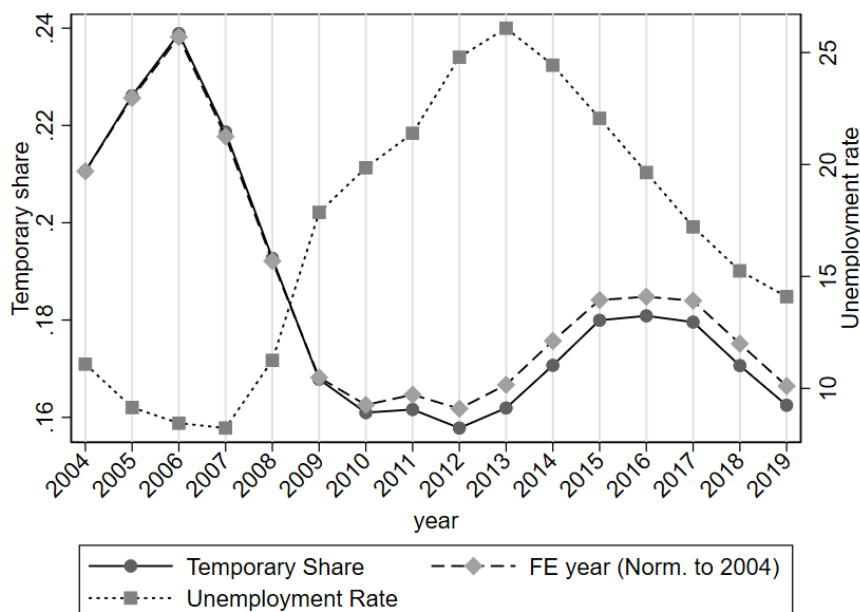
to 15% (see column (5) in Table 1).⁷ These results show that industry variation is the most important source of variation among the three, that there is a non-negligible role for spatial variation, and that variation due to aggregate macroeconomic factors, such as the business cycle, is small compared to the cross-sectional heterogeneity. Yet, we altogether find that most of the variation (85%) is not accounted for by aggregate factors, implying that firm-level determinants within the same year, sector, and province have a large role to play. Within this, a big share of overall variation is captured when we add firm fixed-effects (see column (6) in Table 1), with the R^2 increasing up to 60.2%. Namely, unobserved time-invariant within-firm characteristics explain a very large share of the variation in the temporary share.

In what follows, we delve deeper into each of the aggregate elements in turn, and leave the within-firm variation for the next section.

3.1 Time variation

Figure 3 reports the time series of the temporary share. We plot both the cross-sectional average of the temporary share in each year as well as the partial effect α_t which we recover after estimating regression (1) without the use of firm fixed effects. The time variation is significant and extremely similar in both cases: the average share of FT contracts across all firms ranges from 24% in 2006, which marked the peak of the expansion before the Great Recession, to 16% between 2010 and 2013, the last years before the outset of the economic recovery. Indeed, the Figure also shows a clear negative correlation between the FT share and the unemployment rate until 2015, which signals a pro-cyclical behavior of the FT share. Instead, after 2015 both the unemployment rate and the FT share decline together.

Figure 3: Temporary Share and the Unemployment Rate (2004-2019)



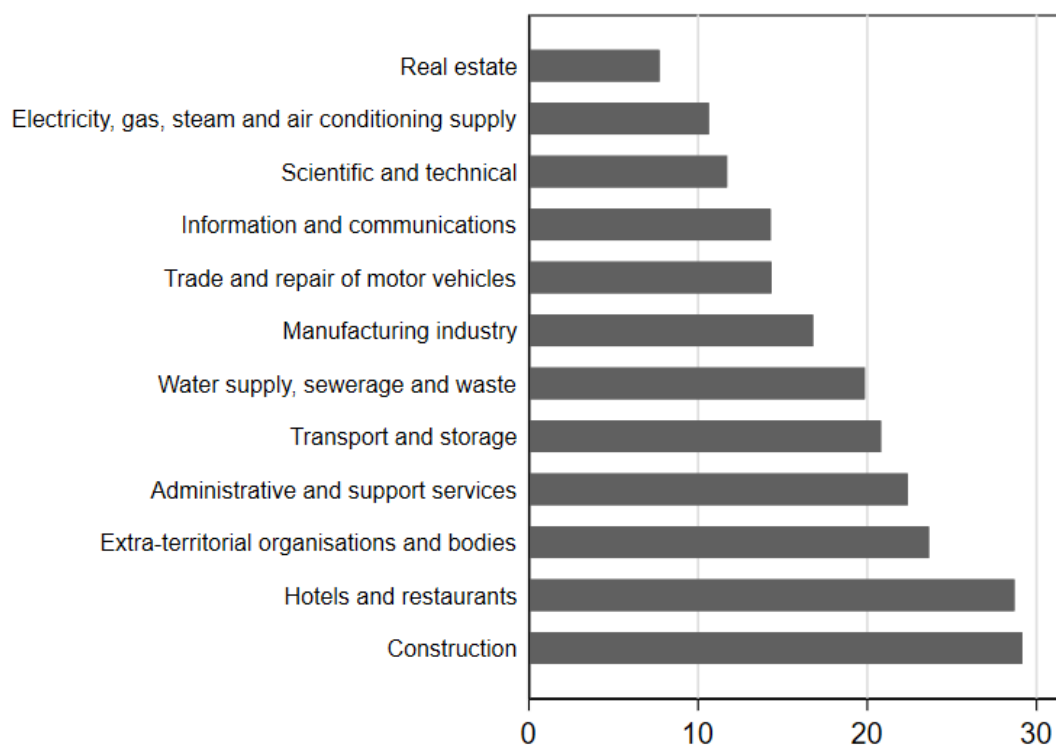
⁷We have also run the same regression but with 4-digit industry, instead of 2-digit sector indicator, and we have found that 4-digit sector explain 11.3% of the overall variation in temporary share, while the regression with the three-way time-4 digit sector-province variation delivers an R^2 of 20.8%.

The negative correlation between the unemployment rate and the FT share may arise due to the fact that most hiring and firing in Spain is done through temporary contracts. Using the Spanish labor force survey, Pijoan-Mas and Roldan-Blanco (2022) report that the unemployment-to-employment quarterly flow is 1.5% for OE contracts and 19.5% for FT contracts. That is, out of 100 unemployed workers, 1.5 find an OE job in the next quarter, 19.5 of them find an FT job in the next quarter, and the rest remain unemployed. The employment-to-unemployment quarterly flows are 1.5% for OE contracts and 13% for FT contracts. Thus, we may expect the temporary share of workers to increase in expansions (when hiring is large) and decline in recessions (when firing is large).

3.2 Sectoral variation

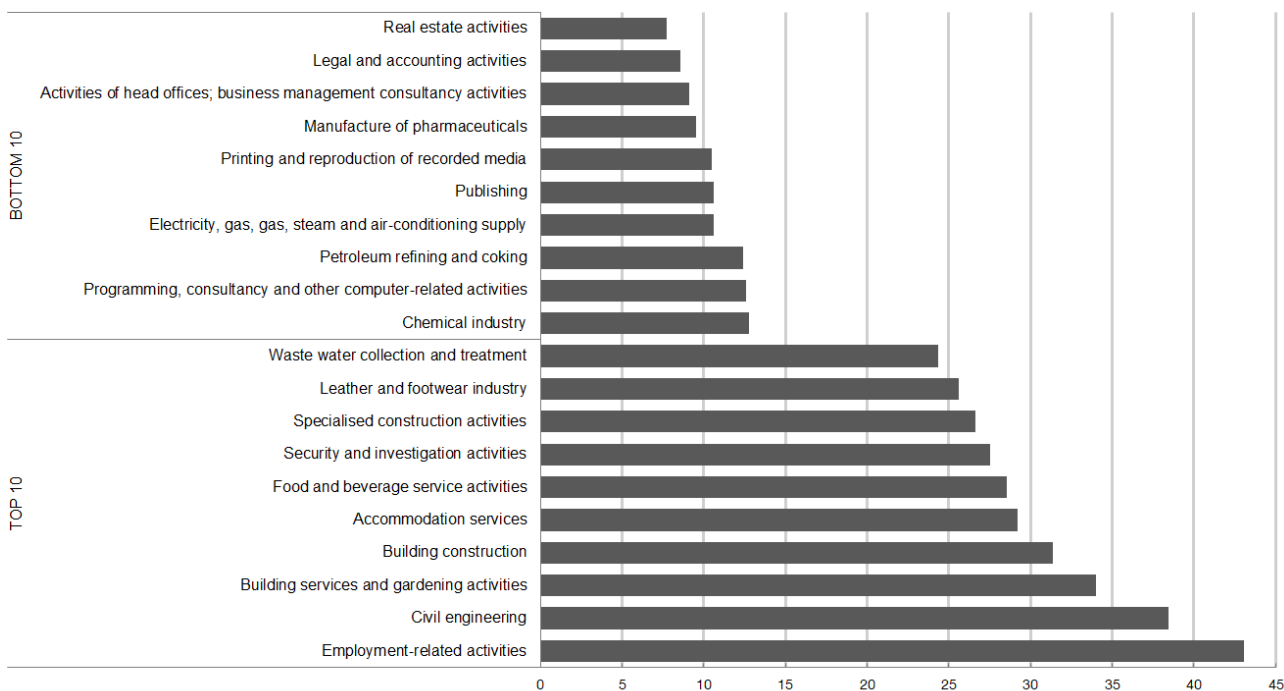
The incidence of temporary contracts also varies substantially by sectors (see Figure 4). Looking at 1-digit sector classification, the temporary share is largest in Construction (29.2%) and Hotels and Restaurants (28.7%), two sectors where the seasonality of demand is substantial and the skill level of workers is relatively low. In contrast, the temporary share is lowest in Real Estate (7.7%).

Figure 4: Average temporary share by 1-digit sector.



As we disaggregate into 2-digit sectors, these differences become larger, as seen in Figure 5. For instance, Employment-related Activities (43.1%), Civil Engineering (38.4%), Building Services and Gardening Activities (34%), and Building Construction (31.4%)

Figure 5: Top-Bottom 2-digit sectors by average temporary share.



display the highest rates of FT contracts. In contrast, Real Estate Activities (7%), Legal and Accounting Activities (8.5%), and Activities of Head Offices (9.1%) display the lowest ones.

There are multiple potential reasons to expect the variation in the FT share of firms to be high between sectors. First, because FT contracts are associated to lower-skilled workers, one hypothesis is that sectors with lower-skill needs may rely more heavily on FT contracts. In Figure 6, we show that the average FT rate across sectors is negatively related to the average wage paid by firms in that sector, which could be understood as a proxy for the skill content of work within the firm. Second, FT contracts may be more useful in sectors where firms need to adjust their labor force more frequently. One possible motive could be due to seasonality of demand, which is likely related to the high temporary share that we see in Construction or Hotels and Restaurants.

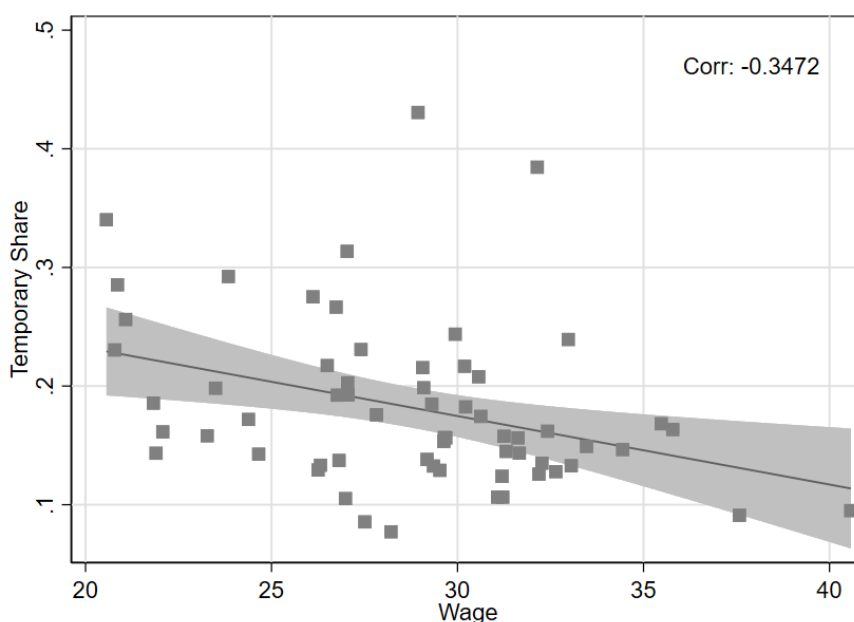
3.3 Regional variation

Our data provides the postcode where the firm is registered, which allows us to explore the geographic variation in the temporary share across firms. When we aggregate this information to the province level, we uncover a large variation once again.⁸ The 5 provinces with the highest average temporary share across our sample period are Huelva, Almería,

⁸While the province where the firm is registered typically coincide with the province where the firm operates, this need not always be true. Some firms (e.g., multi-plant firms) may be registered in locations different from where they have their main activity.

Cádiz, Córdoba, and Jaén, whose temporary shares range from 32% to 39%. At the other end of the distribution, the 5 provinces with the lowest temporary share are Barcelona, Álava, La Rioja, Soria, and Madrid, with temporary shares ranging from 12% to 14%. In Panel (a) of Figure 7 we provide a more complete account of this geographical variation by showing a map of all Spanish provinces with their corresponding temporary shares.

Figure 6: Mean temporary share and wages by 2 dig. sector



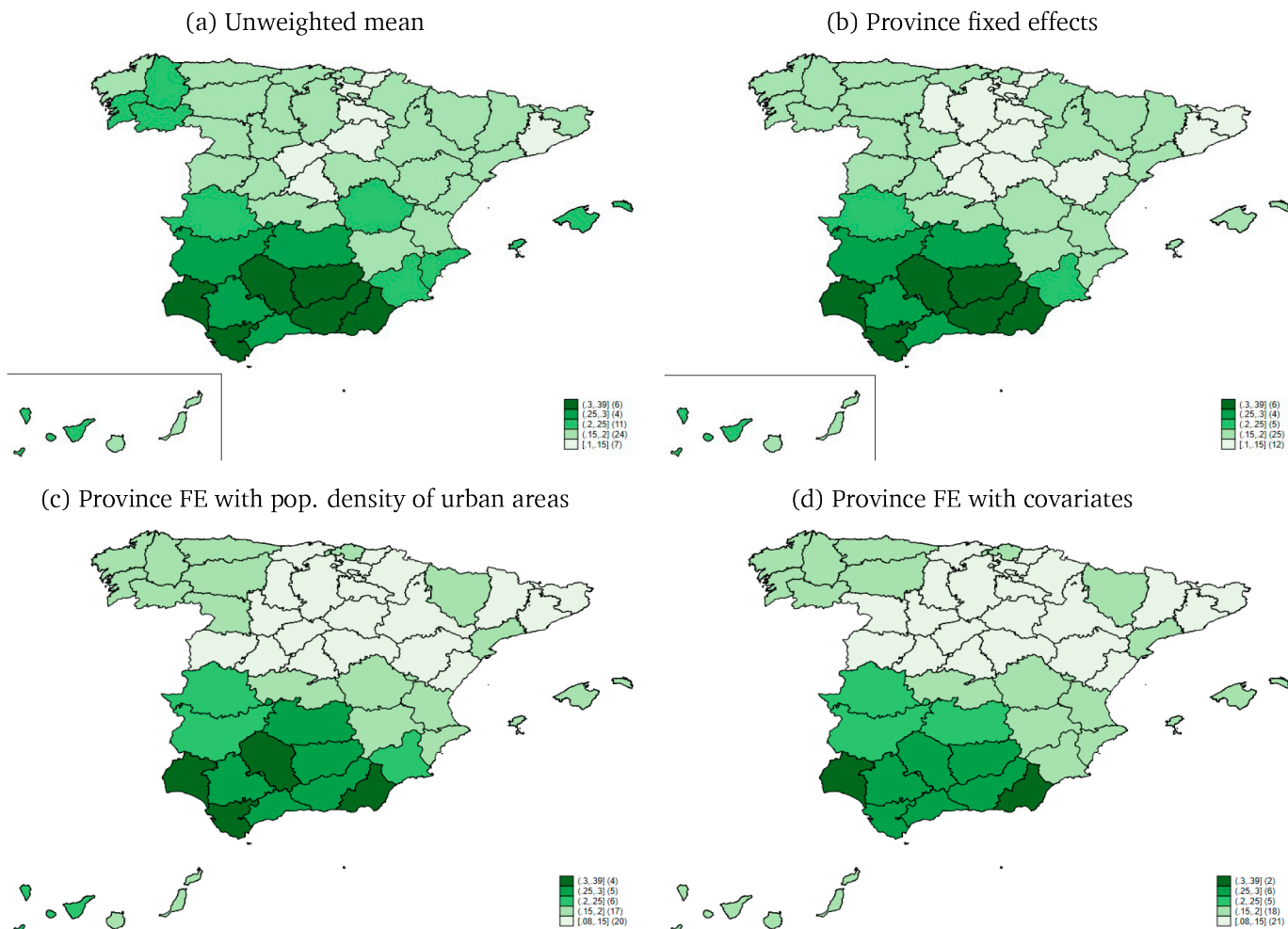
One potential reason for this variation could be differences in the industry composition across provinces. To partial out these differences, in Panel (b) of Figure 7 we plot the α_p terms from equation (1) estimated without firm fixed effects. This panel hence reports the average share of FT contracts across firms in every province, if provinces had the same composition of industries (equal to the average composition in Spain) and were observed at the same point in time. We see that the provincial variation shows a clear South-North divide, with southern territories (Andalucía, Extremadura, Murcia, part of Castilla-La Mancha) being clearly above the rest.

The geographic variation in the temporary share could also be driven by differences in the urban-rural composition across provinces (e.g., if firms in rural areas have monopsonistic power), or by a specific type of firms choosing to locate in different provinces. To account for these factors, in Panel (c) of Figure 7 we plot again the α_p fixed-effects after controlling for the population density of the urban area in which the firm is located. In Panel (d), we further control for several firm-level variables.⁹ The comparison of Panel (a) and (c)-(d) in

⁹Specifically, these firm-level variables include firm size, productivity, the average wage paid by the firm, a measure of financial indebtedness, the age of the firm, and age squared. See Section 4 for a detailed discussion on the construction of these variables.

Figure 7 reveals that differences in the structural composition, urban-rural composition, and firm-level characteristics across province fail to account for a large share of the overall geographic variation in the use of FT contracts.

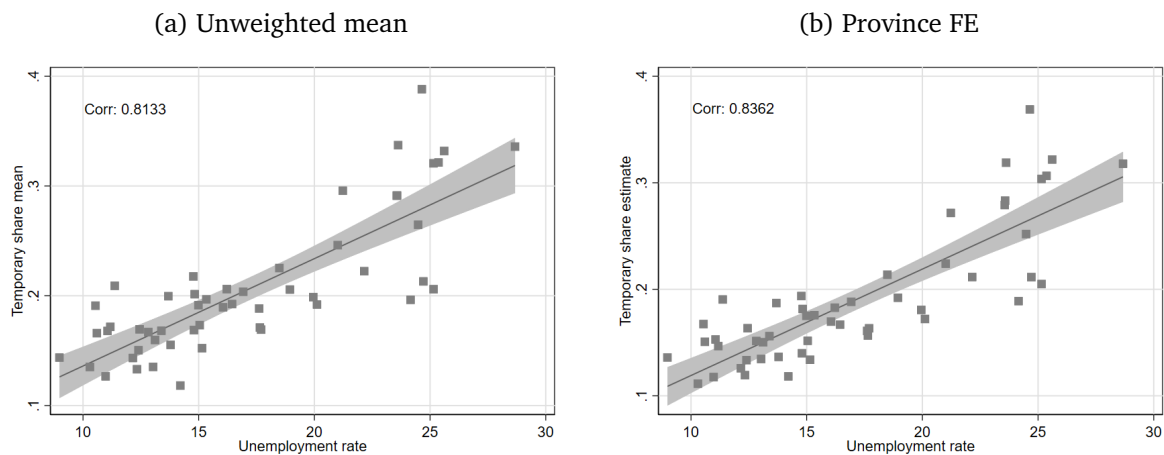
Figure 7: Regional variation in the temporary share across different specifications.



What is the possible origin of this source of heterogeneity? Short of a complete answer, we provide two interesting correlations. First, the map of the temporary share is very similar to the map of the unemployment rate. In Figure 8 we correlate the unemployment rate of the province on its temporary share (Panel (a)), and the temporary share of the province net of the other aggregate variables, that is, α_p from equation (1) estimated without firm fixed effects (Panel (b)). In both cases we see a strong positive relationship, suggesting that labor markets where workers have worse outside options (low probability of finding a job due to the high incidence of unemployment) are those where temporary jobs are more abundant. This could happen e.g. if FT contracts served as a tool for firms to extract surplus from workers. An alternative explanation comes from the opposite direction of causality: wherever the temporary share is higher, the employment-to-unemployment flows are higher, making the unemployment rate higher. Consistent with this explanation, Bilal

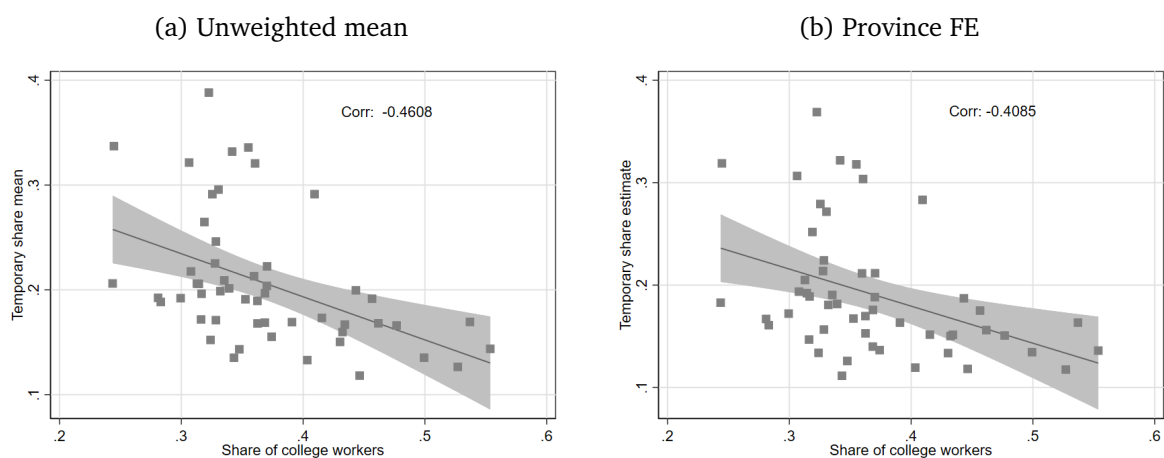
(2022) shows that, in France, locations with higher unemployment are characterized by more job destruction (and similar job creation).

Figure 8: Mean temporary share and unemployment rate by province



Second, there is also a significant negative correlation across provinces between the temporary share and the share of college-educated workers, as depicted in Panel (a) of Figure 9.¹⁰ This evidence is in line with the findings from worker-level data showing that lower-skilled workers suffer a higher incidence of temporary employment. Interestingly, this relationship is equally strong when controlling for industry (and year) fixed effects, as seen in Panel (b). This means that the skill composition correlates with the temporary share across provinces, even while holding constant the industrial composition in each province. This could happen if, within the same 2-digit industry, some provinces specialized in tasks performed by high-skill workers and chose OE contracts, while other provinces specialized in tasks performed by low-skill workers and chose FT contracts instead.

Figure 9: Mean temporary share and college workers rate by province



¹⁰The share of college-educated workers in each province is calculated using data from the Spanish labor force survey (EPA).

4 Firm-level variation

Having explored aggregate sources of variation, in this section we look at how firms with different observable characteristics vary in their use of FT versus OE contracts. Section 4.1 presents basic summary statistics on the share of temporary workers for firms of different size, age and productivity. Section 4.2 shows the results of a more comprehensive analysis of the firm-level variation in the temporary share using multivariate regression methods.

4.1 Descriptive statistics

The first row in Table 2 reports the average as well as several percentiles of the distribution of the firm-level temporary share. The second row reports the same statistics weighted by employment, whereas the next rows show the distribution of the temporary share across different bins of firm size, firm age, and firm productivity.

Table 2: Distribution of the temporary share by firm characteristics.

	% firms	% employment	Mean	p10	p25	p50	p75	p90	p95
Total	100.00	100.00	0.183	0	0	0.027	0.294	0.591	0.800
Employment Weighted	100.00	100.00	0.243	0	0.022	0.152	0.367	0.669	0.881
Firm size (in number of employees)									
0-5	60.18	9.34	0.145	0	0	0	0.200	0.500	0.765
6-10	18.43	8.59	0.231	0	0	0.143	0.369	0.640	0.799
11-20	11.33	10.33	0.247	0	0.029	0.161	0.385	0.667	0.818
21-30	3.94	6.27	0.255	0	0.041	0.167	0.393	0.685	0.833
31-40	1.86	4.23	0.261	0	0.045	0.174	0.400	0.695	0.847
41-50	1.16	3.41	0.259	0	0.041	0.168	0.399	0.705	0.855
51-250	2.56	17.55	0.249	0	0.033	0.156	0.380	0.683	0.851
+250	0.53	40.28	0.233	0	0.033	0.145	0.340	0.626	0.849
Firm age (in years)									
0-5	21.01	10.38	0.248	0	0	0.084	0.448	0.770	1.000
6-10	22.69	15.38	0.199	0	0	0.037	0.333	0.634	0.832
11-15	20.91	17.85	0.175	0	0	0.020	0.280	0.552	0.750
16-20	15.89	17.03	0.152	0	0	0.005	0.232	0.500	0.669
21-30	15.14	22.83	0.134	0	0	0.009	0.198	0.439	0.600
+30	4.34	16.5	0.113	0	0	0.018	0.159	0.355	0.500
Firm productivity quartiles (value added per worker)									
p25	25	19.40	0.207	0	0	0	0.351	0.667	0.884
p50	25	23.24	0.213	0	0	0.097	0.344	0.638	0.811
p75	25	28.60	0.190	0	0	0.074	0.300	0.573	0.761
p100	25	28.76	0.135	0	0	0	0.183	0.487	0.668

The first thing worth noting is that small firms constitute the vast majority of the population of Spanish firms, but employment is very much concentrated in a few large firms. For example, 78% of the population of firms has at most 10 workers, but such firms account for just 18% of total employment. In contrast, firms with more than 250 workers constitute less than 1% of the population of firms but they concentrate 40% of total employment. The average share of temporary workers increases with firm size for firms with at most 40 workers, while it is slightly decreasing in firm size for larger firms. The lowest incidence of temporary employment is found among firms with at most 5 workers. These firms employ, on average, 14.5% of their workforce under a FT contract. This increases sharply for firms with 6-10 workers (23.1%, on average), reaching a peak of 26.1% among firms with 31-40 workers and decreasing to 23.3% for firms with more than 250 workers.

The right-skewness of the temporary share distribution already noted in Section 2 remains true within firm size categories. For example, half of firms with less than 5 workers have no temporary workers, while only 10% of such firms have more than 50% of their workers employed with a temporary contract. Moreover, the right-skewness between firms size and the temporary share holds not only on average but also throughout the distribution of the temporary share. The median firm of 0-5 workers has no worker employed under a FT contract while the median firms of 31-40 workers and of more than 250 workers employ, respectively, 17.3% and 14.5% of such workers.

The age distribution of firms is clearly skewed towards younger firms: 21% of firms have been operating for at most 5 years, while firms with more than 30 years are just 4.3%. Nevertheless, employment is relatively more concentrated among older firms, as there is a strong positive correlation between a firm's size and its age. Younger firms clearly rely more on FT contracts than older firms. The average temporary share among firms with 5 years or less of activity (21% of Spanish firms) is 25%. This decreases to 20% for firms which have been operating for 6 to 10 years (23% of firms); to 17% for firms with 11 to 15 years (21% of firms); and to 11% for firms with more than 30 years (4% of firms). We observe a similar negative relationship if we look at different percentiles of the temporary share distribution. For instance, the median temporary share is 8% for firms aged 5 years or less, while it is less than 2% for firms of more than 15 years of age. The distribution is also more right-skewed among younger firms, e.g. the 90th percentile goes from 77% for firms with 5 years or less to 36% for firms with more than 30 years.

Finally, there is a negative relationship between firm productivity, defined as value added per worker, and the incidence of temporary employment. Whereas firms in the first two quartiles of the productivity distribution have a mean share of temporary workers equal to 21%, this is respectively 19% and 13% for firms in the third and fourth quartiles. Similarly to firm age, the negative relationship between productivity and temporary employment is apparent also at several percentiles of the temporary share distribution, with firms in the lower quartiles having a more positively skewed distribution than firms in the higher quartiles. Further, more productive firms concentrate a relatively higher share of total

employment (28.8% and 19.4% for firms in the top versus bottom quartiles, respectively), but differences across productivity are nowhere as striking as those across size and age.

4.2 Firm-level regressions

While the descriptive statistics in Table 2 suggest that younger, less productive and, to some extent, larger firms employ more temporary workers than smaller and older firms, these differences might be driven by other confounding factors which are related to both the share of temporary workers and the size or age of the firm. For example, larger firms might be located predominantly in certain areas, or might belong to certain sectors, in which the use of FT contracts is more extended. Moreover, there could be a spurious correlation between the share of FT contracts and the age of the firm if younger firms recur to FT contracts as a consequence of being more financially constrained.

To provide a more robust analysis of the firm-level variation in the temporary share, we explore the correlation between the temporary share and several firm characteristics through a multivariate regression analysis. We consider regressions of the type

$$TempSh_{ft} = \alpha_t + \alpha_i + \alpha_p + \alpha_f + \beta X_{ft} + \varepsilon_{ft} \quad (2)$$

which adds firm time-varying observable characteristics X_{ft} to regression (1). We consider the following firm-level variables within X_{ft} : the logarithm of the total number of workers; the logarithm of the average productivity per worker (defined as the ratio between the value added and the number of full-time equivalent workers); the logarithm of the average wage at the firm-level; a measure of the firm's financial indebtedness (defined as short- plus long-term debt divided by total assets); and the age of the firm and its square.

We start by running regression (2) with only X_{ft} (without any fixed effects). We highlight five main facts, whose results are presented in Column (1) of Table 3. First, larger firms have a larger share of temporary workers: a 1 percent increase in employment is associated, on average, with a 0.06 percentage point increase in the share of temporary workers. This is a relatively small effect although the estimate is strongly statistically significant. Second, there is a negative relationship between the age of the firm and the share of temporary workers.¹¹ Thus, as seen in Table 2, older firms employ, on average, a lower proportion of temporary workers than younger firms. Third, firms which are on average more productive have fewer temporary workers, although the magnitude of the estimated coefficient is small: a 1 percent increase in productivity is associated with a 0.006

¹¹Our regression uncovers a U-shaped relationship between temporary share and firm age, but the coefficient associated to the square of the firm's age is very small in magnitude —the minimum point of the U-shape is at 54 years, in the far right-tail of the age distribution (the 99-th percentile). This implies that, for the typical values of the firm's age found in the sample, the estimated relationship between age and the share of temporary workers is monotonically negative.

percentage points decline in the share of temporary workers. Fourth, firms whose average wage bill is larger also have a lower proportion of temporary workers, even after controlling for firm size and productivity. This could indicate that those firms which are able to pay better wages are also more likely, at least on average, to offer more stable employment contracts. Finally, there is no statistically significant correlation between the level of firm's indebtedness and the share of temporary workers, suggesting that firms do not seem to recur to temporary contracts when they are more financially constrained. Altogether, firm characteristics explain 9% of the cross-sectional variation in the temporary share.

In Table 3, we test the robustness of the estimated coefficients to the inclusion of time fixed effects (column 2), province fixed effects (column 3), sector fixed effects (column 4), and time, province and sector fixed effects (column 5), because the variation over time and across provinces and sectors could generate spurious correlation with firm-level variables. Controlling for year, sector and/or province fixed effects ensures that only variation within calendar year, province and/or sector is taken into account, thus comparing firms with different characteristics but belonging to the same sector or residing in the same province. Across all specifications, the correlation of the temporary share with firm size and age remains strongly statistically significant, with very little change in the associated point estimates. Estimated coefficients for productivity and the average wage bill also remain negative and significant, although they are smaller in absolute value when controlling for year, province and sector fixed effects. The results in column 2-5 also confirm the lack of any significant relationship between the share of FT workers and firm leverage.

The last two columns of Table 3 show results when including firm fixed effects, which allows controlling for unobserved firm characteristics that are fixed over time. Even when using only within-firm variation in firm characteristics to estimate the regression model, there is a positive and significant correlation between the size of the firm and the share of temporary workers, which suggest that firms use temporary contracts when increasing in size. Indeed, the point estimate for the effect of firm size on the temporary share is larger with firm fixed effects. This relationship is robust to further including year, province and sector fixed effects (column 7). Second, the relationship between the temporary share and firm age remains negative and significant even in the fixed effect model.¹² This suggests that, as the firm gets older, it reduces its share of temporary employment.

Finally, we complement the previous analysis by estimating nonparametrically the relationship between the firm's temporary share and its size, its age, and its productivity, i.e. we estimate equation (2) using employment, age and productivity bins.

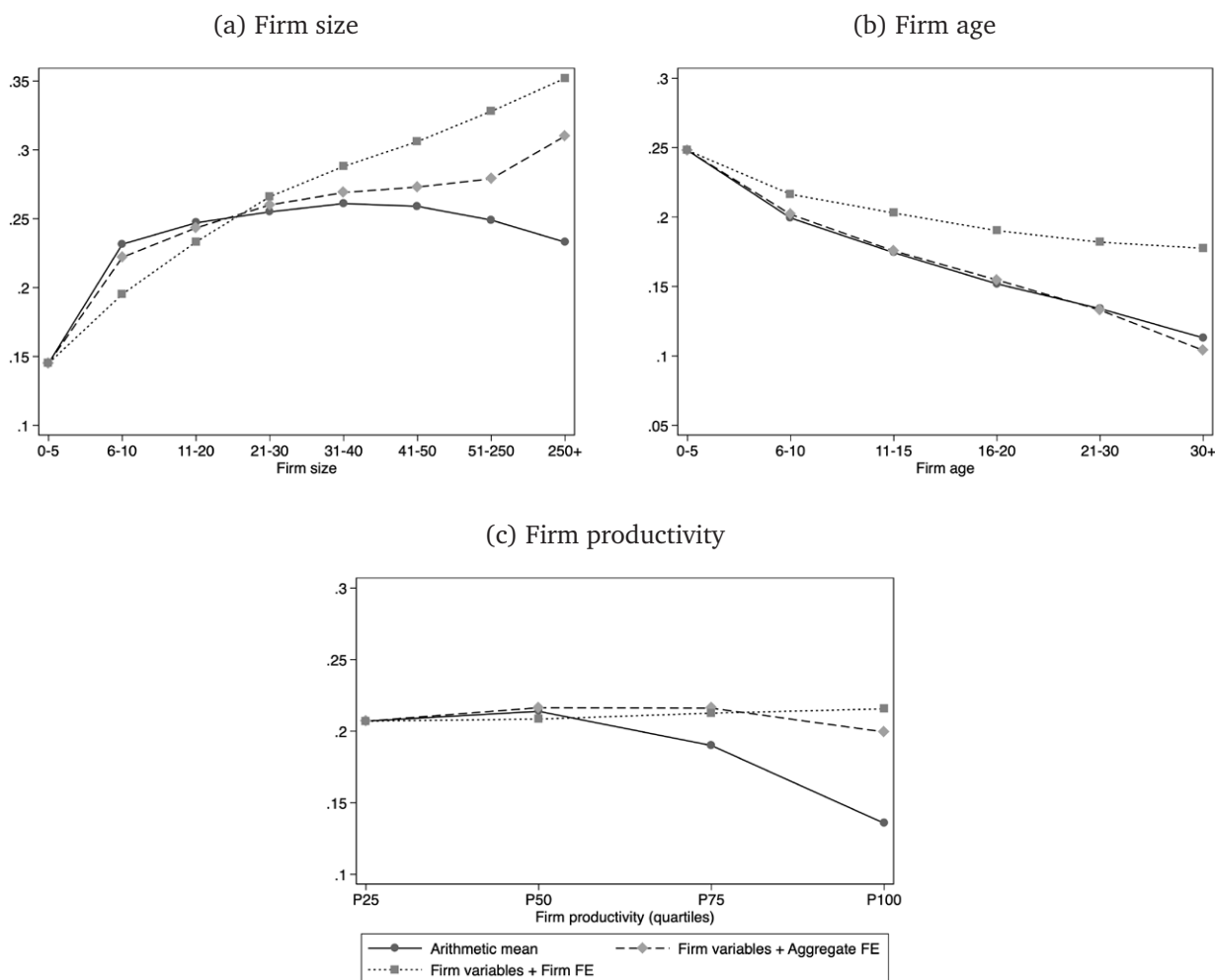
¹²It should be noted that the coefficient for firm age cannot be estimated when using both firm fixed effects and time fixed effects, as there is perfect collinearity between age and the time dummies within the firm. For this reason, the regression model in column 7 of Table 3 is estimated without the age controls.

Table 3: Firm-level regressions

	Dependent variable: firm's temporary share						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Employment (log)	10.97*** (0.0252)	11.00*** (0.0253)	10.26*** (0.0249)	10.03*** (0.0256)	9.626*** (0.0253)	8.484*** (0.0530)	8.284*** (0.0531)
Employment (log) squared	-1.316*** (0.00628)	-1.321*** (0.00629)	-1.169*** (0.00618)	-1.213*** (0.00610)	-1.125*** (0.00599)	-0.432*** (0.0139)	-0.512*** (0.0138)
Leverage	0.00898 (0.0275)	0.0112 (0.0274)	0.0116 (0.0263)	0.00936 (0.0286)	0.0141 (0.0277)	-0.0164 (0.0137)	-0.0153 (0.0137)
Productivity (log)	-0.262*** (0.0158)	-0.387*** (0.0159)	-0.123*** (0.0155)	0.0893*** (0.0164)	0.0681*** (0.0161)	0.606*** (0.0173)	0.381*** (0.0176)
Average wage (log)	-5.034*** (0.0279)	-4.958*** (0.0280)	-3.520*** (0.0277)	-4.761*** (0.0282)	-3.349*** (0.0280)	-1.858*** (0.0359)	-1.704*** (0.0361)
Age (decades)	-7.984*** (0.0250)	-8.382*** (0.0255)	-7.962*** (0.0249)	-7.257*** (0.0247)	-7.528*** (0.0250)	-7.530*** (0.0530)	
Age (decades) squared	0.745*** (0.00487)	0.777*** (0.00491)	0.759*** (0.00494)	0.701*** (0.00482)	0.734*** (0.00492)	1.412*** (0.0130)	
Constant	32.11*** (0.0744)	32.72*** (0.0748)	27.28*** (0.0736)	30.18*** (0.0751)	26.33*** (0.0748)	17.11*** (0.130)	11.38*** (0.125)
Year FE	No	Yes	No	No	Yes	No	Yes
Province FE	No	No	Yes	No	Yes	No	Yes
Sector 2dig FE	No	No	No	Yes	Yes	No	Yes
Firm FE	No	No	No	No	No	Yes	Yes
N	5,300,548	5,300,548	5,300,548	5,299,668	5,299,668	5,284,540	5,283,862
R ²	0.100	0.103	0.141	0.159	0.200	0.672	0.672

Notes: The dependent variable (temporary share) is expressed in percentages. Age is expressed in decades, and leverage is normalized by 1,000. Robust standard errors in parenthesis. Significance levels: * = 10%; ** = 5%; *** = 1%.

Figure 10: Temporary share across firm size, age and productivity



Panel (a) of Figure 10 plots the estimated coefficients corresponding to the employment dummies, whereas panels (b) and (c) show, respectively, estimates for the age and productivity dummies. The dashed line corresponds to the specification that controls for firm variables (i.e., employment, age and productive quartile dummies, plus the leverage measure and the logarithm of the average wage), including year, sector and province fixed effects; the dotted line corresponds to estimates controlling for the same firm variables and firm fixed effects. In order to visualize the effect of controlling for these covariates in the estimation, the solid line also reports the unconditional average temporary share for each employment, age and productivity group (corresponding to the third column of Table 2).

Whereas the unconditional average temporary share presents an inverted U-shaped pattern with firm size, this relationship becomes increasing for all firm size bins when controlling for firm characteristics and aggregate fixed effects. This indicates that, when comparing two firms from the same sector and province (and keeping constant other characteristics such as age and productivity), the larger firm would, on average, employ a larger share of temporary workers. The increasing relationship between the average temporary share and firm size is even more pronounced when controlling for firm fixed

effects. As for the negative relationship between the temporary share and the age of the firm, this is basically unchanged when controlling for aggregate fixed effects, although it becomes somehow flatter when including firm fixed effect. This confirms that older firms employ on average fewer temporary workers. Finally, we also see that the negative relationship between the temporary share and firm productivity documented in Table 2 and the solid line in Panel (c) of Figure 10 disappears once we control non-parametrically for firm-level variables and aggregate fixed effects (and also when further controlling for firm fixed effects).

5 Conclusion

In this article, we document the use of open-ended and fixed-term contracts by Spanish firms (2004-2019). Our findings indicate that the use of different contract types was very heterogeneous in the cross-section of firms during this period. The distribution of temporary employment at the firm level is highly right-skewed, with few firms making very intensive use of fixed-term contracts. We document that there is a large aggregate variation across sectors, regions, and over time. Yet, the overwhelming majority of the overall variation in the temporary share is explained by firm-level fixed effects, namely by unobserved within-firm time-invariant factors. At the individual level, larger and younger firms make more intensive use of temporary contracts.

Our findings can be useful to assess which firms may be more exposed to the effects of labor market reforms designed to address market duality, for example those attempting to limit the use and/or duration of fixed-term contracts such as the recent labor market reform introduced in Spain in late 2021. Our findings indicate that, insofar as such reforms are expected to more directly impact those firms with higher shares of temporary employment, larger and younger firms would be disproportionately affected. All in all, further research is needed to empirically assess the implications for firm outcomes and the aggregate economy of labor market reforms intended to reduce labor market duality.

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