Labor Market Concentration, Wages and Job Security in Europe
Online Appendix

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Appendix 1 – Data

1.1 Data definition and construction

The structure of the data varies across countries. In Germany and France, we observe all job matches (i.e. an employee matched with an employer) during the year, but not contract changes within a job match.[1] In Denmark and Portugal, we only observe job matches at one month of the year, namely October for Portugal, and November for Denmark. In Italy and Spain, our observations are contracts rather than job matches. In Italy, we have information on the start and end dates of each contract during the year, while in Spain we only have information on the start date. In these two countries we do not have information on the stock of employment. Data availability periods are also slightly different across countries: 2010-2018 for Denmark, 2009-2017 for France, 2011-2018 for Germany, 2012-2018 for Italy, 2010-2019 for Portugal and 2010-2017 for Spain.

1.1.1 Measuring the HHI

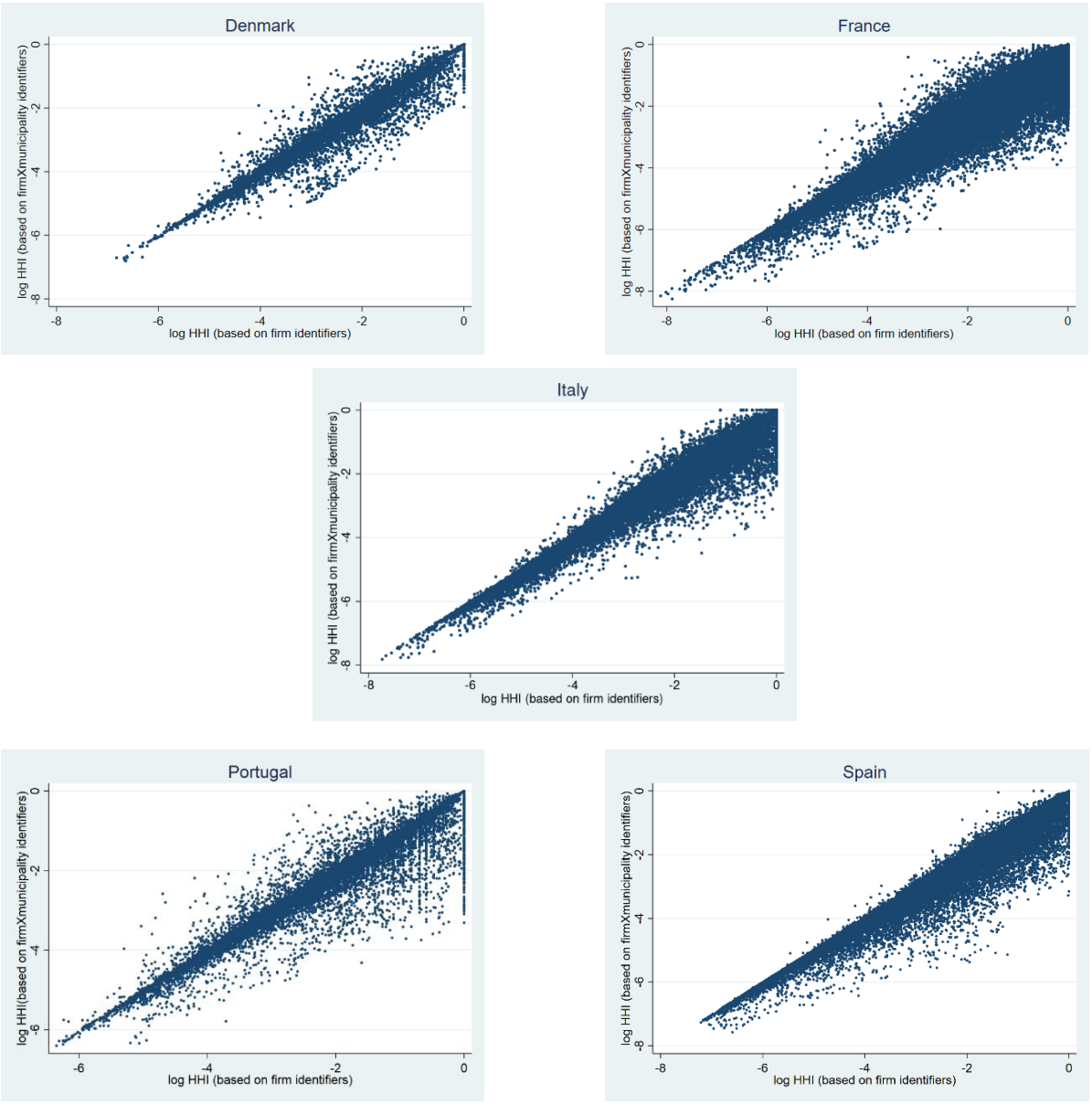
In Italy and Germany, all establishments of a given firm located in a given municipality are reported in the data as a single establishment. Moreover, in Germany, the data do not allow to identify firms, but only establishments, i.e. firm-by-municipality couples. In order to harmonize our units of observation across countries, we define an employer as being composed of all the establishments belonging to a given firm and located in a given municipality. Using this firm-by-municipality concept, by definition, we only have single-establishment employers in Italy and Germany, while in other countries employers may be composed of several establishments, all located in the same municipality. We show in Appendix Figure 1.1 here below that, in countries where we can also use a more standard definition of employers based on firm rather than firm-by-municipality, the resulting HHIs, computed using the formula presented in Section II.A, are strongly correlated with one another.[2] Moreover, in each country, regressing one HHI

[1] In particular, we do not observe conversions from temporary to permanent contracts.

[2] When an employer is defined as the firm instead of the firm-by-municipality couple, the hiring shares are defined as the ratio of the number of new hires of the firm in the local labor market to the total number of new hires in that market. However, all transfers are excluded when computing the number of new hires, including those coming

on the other yields point estimates close to 1, which suggests that they can be used interchangeably and that the estimation error we make by using a firm-by-municipality concept is small.[3]

Appendix Figure 1.1– Correlations between $log\,(HHI)$ constructed using firm-by-municipality and firm identifiers



Note: Local labor markets are defined based on Functional Areas (FAs) and 4-digit occupation.

The distribution of our baseline measure of concentration is presented in Table 1. It could be

from other establishments of the same firm located in other geographical areas. Correlation coefficients between $log(HHI)$ based on firm-by-municipality and $log(HHI)$ based on firm identifiers are 0.87 for Denmark, 0.95 for France, 0.99 for Italy, and 0.96 for Portugal and Spain.

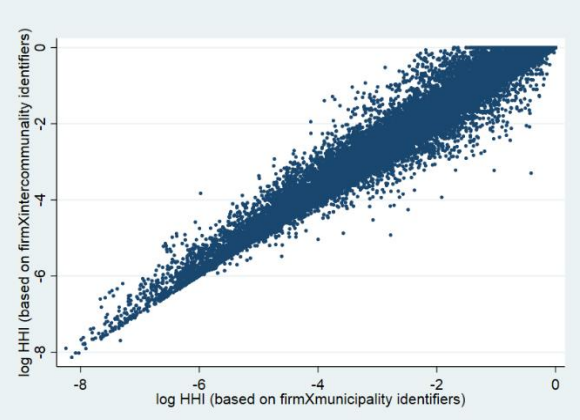
[3] The point estimates of the regressions of $log(HHI)$ based on firm-by-municipality on $log(HHI)$ based on firm identifiers are 0.880 for Denmark, 1.038 for France, 1.010 for Italy, 1.008 for Portugal and 0.982 for Spain.

affected by our definition of employers which relies on a firm-by-municipality concept. In all countries except Germany, we can recompute the HHI distribution based on the classic firm concept which aggregates all establishments of the same firm, whatever the municipality they are located in. When doing so, labor market concentration does not increase substantially: it is still the case that in all countries less than 25% of the new hires are employed in a local labor market with an HHI higher than 0.15, and that the 90th percentile of the HHI distribution is below 0.25 everywhere except in Portugal.[4]

Municipalities are of different sizes across countries. France has the smallest ones (with an average population of 1,751 individuals per municipality) while Denmark and Portugal have the largest ones (59,402 and 32,968 individuals per municipality, respectively). One could therefore worry that HHIs based on firm-by-municipality identifiers will not be comparable across countries. In French data, we also know in which *cantons* and in which *intercommunalités* firms are located. *Cantons* and *intercommunalités* are geographical units larger than French municipalities but of comparable size to Portuguese and Danish municipalities (with an average population of 33,579 individuals in *cantons* and 53,497 individuals in *intercommunalités*). We show in Appendix Figure 1.2 below that HHIs based on firm-by-municipality and on firm-by-*canton* or firm-by-*intercommunalité* identifiers are approximatively superposed.

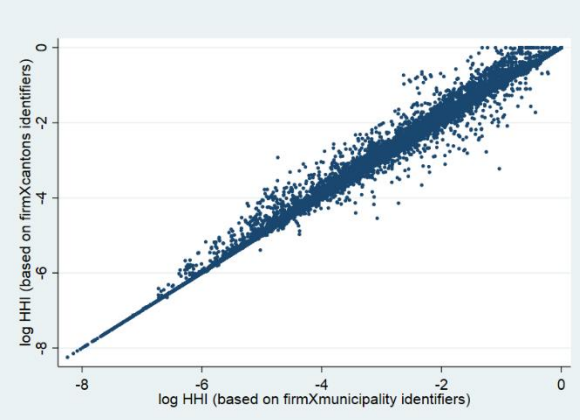
Appendix Figure 1.2. Correlations between $log\,(HHI)$ constructed using identifiers based on firm-by-municipality and firm-by-larger geographical area (France only).

Panel A: Firm-by-*Intercommunalité* identifiers



Regression coefficient: 0.9304; R-squared: 0.9702

Panel B: Firm-by-*Canton* identifiers



Regression coefficient: 0.9970; R-squared: 0.9970

Note: Local labor markets are defined based on Functional Areas (FAs) and 4-digit occupation.

[4] In this case, the 75th (resp. 90th) percentiles of the HHI distribution are 0.0718 (resp. 0.1667) in Denmark, 0.0750 (resp. 0.2088) in France, 0.0599 (resp. 0.1825) in Italy, 0.1024 (resp. 0.2802) in Portugal and in 0.0807 (resp. 0.2231) in Spain.

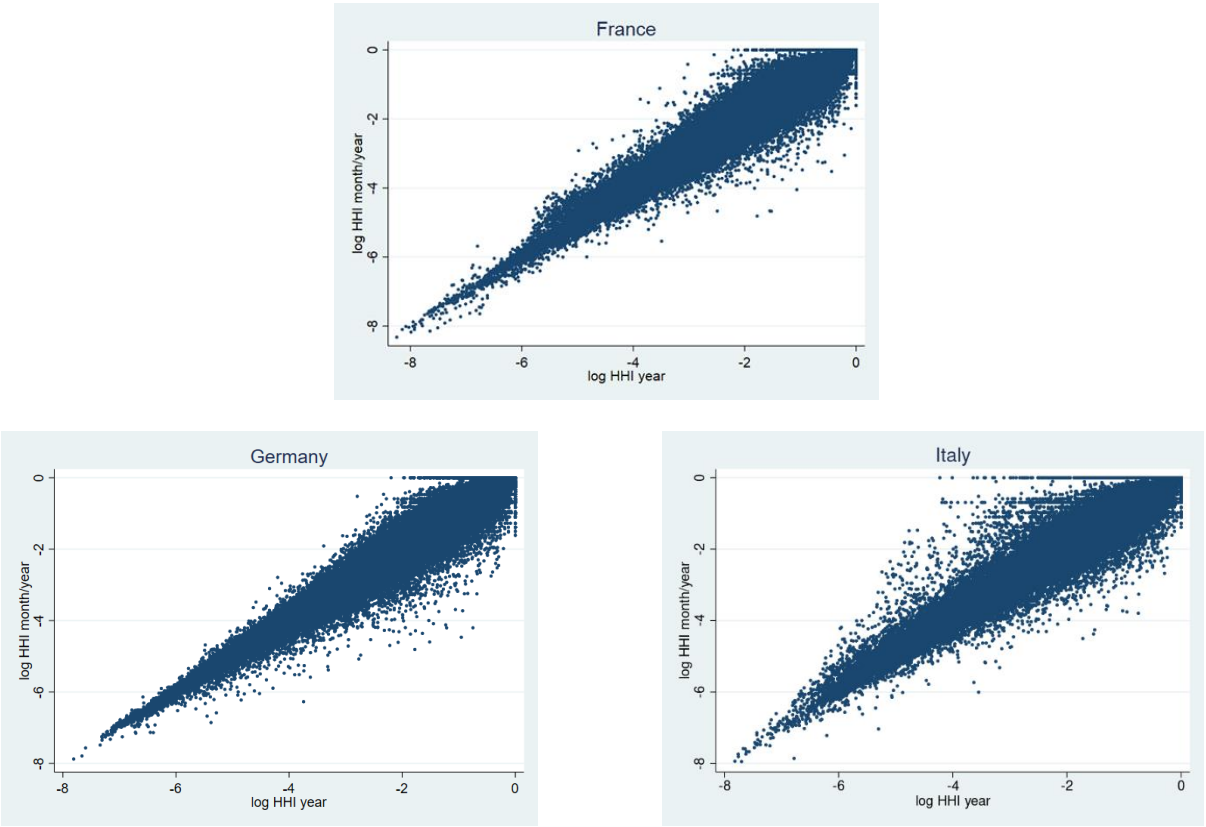
In our data, new hires are defined as individuals who are in a firm-by-municipality couple at time t and were not there at $t-1$. The precise definition slightly varies across countries. In France, Germany and Italy a new hire is defined as an individual who is employed in a firm-by-municipality couple (with at least 1 month of tenure) at year t and was not employed in the same firm-by-municipality couple at $t-1$. In Denmark, new hires are defined as employees who are employed in a firm-by-municipality in November of year t (with at least 1 month of tenure by the end of the month) and were hired between December of year $t-1$ and October of year t. In Portugal, we only know the month in which individuals were hired (but not the day) and we do not know whether they worked during the whole month of October. As a consequence, we define new hires as employees who are employed in a firm-by-municipality in October of year t and were hired between November of year $t-1$ and August of year t since we want them to have at least one month of tenure. In Spain, new hires are employees who started a contract (whose expected duration was at least 1 month) at year t and did not start a contract in the previous 12 months with the same employer.

One could worry that these differences in the definition of new hires might affect our results. In France, Germany and Italy, our preferred definition of new hires relies on a year concept, i.e. as workers who are employed for at least 1 month at the firm-by-municipality couple in year t and were not employed there in year $t-1$. As a robustness check, in these countries we can alternatively define new hires using a month-year concept, i.e. as workers who are employed at the firm-by-municipality couple in month m of year t (with tenure being at least 1 month) and were not employed by the same employer in the same month of year $t-1$. The reference month m chosen for this exercise is December in Germany and Italy and November in France. When doing so, the HHIs computed for new hires defined based on a month-year concept turn out to be almost superposed with the HHIs computed for new hires defined based on a year concept – see Appendix Figure 1.3 below. Both HHIs are also strongly correlated with one another[5] and regressing one on the other yields point estimates close to 1.[6]

[5] Correlation coefficients between $log\ (HHI)$ computed for new hires defined based on a month-year concept and $log(HHI)$ computed for new hires defined based on a year concept are 0.99 for France and Germany and 0.98 for Italy.

[6] The point estimates obtained when regressing $log(HHI)$ computed for new hires defined based on a month-year concept on $log(HHI)$ computed for new hires defined based on a year concept are 1.005 for France, 0.992 for Germany and 0.987 for Italy.

Appendix Figure 1.3 – Correlations between $log\ (HHI)$ computed with new hires defined based on a month-year concept and $log\ (HHI)$ computed with new hires defined based on a year concept



Note: when using a year concept, new hires are workers who are employed for at least 1 month at the firm-by-municipality couple in year t and were not employed there in year $t-1$. When using a month-year concept, new hires are workers who are employed at the firm-by-municipality couple in month m of year t (with tenure being at least 1 month) and were not employed by the same employer in the same month of year $t-1$. The reference month m chosen for this exercise is December in Germany and Italy and November in France. Local labor markets are defined based on Functional Areas (FAs) and 4-digit occupations.

1.1.2 Dependent and control variables

We have information on wages for Denmark, France, Germany and Portugal. Monthly wages are available for Denmark and Portugal, while annual wages are available for France and Germany. In Denmark and France, we have information on the number of days of employment with each employer and the number of hours worked. German data only report the number of days of employment and Portuguese data only have the number of hours worked. So, we construct monthly wages for Portugal, daily wages for Denmark, France and Germany, and

hourly wages for Denmark, France and Portugal.[7] Whatever our measure of wages (either monthly, daily or hourly) we trim the top and bottom 1% of the distribution.

Information on the type of contract upon hiring (permanent vs temporary) is available in all countries except Denmark and Portugal.[8] In Portugal, however, we observe the type of contract of workers employed in October of each year and we know the month in which they were hired. We therefore approximate the contract type at the time of hiring by the contract type observed in October of each year, for the subsample of employees hired in June, July and August of that year. These indeed have at least 1 month of tenure – see above – and have been hired sufficiently recently to have a high probability of being still employed on the type of contract on which they were hired.

In Italy and Spain, we also have information on contract changes, which allows us to define a conversion variable for individuals hired on temporary contracts in year *t* as a dummy variable taking value one if the individual had/started a permanent contract with the same employer in the following year.

Our data also contain information on education – grouped in four categories: less than upper secondary education, upper secondary, more than upper secondary education and a category for missing values since in several countries the information on education is missing for a substantial number of employees.[9]

In Portugal, we have information on the type of collective agreements each employer is subject to. This information is not available for other countries.[10] However, for Germany we retrieve information on collective bargaining from the IAB Establishment Panel and match it with our

[7] Since daily wages are defined as wages per day of employment and since we only consider individuals with at least one month of job tenure, monthly wages are approximatively equivalent to daily wages multiplied by a constant.

[8] In Italy, apprentices have been included in the temporary category, even if they have formally an open-ended contract. This is because, in Italy, employers can lay apprentices off without motivation or severance pay at the end of the apprenticeship period, in the same way as the employers can terminate fixed-term contracts without motivation or severance pay at the end of the contract period.

[9] The information on education is missing for 21% of the observations in Italy and 35% in Germany in the original data. In Germany, IAB provides an imputed education variable following a procedure described in Thomsen, Ludsteck, and Schmucker (2018), which reduces the proportion of missing values to less than 5% of all observations. The proportion of missing values is particularly large in France (58%) since the administrative data on which we run our estimates (DADS) do not contain information on education. To retrieve it, we match these data with a reduced random sample of individuals (*Echantillon Démographique Permanent*). The resulting missing variables are therefore independent from any individual characteristic.

[10] Collective bargaining information is also available in Italy, where, however, coverage is universal.

data at the industry-level.[11] These data are averaged over time for each industry to improve representativeness. For comparability, information on collective bargaining coverage is aggregated at the industry level and over time also in the case of Portugal.

Finally, in all countries we also have information on full-time part-time status as well as demographics such as gender and age. Descriptive statistics of our data are provided in Appendix Table 1.1 below.

Unsurprisingly, (monthly, daily and hourly) wages of full-timers are lower for new hires than in the whole population of employees, in all countries. Women represent about 40% of new hires and this share is quite homogeneous across countries – 40% in Denmark, 42% in France, 44% in Germany, 38% in Italy, 45% in Portugal, and 41% in Spain. Workers in our full samples are about 40 years old on average. New hires are somewhat younger with a mean age ranging from 33 in Denmark and France, to 34 in Spain and 36 in Germany, Italy and Portugal. Full-timers represent a vast majority of the workforce, ranging from 93% in Portugal to 76% in Denmark, 72% in France and 64% in Germany. The distribution of educational levels (computed excluding missing values) varies substantially across countries. In Germany, 74% of the workers have upper secondary education while only 16% have attended higher education. In contrast, in France 45% of the full sample has not attained at least upper secondary education while 33% has some higher education. Denmark lies in between with only 23% of the employees without upper secondary education and 28% with some higher education. In Portugal, the educational level of the workforce is overall lower with 53% of the workers having less than upper secondary education and 28% having no more than high-school education. The proportion of new hires on permanent contracts also varies a lot across countries from 67% in Germany to 44% in France, 22% in Portugal, 32% in Italy and 16% in Spain. The dual nature of the Spanish labor market is confirmed by the small rate of conversion from temporary to permanent contracts: only 5.7% in the course of the first year following hiring, as compared to 16% in Italy. Finally, the majority of employees are covered by sector-level collective agreements in our data – 51% in Germany and 74% in Portugal – while firm-level agreements only cover 10% of employees in Germany and 7% in Portugal – see Appendix Table 1.2 below.

[11]The IAB Establishment Panel is an annual survey of about 15,500 establishments The industry partition for which the IAB Establishment Panel is representative contains 19 industries – see Ellguth, Kohaut, and Möller (2014). We use this level of aggregation to match collective bargaining data with our main German dataset.

Table 1.1 – Descriptive Statistics

Variable	Denmark		France		Germany		Italy		Portugal			Spain	
	Full sample	New hires	Full sample	New hires	Full sample	New hires	Full sample	New hires	Full sample	New hires	New hires (June to August)	Full sample	New hires
HHI													
Mean	0.0684	0.0596	0.0691	0.0640	0.0630	0.0599	-	0.0636	0.0957	0.0956	0.0950	-	0.0543
Standard deviation	0.1174	0.1086	0.1298	0.1270	0.1236	0.1229	-	0.1372	0.1649	0.1685	0.1689	-	0.1277
Daily wage (full-timers)													
Mean	158.15	140.82	68.51	57.48	116.3	95.17	-	-	-	-	-	-	-
Standard deviation	63.27	59.18	36.58	30.69	60.46	53.63	-	-	-	-	-	-	-
Monthly wage (full-timers)													
Mean	-	-	-	-	-	-	-	-	1059.5	914.7	818.2	-	-
Standard deviation	-	-	-	-	-	-	-	-	680.1	565.3	448.2	-	-
Hourly wage (full-timers)													
Mean	30.70	27.66	13.30	11.32	-	-	-	-	6.44	5.60	5.02	-	-
Standard deviation	12.04	11.35	6.41	5.24	-	-	-	-	4.18	3.46	2.68	-	-
Hourly wage (all)													
Mean	28.58	24.39	12.78	10.97	-	-	-	-	6.20	5.34	4.82	-	-
Standard deviation	12.09	10.90	6.20	4.98	-	-	-	-	4.06	3.29	2.53	-	-
Women													
Mean	0.3718	0.3985	0.4079	0.4209	0.4162	0.4399	-	0.3763	0.4301	0.4532	0.4346	-	0.4118
Standard deviation	0.4833	0.4896	0.4914	0.4937	0.4929	0.4964	-	0.4845	0.4951	0.4978	0.4957	-	0.4921
Age													
Mean	39.71	32.96	38.01	32.93	42.64	36.05	-	35.64	40.23	36.33	33.93	-	34.36
Standard deviation	13.46	13.04	12.30	11.70	13.52	13.44	-	11.50	11.05	11.36	11.17	-	10.52
Full-time work													
Mean	0.7592	0.5880	0.7233	0.6471	0.6354	0.5357	-	0.5785	0.9345	0.8807	0.8543	-	0.5358
Standard deviation	0.4276	0.4922	0.4474	0.4779	0.4813	0.4987	-	0.4938	0.2475	0.3241	0.3528	-	0.4987

Notes: Wages are in nominal euros.

Table 1.1 – Descriptive Statistics (cont.)

Variable	Denmark		France		Germany		Italy		Portugal			Spain	
	Full sample	New hires	Full sample	New hires	Full sample	New hires	Full sample	New hires	Full sample	New hires	New hires (June to Aug.)	Full sample	New hires
Education													
Below upper secondary													
Mean	0.2262	0.2996	0.1888	0.1778	0.0967	0.1444	-	0.3752	0.5322	0.4871	0.4904	-	0.6536
Standard deviation	0.4184	0.4581	0.3913	0.3823	0.2956	0.3515	-	0.4842	0.4990	0.4998	0.4999	-	0.4758
Upper secondary													
Mean	0.4838	0.4437	0.0934	0.0906	0.7055	0.6170	-	0.3311	0.2841	0.3186	0.3400	-	0.2543
Standard deviation	0.4997	0.4968	0.2909	0.2870	0.4558	0.4861	-	0.4706	0.4510	0.4659	0.4737	-	0.4355
Above upper secondary													
Mean	0.2815	0.2464	0.1367	0.1128	0.1505	0.1419	-	0.0835	0.1816	0.1906	0.1648	-	0.0919
Standard deviation	0.4497	0.4309	0.3435	0.3164	0.3537	0.3490	-	0.2767	0.3855	0.3928	0.3710	-	0.2889
Missing													
Mean	0.0085	0.0103	0.5812	0.6188	0.0474	0.0967	-	0.2102	0.0022	0.0038	0.0048	-	0
Standard deviation	0.0917	0.1008	0.4934	0.4857	0.2124	0.2956	-	0.4075	0.0463	0.0614	0.0691	-	0
New hires													
Mean	0.2680	-	0.3038	-	0.2145	-	-	-	0.2330	-	-	-	-
Standard deviation	0.4429	-	0.4599	-	0.4105	-	-	-	0.4227	-	-	-	-
Employed year before if new hire													
Mean	-	0.6791	-	0.7273	-	0.7171	-	0.6404	-	0.4035	0.3819	-	0.2809
Standard deviation	-	0.4668	-	0.4453	-	0.4504	-	0.4799	-	0.4906	0.4859	-	.4494
New hires on perm. contract													
Mean	-	-	-	0.4444	-	0.6693	-	0.3152	-	0.4062	0.2157	-	0.1614
Standard deviation	-	-	-	0.4969	-	0.4705	-	0.4646	-	0.4911	0.4113	-	0.3679
Conversion to permanent contract													
Mean	-	-	-	-	-	-	-	0.1595	-	-	-	-	0.0570
Standard deviation	-	-	-	-	-	-	-	0.3662	-	-	-	-	0.2318

Notes: Conversions are computed on the samples of new hires on temporary contracts. For Spain, "Employed year before if new hire" means "Started a contract the year before if new hire".

Table 1.2 – Proportion of workers covered by collective bargaining, by type of agreement

	Germany	Portugal
Firm-level collective agreement	10%	7%
Sector-level collective agreement	51%	74%
No agreement	39%	19%

Notes: In Germany the table indicates the proportion of overall employment accounted by establishments subject to a collective agreement. In Portugal, the table indicates the proportion of workers whose wage is regulated by a collective agreement. In this country, agreements between one association of employers and one or more unions are considered sector-level agreements, while agreements between one or more firms and one or more unions are considered firm-level agreements.

1.2 Data sources

1.2.1 Denmark

The best-suited dataset to study labor market concentration in Denmark is the Danish Integrated Database for Labor Market Research (in Danish, *Den Integrerede Database for Arbejdsmarkedsforskning*, IDA). The database covers the universe of Danish workers, establishments, and firms in all sectors of the economy.

Each worker is observed at a yearly frequency (in November), when information is recorded on his/her employment status, main occupation, and on one secondary activity. A host of information is available for each job, including the occupational category (ISCO-08 plus one additional level of disaggregation), the number of hours worked per week, and the hourly wage.

Worker-level data can be linked to data on both the establishment and the firm in which the worker is employed. Workers, establishments, and firms have unique time-invariant identifiers, which allow for the construction of a panel.

To facilitate the creation of employment histories, the dataset also includes a retrospective and a prospective employment variable. For each worker, the retrospective variable identifies the employment status of the individual in the previous year and provides some additional

explanation for changes in status.[12] Similarly, the prospective variable identifies the employment status of the individual in the following year.[13]

At the individual level, the database also includes a host of personal worker characteristics, including age, gender, and education.

For this project, we use data from 2010 to 2018.

1.2.2 France

The analysis for France builds upon the *Déclarations Annuelles de Données Sociales* (DADS), which are social security records drawn from firm tax declarations. The DADS are available under different formats. The *DADS-Postes* cover the universe of workers and establishments in all industries since 2009 (before that date the DADS did not include agriculture, part of the food-processing industry, so-called rural financial institutions – including Crédit Agricole, which is one of the largest French banks – and the public administration). We have access to these data until 2017, which effectively limits our sample to 2009-2017. The data contain information on each establishment's industry (at the 4-digit NACE level), location (municipality) and the firm to which the establishment belongs. They also contain information on each wage and salary employee who has worked for at least one hour in the establishment over the year. In particular, we know his/her 4-digit occupation according to the PCS-ESE classification, which contains about the same number of categories as the 4-digit breakdown of the ISCO-08 classification.[14] Self-employed are not covered by the dataset, while household employees and interns are dropped even if included in the original data.

Each line in this dataset is a job match (establishment-by-employee-by-year). Establishments have a unique identifier which is invariant over time, except when the establishment changes location (or simply changes mail address), in which case it is assigned a new identifier. By contrast, for the sake of anonymity, workers' identifiers are changed every year (but they are unique in a given year, even if they change establishment). However, for any given wave (corresponding to a given year), the previous year's record corresponding to the same job match

[12] If the worker was not in the same establishment in the previous year, the variable records whether he/she moved to his/her current post from another establishment of the same firm, a different firm, unemployment, outside the labor force, abroad, or a period of leave.
[13] If the individual is not present in the same establishment in the following year, the variable records whether he/she moved to another establishment within the same firm, another firm, unemployment, outside the labor force, abroad, a period of leave, or died.
[14] 412 categories in the PCS-ESE classification as compared to 436 categories in the ISCO-08 classification.

(if any) is also reported (with a random noise on quantitative variables, so that these couples of observations for different waves cannot be chained and used to reconstruct a long panel).[15] Information concerning dissolved matches that existed in the previous year is also reported. Using these pieces of information, we can identify whether a worker is a new hire under the different definitions of firm used in the paper.

For the subset of workers in the *DADS-Postes* who are born in October of each year, there exists a panel which maintains the same identifier over time for each worker and hence allows to follow workers across various employers and years. This panel (*Panel tous salariés*) reports the day when the worker was hired and when the employment spell terminates. It also reports, for each match, the annual gross wage, a full-time/part-time indicator and annual hours worked. The data also report workers' age, gender, place of birth, municipality of residence, type of contract, and 4-digit occupation.

The *Echantillon Démographique Permanent* (EDP) is used to retrieve information on education. It contains a random sample of individuals updated with Census data (which are updated on a rotating basis for 1/10 of the population each year). However, as this information is updated every ten years, it only allows to define a rough, time-invariant variable based on the highest diploma, as the precise dates of change in educational status cannot be identified. Moreover, since not all workers in the *Panel tous salariés* are part of the EDP, information on educational attainment can be retrieved only for a minority of the workers in our sample.

1.2.3 Germany

The analysis for Germany builds on the Employment History (BeH V10.05.01-201912) of the Institute for Employment Research (IAB), which is equivalent to the employment information in the IAB Integrated Employment Biographies – IEB, described in Müller and Wolter (2020). The BeH contains employer declarations about the universe of workers who are subject to social security contributions. Thus, the data give full account of private sector employment for regular

[15] For example, for a given establishment A and worker B, the 2010 wave reports both the variables corresponding to 2010 and 2009, with a small random noise added to the 2009 values. If all variables for the previous year (2009 in the example) are missing, this means that worker B was not in establishment A in that year. If no record concerning worker B and the employer associated with establishment A can be found in the previous year, then the worker was not with that employer the previous year (therefore it would be unambiguously a new hire in the current year – 2010 in the example). If no record involving worker B can be found in the previous year, this means that he/she was not working as a salaried employee the previous year.

workers, marginal workers, and apprentices in the German labor market.[16] The BeH is available from 1975 onwards for West Germany and 1993 onwards for East Germany. In this project, we use the universe of employment spells in the years 2011–2018.

Information on employment spells is available at the daily level. Wages are averaged over the spells' duration and reported by calendar year for spells that cover several calendar years. When establishments report multiple spells for the same worker in the same year, we select the spell with the highest wage.[17] The information is thus organized in worker-by-establishment-by-year triplets (i.e., job-year combinations). An establishment typically comprises all establishments of a firm within a municipality, but we do not observe whether establishments in different municipalities belong to the same firm.

As regards workers, the data include the daily wage (up to the social security contribution ceiling), job duration, social security status, gender, age, nationality, education, occupation, the employer's location and industry, and an indicator for full-time and part-time employment, but not the precise number of working hours. Furthermore, the data contain information on whether a worker was hired on a fixed-term or a permanent contract, though we cannot observe later conversions.

Occupations are recorded using the German Classification of Occupations (KldB 2010) with 1,286 distinct occupations, which we map onto 4-digit ISCO-08 occupations via a standard crosswalk – German Federal Employment Agency (2011). Moreover, we follow standard practice and impute top-coded wages using a two-step procedure – see Card, Heining, and Kline (2013).[18]

Information on collective bargaining coverage is retrieved from the IAB Establishment Panel, which contains a sample of about 15,500 establishments per year – Bellmann et al. (2021). The survey reports whether each establishment is subject to a sector-level or a firm-level collective agreement and whether there is a works council. The survey's sampling scheme is based on a

[16] Being exempt from social security records, civil servants, self-employed persons and family workers do not enter the IEB.
[17] If there is a tie, we choose the spell with the longest duration.
[18] First, we use fitted wages from a Tobit regression at the worker level to calculate average daily wages for each establishment-year combination (excluding the top-coded observation at hand). In a second step, we repeat the Tobit regression with this leave-one-out variable as an additional regressor which delivers the final imputations. Specifically, we adopt Schmucker et al.'s (2018) implementation and regress log daily wages on age, a quadratic of log establishment size, the share of low-skilled and high-skilled workers within the establishment, the share of censored observations excluding the observation at hand, as well as dummy variables for German nationality, workplace in East Germany, one-person establishments and establishments with more than ten full-time employees. Separate Tobit models are estimated for 56 cells defined according to the year (7 groups), gender (2 groups) and individual qualification (4 groups).

partition of the economy in 19 industries, an intermediate level between 1 and 2 digits of the NACE rev.2 classification – see Ellguth, Kohaut, and Möller (2014) – and is therefore representative of each of these industries.

1.2.4 Italy

The analysis for Italy builds on *Comunicazioni Obbligatorie* (CO), a contract-level dataset maintained for administrative purposes by the Ministry of Labor and Social Policies and made available thanks to a research agreement with ANPAL (*Agenzia Nazionale Politiche Attive Lavoro*). The dataset contains all employers' declarations about activations, terminations and conversions of contracts that took place in Italy since 2010. Employees with an intermediary status between employment and self-employment, such as collaborators, have been excluded from the sample, as well as employees with non-standard contracts that entail by their nature a discontinuous and occasional relationship with the firm.

For each contract, this dataset reports rich information about its characteristics: the (anonymized) identity of the employer and that of the employee; the start date; the conversion date (i.e. the date when a non-permanent contract is converted into a permanent one), the termination date, if applicable; and the number of contract extensions (for non-permanent contracts only). Furthermore, the dataset contains the following information: the type of contract (permanent, temporary, or apprenticeship), the business sector (6-digit NACE Rev.2 classification); the working hour arrangements (i.e. full-time or part-time); the occupation (5-digit CP-2011 classification which we map onto 4-digit ISCO-08 using a hand-created crosswalk); and the municipality where the employer is located.

Alongside information about the contract, the following socio-demographic characteristics of the employee are available: gender, age, nationality and education.

Against these unique advantages, the dataset has the drawback that it does not record information about the hiring wage and the size of the firm.

For this project, we use data from 2012 to 2018.

1.2.5 Portugal

The data for Portugal come from the *Quadros de Pessoal* (QP), an administrative panel with matched firm, establishment, and worker data for all firms operating in the private sector. Since

2010, the QP is part of a broader compulsory survey on firms, the *Relatório Único*. All firms employing at least one worker in a given year have to deliver the *Relatório Único* to the Ministry of Labor by April of the following year. When filling the QP part of the *Relatório Único* for a given year, firms must report detailed information on their activity and on every worker who was employed in the firm at some point in October of that year. Workers hired after October of year *t* and who leave before October of year *t+1* will not be included in this record. The QP is therefore a snapshot of the Portuguese labor market as of October of each year.

Importantly for us, the QP provides us with the location of firms and all their establishments at the municipality-level, as well as their economic activity, following the 5-digit Portuguese Classification of Economic Activities (CAE Rev.3), which is harmonized and directly comparable with NACE-Rev.2 until the fourth digit.

At the worker level, the QP includes information on gender, date of birth, education, the month and year of admission in the firm, gross monthly wages (base, bonuses, and overtime components separately), hours worked in October, whether or not the individual works full-time or part-time, his/her type of contract (permanent vs temporary), and occupation at the 4 digit-level of the 2010 Portuguese Classification of Occupations (CPP/2010), which is harmonized and directly comparable with ISCO-08. The QP also reports collective agreements regulating the employment contract of the worker, distinguishing among: i) agreements between one firm and one or more unions; ii) agreements between two or more firms and one or more unions; iii) agreements between one employer association and one or more unions; and iv) contracts regulated by working condition ordinances (issued by the Government) and/or no collective agreement.

Firms, establishments and workers all have identifiers that enable us following them longitudinally. This allows us to define a new hire both according to the firm and to the firm-by-municipality concept.

Since the QP does not provide the number of days worked in the firm, in order to ensure that new hires have at least one month of tenure, we exclude all new hires whose admission in the firm dates back to September of each year.[19]

While the QP is available since 1985, we focus on 2010-2019 for three reasons. First, to work on a time period that is contemporaneous to the ones used in other countries. Second, because

[19] We are not able to assess the number of days of tenure of two workers who would be hired in September and would leave the firm during the month of October, even though it is possible that one of them completed 1 month of tenure while the other one did not.

the introduction of the *Relatório Único* in 2010 led to some changes in the data as compared to 2009. Third, in 2010, occupations were recoded according to the CPP/2010, in replacement of the National Classification of Occupations dating back to 1994. Hence, focusing on 2010 onward ensures that we are consistently defining local labor markets.

1.2.6 Spain

The analysis for Spain uses confidential information on the universe of contracts recorded by the National Public Employment Service (*Servicio Público de Empleo Estatal* or SEPE), an independent agency ascribed to the Ministry of Labor and Social Economy. Our dataset contains anonymized records for the universe of regular private sector employment contracts including apprenticeship. The data are available starting in 2007, but for this project we use the universe of contracts signed between 2010 and 2017.

The administrative record for each contract contains information about the worker, including gender, age, an anonymized ID and his/her level of education. It also includes a unique firm and an establishment-level ID, the 4-digit sector (according to the 2009 National Classification of Economic Activities) in which the firm is active and the location of the establishment. As regards the labor contract itself, it provides information on the 4-digit occupation, regular working hours, as well as the starting date and type of the contract. In contrast, our dataset does not contain information on wages and only provides information on the expected end dates for fixed-term contracts.

Occupations are recorded using the 4-digit Spanish Classification of Occupations (CNO 2011). We map this classification onto the 4-digit ISCO-08 classification using a crosswalk provided by the Spanish National Statistical Institute (INE).

Formally, our dataset is a matched employer-employee panel with information on the universe of contracts. As such, we can distinguish between initial contracts, new contracts and the conversion of temporary or fixed-term contracts into permanent contracts.

Appendix 2 – First-stage Estimates and Robustness Checks

Table 2.1 – Labor market concentration and daily wages of full-timers – OLS estimates.

Dep. Var Daily Wages	Denmark	France	Germany	Portugal
Log HHI	-0.0003 (0.0004)	-0.0007** (0.0003)	-0.0003 (0.0002)	-0.0007*** (0.0002)
Observations	6,300,449	8,269,430	11,050,435	15,087,543

Note: The dependent variable is log(wage). Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include yearly dummies for workers' age, whether the individual is a new hire, whether the individual was employed the year before if new hire, as well as individual fixed effects, firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. Monthly wages instead of daily wages are used for Portugal. Standard errors are clustered at the labor-market-by-year level. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.2 – Labor market concentration and daily wages of full-timers – First stage equation.

Dep. Var Log (HHI)	Denmark	France	Germany	Portugal
Avg. of log $(1/N_{o,z\prime,t})$	0.147*** (0.027)	0.766*** (0.029)	0.726*** (0.044)	0.163*** (0.043)
R^2	0.947	0.971	0.966	0.955
Observations	6,299,179	8,269,375	11,050,435	15,086,998

Note: The dependent variable is $Log(HHI)$. Local labor markets are defined based on 4-digit-occupations and Functional Areas (FAs). Control variables include yearly dummies for workers' age, whether the individual is a new hire, whether the individual was employed the year before if new hire, as well as individual fixed effects, firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $N_{o,z\prime,t}$ is the number of firms with positive hirings in all other FAs z' for the same occupation o and time period t. Monthly wages instead of daily wages are used for Portugal. Standard errors are clustered at labor-market-by-year level. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.3 – Labor market concentration and daily wages of full-timers – IV estimates using the leave-one-out HHI as an instrument.

Dep. Var Daily Wages	Denmark	France	Germany	Portugal
Log HHI	-0.006***	-0.009***	-0.018***	-0.010***
	(0.002)	(0.001)	(0.002)	(0.004)
KP F Test	78.3	1149.7	361.5	36.4
Observations	6,299,179	8,269,375	11,050,435	15,086,998

Note: 2SLS estimates. The dependent variable is log(wage). Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include yearly dummies for workers' age, whether the individual is a new hire, whether the individual was employed the year before if new hire, as well as individual fixed effects, firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of $Log(HHI)$ in other FAs for the same occupation. Monthly wages instead of daily wages are used for Portugal. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.4 – Labor market concentration and daily wages of full-timers – IV estimates – HHI based on employment.

Dep. Var Daily Wages	Denmark	France	Germany	Portugal
Log HHI	-0.021***	-0.025***	-0.026***	-0.032***
	(0.002)	(0.002)	(0.002)	(0.005)
KP F Test	599.7	1776.1	1540.0	95.0
Observations	6,312,863	8,281,465	11,073,053	15,172,125

Note: 2SLS estimates. The dependent variable is log(wage). Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include yearly dummies for workers' age, whether the individual is a new hire, whether the individual was employed the year before if new hire, as well as individual fixed effects, firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive employment in other FAs for the same occupation. Monthly wages instead of daily wages are used for Portugal. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

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Table 2.5 – Labor market concentration and daily wages of full-timers – IV estimates – controlling for the share of 4-digit occupations in new hires at the national level.

Dep. Var Daily Wages	Denmark	France	Germany	Portugal
Log HHI	-0.015*** (0.003)	-0.021*** (0.002)	-0.025*** (0.002)	-0.022*** (0.007)
Share of occupation o in hiring at the national level	yes	yes	yes	yes
KP F Test	77.5	921.9	338.3	24.0
Observations	6,299,179	8,269,375	11,050,435	15,086,998

Note: 2SLS estimates. The dependent variable is log(wage). Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Additional control variables include yearly dummies for workers' age, whether the individual is a new hire, whether the individual was employed the year before if new hire, as well as individual fixed effects, firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FAs for the same occupation. Monthly wages instead of daily wages are used for Portugal. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.6 – Labor market concentration and daily wages of full-timers – Plausibly exogenous instrument regressions.

Dep. Var Daily Wages	Denmark	France	Germany	Portugal
(1) Reduced-form estimate of α from eq. (5)	-0.0068*** (0.0012)	-0.0171*** (0.0013)	-0.0141*** (0.0015)	-0.0041*** (0.0009)
(2) Minimum γ for which β is significant at the 10% level in eq. (4) using 2SLS	-0.0050	-0.0148	-0.0113	-0.0023
(2)/(1)	0.74	0.87	0.80	0.57

Note: The dependent variable is log(wage). Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include yearly dummies for workers' age, whether the individual is a new hire, whether the individual was employed the year before if new hire, as well as individual fixed effects, firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. Monthly wages instead of daily wages are used for Portugal. Standard errors are clustered at the labor-market-by-year level. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.7 – Labor market concentration and daily wages of full-timers in France – IV estimates – other employer identifiers.

Dep. Var Daily Wages	Firm-by-*intercommunalité* identifiers	Firm-by-*canton* identifiers
Log HHI	-0.0236*** (0.0020)	-0.0227*** (0.0019)
KP F Test	599.8	696.2
Observations	8,269,106	8,269,343

Note: The dependent variable is log(wage). Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). An employer is defined as the aggregation of all the establishments of the same firm in an *intercommunalité* (resp. *canton*). Control variables include yearly dummies for workers' age, whether the individual is a new hire, whether the individual was employed the year before if new hire, as well as individual fixed effects, firm-by-*intercommunalité*-by-year (resp. firm-by-*canton*-by-year) fixed effects, establishment fixed effects and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.8 – Labor market concentration and daily wages of full-timers – IV estimates – Nationwide firms.

Dep. Var Daily Wages	Denmark	France	Portugal
Log HHI	-0.055** (0.021)	-0.024*** (0.002)	-0.021*** (0.008)
KP F Test	8.4	558.7	15.6
Observations	6,296,320	8,266,589	15,074,086

Note: 2SLS estimates. The dependent variable is log(wage). Employers are defined as the aggregation of all their establishments nationwide, rather than the aggregation of their establishments at the municipality level, as done in our baseline regressions. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include yearly dummies for workers' age, whether the individual is a new hire, whether the individual was employed the year before if new hire, as well as individual fixed effects, firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FAs for the same occupation. Monthly wages instead of daily wages are used for Portugal. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.9 – Labor market concentration and daily wages of full-timers – IV estimates – HHI based on 2-digit occupations.

Dep. Var Daily Wages	Denmark	France	Germany	Portugal
Log HHI	-0.093**	-0.064***	-0.060***	-0.047
	(.042)	(0.016)	(0.010)	(0.123)
KP F Test	5.6	16.3	44.5	0.17
Observations	6,312,946	8,282,207	11,072,939	15,169,435

Note: 2SLS estimates. The dependent variable is log(wage). Local labor markets are defined based on 2-digit occupations and Functional Areas (FAs). Control variables include yearly dummies for workers' age, whether the individual is a new hire, whether the individual was employed the year before if new hire, as well as individual fixed effects, firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FAs for the same occupation. Monthly wages instead of daily wages are used for Portugal. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.10 – Labor market concentration and daily wages of full-timers – IV estimates – Arnold's (2021) method.

Dep. Var Daily Wages	Denmark	France	Germany	Portugal
Log HHI	-0.046***	-0.052***	-0.029***	-0.046***
	(0.006)	(0.004)	(0.003)	(0.009)
KP F Test	155.0	490.9	1244.7	44.2
Observations	6,306,174	8,281,280	11,073,053	15,172,125

Note: 2SLS estimates. The dependent variable is log(wage). Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). The HHI is adjusted by taking into account transitions across occupations, as in Arnold (2021). Control variables include yearly dummies for workers' age, whether the individual is a new hire, whether the individual was employed the year before if new hire, as well as individual fixed effects, firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive employment in other FAs for the same occupation. Monthly wages instead of daily wages are used for Portugal. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.11 – Labor market concentration and daily wages of full-timers – IV estimates – Local labor markets based on FUAs.

Dep. Var Daily Wages	Denmark	France	Germany	Portugal
Log HHI	-0.041***	-0.022***	-0.017***	-0.028***
	(0.009)	(0.002)	(0.003)	(0.009)
KP F Test	29.1	540.5	215.0	17.5
Observations	4,182,814	6,973,438	8,472,227	9,902,973

Note: 2SLS estimates. The dependent variable is log(wage). Local labor markets are defined based on 4-digit occupations and Functional Urban Areas (FUAs), rather than Functional Areas, as in our baseline regressions. Control variables include yearly dummies for workers' age, whether the individual is a new hire, whether the individual was employed the year before if new hire, as well as individual fixed effects, firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FUAs for the same occupation. Monthly wages instead of daily wages are used for Portugal. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.12 – Labor market concentration and daily wages of full-timers – IV estimates – Local labor markets based on NUTS-3 regions.

Dep. Var Daily Wages	Denmark	France	Germany	Portugal
Log HHI	-0.031***	-0.023***	-0.021***	-0.017
	(0.004)	(0.001)	(0.002)	(0.011)
KP F Test	97.6	2695.1	547.5	6.5
Observations	8,372,912	9,564,667	11,037,434	17,362,165

Note: 2SLS estimates. The dependent variable is log(wage). Local labor markets are defined based on 4-digit occupations and NUTS-3 regions (districts in Portugal), rather than Functional Areas, as in our baseline regressions. Control variables include yearly dummies for workers' age, whether the individual is a new hire, whether the individual was employed the year before if new hire, as well as individual fixed effects, firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other NUTS-3 regions for the same occupation. Monthly wages instead of daily wages are used for Portugal. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.13 – Labor market concentration and probability of being hired on a permanent contract – OLS estimates – New hires only.

Dep. Var Perm contract	France	Germany	Italy	Portugal	Spain
Log HHI	0.0012	-0.0025**	0.0006	-0.0022*	-0.0055***
	(0.0010)	(0.0012)	(0.0006)	(0.0012)	(0.0008)
Observations	3,530,688	4,167,918	16,781,481	1,039,822	4,895,950

Note: The dependent variable is a dummy variable equal to 1 if the individual is hired on a permanent contract and 0 if hired on a temporary contract. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. Standard errors are clustered at the labor-market-by-year level. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.14 – Labor market concentration and probability of being hired on a permanent contract – New hires only – First stage equation.

Dep. Var Log (HHI)	France	Germany	Italy	Portugal	Spain
Avg. of log $(1/N_{o,z\prime,t})$	0.769***	0.789***	0.521***	0.182***	0.715***
	(0.032)	(0.049)	(0.052)	(0.050)	(0.017)
R^2	0.976	0.979	0.982	0.972	0.986
Observations	3,530,660	4,167,918	16,781,457	1,039,792	4,895,949

Note: The dependent variable is $Log(HHI)$. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $N_{o,z\prime,t}$ is the number of firms with positive hirings in all other FAs z' for the same occupation o and time period t. Standard errors are clustered at the labor-market-by-year level. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.15 – Labor market concentration and probability of being hired on a permanent contract in France – IV estimates – New hires only – other employer identifiers.

Dep. Var Perm contract	Firm-by-*intercommunalité* identifiers	Firm-by-*canton* identifiers
Log HHI	-0.0198*** (0.0048)	-0.0204*** (0.0047)
KP F Test	637.9	580.7
Observations	3,376,061	3,503,243

Note: 2SLS estimates. The dependent variable is a dummy variable equal to 1 if the individual is hired on a permanent contract and 0 if hired on a temporary contract. An employer is defined as the aggregation of all the establishments of the same firm in an *intercommunalité* (resp. *canton*). Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before, whether he/she works full time or not, as well as firm-by-*intercommunalité*-by-year (resp. firm-by-*canton*-by-year) fixed effects, establishment fixed effects and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.16 – Labor market concentration and probability of being hired on a permanent contract – New hires only – IV estimates using the leave-one-out HHI as an instrument.

Dep. Var Perm. contract	France	Germany	Italy	Portugal	Spain
Log HHI	-0.0108*** (0.0032)	-0.0306*** (0.0093)	-0.0056 (0.0055)	-0.0224 (0.0188)	-0.0029* (0.0015)
KP F Test	1134.1	419.8	88.2	28.3	2,412.4
Observations	3,530,660	4,167,918	16,781,457	1,039,792	4,895,949

Note: 2SLS estimates. The dependent variable is a dummy variable equal to 1 if the individual is hired on a permanent contract and 0 if hired on a temporary contract. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of $Log(HHI)$ in other FAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.17 – Labor market concentration and probability of being hired on a permanent contract – IV estimates – New hires only – HHI based on employment.

Dep. Var Perm. contract	France	Germany	Portugal
Log HHI	-0.0198*** (0.0041)	-0.0459*** (0.0131)	-0.0402 (0.0276)
KP F Test	1405.4	796.3	19.9
Observations	3,531,342	4,167,936	1,039,812

Note: 2SLS estimates. The dependent variable is a dummy variable equal to 1 if the individual is hired on a permanent contract and 0 if hired on a temporary contract. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive employment in other FAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1, $^{+}$ p<0.11.

Table 2.18 – Labor market concentration and probability of being hired on a permanent contract – IV estimates – New hires only – controlling for the share of 4-digit occupations in new hires at the national level.

Dep. Var Permanent contract	France	Germany	Portugal
Log HHI	-0.0139*** (0.0040)	-0.0344*** (0.0110)	-0.0341* (0.0191)
Share of occupation *o* in hiring at the national level	yes	yes	yes
KP F Test	876.2	317.1	34.3
Observations	3,530,660	4,167,918	1,039,792

Note: 2SLS estimates. The dependent variable is a dummy variable equal to 1 if the individual is hired on a permanent contract and 0 if hired on a temporary contract. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Additional control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.19 – Labor market concentration and probability of being hired on a permanent contract – New hires only – Plausibly exogenous instrument regressions.

Dep. Var Permanent contract	France	Germany
(1) Reduced-form estimate of α from eq. (5)	-0.0159*** (0.0034)	-0.0278*** (0.0092)
(2) Minimum γ for which β is significant at the 10% level in eq. (4) using 2SLS	-0.0101	-0.0121
(2)/(1)	0.63	0.44

Note: The dependent variable is a dummy variable equal to 1 if the individual is hired on a permanent contract and 0 if hired on a temporary contract. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. Standard errors are clustered at the labor-market-by-year level. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.20 – Labor market concentration and probability of being hired on a permanent contract – IV estimates – New hires only – Nationwide firms.

Dep. Var Perm contract	France	Italy	Portugal	Spain
Log HHI	-0.0222*** (0.0050)	0.0020 (0.0092)	-0.0569* (0.0329)	0.0007 (0.0019)
KP F Test	596.5	63.4	13.7	643.7
Observations	3,195,832	16,413,569	1,035,808	4,895,896

Note: 2SLS estimates. The dependent variable is a dummy variable equal to 1 if the individual is hired on a permanent contract and 0 if hired on a temporary contract. Employers are defined as the aggregation of all their establishments nationwide, rather than the aggregation of their establishments at the municipality level, as done in our baseline regressions. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.21 – Labor market concentration and probability of being hired on a permanent contract – IV estimates – New hires only – HHI based on 2-digit occupations.

Dep. Var Perm. contract	France	Germany	Italy	Portugal	Spain
Log HHI	-0.1000** (0.0480)	-0.1258*** (0.0254)	0.0284** (0.0115)	0.1239 (0.1573)	0.0012 (0.0030)
KP F Test	7.9	48.6	24.0	0.74	591.4
Observations	3,532,013	4,167,936	16,781,481	1,039,822	4,895,950

Note: 2SLS estimates. The dependent variable is a dummy variable equal to 1 if the individual is hired on a permanent contract and 0 if hired on a temporary contract. Local labor markets are defined based on 2-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.22 – Labor market concentration and probability of being hired on a permanent contract – IV estimates – New hires only – Arnold's (2021) method.

Dep. Var Perm. contract	France	Germany	Portugal
Log HHI	-0.0443*** (0.0098)	-0.0525*** (0.0150)	-0.0781 (0.0612)
KP F Test	349.0	621.0	5.0
Observations	3,531,207	4,167,936	1,039,812

Note: 2SLS estimates. The dependent variable is a dummy variable equal to 1 if the individual is hired on a permanent contract and 0 if hired on a temporary contract. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). The HHI is adjusted by taking into account transitions across occupations, as in Arnold (2021). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive employment in other FAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.23 – Labor market concentration and probability of being hired on a permanent contract – IV estimates – New hires only – Local labor markets based on FUAs.

Dep. Var Perm contract	France	Germany	Italy	Portugal	Spain
Log HHI	-0.0224*** (0.0052)	-0.0347*** (0.0117)	-0.0006 (0.0105)	-0.0129 (0.0324)	0.0003 (0.0019)
KP F Test	475.6	256.2	33.6	12.7	1500.5
Observations	3,031,829	3,274,302	11,027,905	712,828	3,961,554

Note: 2SLS estimates. The dependent variable is a dummy variable equal to 1 if the individual is hired on a permanent contract and 0 if hired on a temporary contract. Local labor markets are defined based on 4-digit occupations and Functional Urban Areas (FUAs), rather than Functional Areas, as in our baseline regressions. Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FUAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.24 – Labor market concentration and probability of being hired on a permanent contract – IV estimates – New hires only – Local labor markets based on NUTS-3 regions.

Dep. Var Perm contract	France	Germany	Italy	Portugal	Spain
Log HHI	-0.0180*** (0.0032)	-0.0401*** (0.0116)	-0.0061 (0.0061)	-0.0934 (0.0667)	0.0002 (0.0016)
KP F Test	1569.6	444.3	146.2	4.3	2428.4
Observations	4,021,376	4,167,909	18,198,784	1,159,438	5,238,653

Note: 2SLS estimates. The dependent variable is a dummy variable equal to 1 if the individual is hired on a permanent contract and 0 if hired on a temporary contract. Local labor markets are defined based on 4-digit occupations and NUTS-3 regions (districts in Portugal), rather than Functional Areas, as in our baseline regressions. Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other NUTS-3 regions for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.25 – Labor market concentration and conversions from temporary to permanent contracts – OLS estimates – New hires on temporary contracts only.

Dep. Var Conversion	Italy	Spain
Log HHI	-0.0002 (0.0006)	-0.0025*** (0.0005)
Observations	9,012,928	4,105,318

Note: The dependent variable is a dummy variable equal to one when the individual was hired on a temporary contract at year *t* and had/started a permanent contract with the same employer in the following calendar year. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before hiring, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. Standard errors are clustered at the labor-market-by-year level. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.26 – Labor market concentration and conversions from temporary to permanent contracts – First stage equation – New hires on temporary contracts only.

Dep. Var Log (HHI)	Italy	Spain
Avg. of log $(1/N_{o,z\prime,t})$	0.447*** (0.057)	0.709*** (0.017)
Observations	9,012,917	4,105,317

Note: The dependent variable is $Log(HHI)$. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before hiring, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $N_{o,z\prime,t}$ is the number of firms with positive hirings in all other FAs z' for the same occupation o and time period *t*. Standard errors are clustered at the labor-market-by-year level. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.27 – Labor market concentration and conversions from temporary to permanent contracts – IV estimates – New hires on temporary contracts only – Nationwide firms.

Dep. Var Conversion	Italy	Spain
Log HHI	-0.0777*** (0.0216)	-0.0036*** (0.0011)
KP F Test	20.9	578.2
Observations	8,797,233	4,105,271

Note: 2SLS estimates. The dependent variable is a dummy variable equal to one when the individual was hired on a temporary contract at year *t* and had/started a permanent contract with the same employer in the following calendar year. Employers are defined as the aggregation of all their establishments nationwide, rather than the aggregation of their establishments at the municipality level, as done in our baseline regressions. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before hiring, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.28 – Labor market concentration and conversions from temporary to permanent contracts – IV estimates – New hires on temporary contracts only – HHI based on 2-digit occupations.

Dep. Var Conversion	Italy	Spain
Log HHI	-0.0297*** (0.0105)	-0.0059*** (0.0015)
KP F Test	20.2	625.3
Observations	9,012,928	4,105,318

Note: 2SLS estimates. The dependent variable is a dummy variable equal to one when the individual was hired on a temporary contract at year *t* and had/started a permanent contract with the same employer in the following calendar year. Local labor markets are defined based on 2-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before hiring, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.29 – Labor market concentration and conversions from temporary to permanent contracts – IV estimates – New hires on temporary contracts only – Local labor markets based on FUAs.

Dep. Var Conversion	Italy	Spain
Log HHI	-0.0404***	-0.0035***
	(0.0143)	(0.0012)
KP F Test	22.4	1378.9
Observations	5,686,731	3,268,590

Note: 2SLS estimates. The dependent variable is a dummy variable equal to one when the individual was hired on a temporary contract at year *t* and had/started a permanent contract with the same employer in the following calendar year. Local labor markets are defined based on 4-digit occupations and Functional Urban Areas (FUAs), rather than Functional Areas, as in our baseline regressions. Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before hiring, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FUAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.30 – Labor market concentration and conversions from temporary to permanent contracts – IV estimates – New hires on temporary contracts only – Local labor markets based on NUTS-3 regions.

Dep. Var Conversion	Italy	Spain
Log HHI	-0.0401***	-0.0034***
	(0.0079)	(0.0010)
KP F Test	87.4	2194.1
Observations	9,819,966	4,410,352

Note: 2SLS estimates. The dependent variable is a dummy variable equal to one when the individual was hired on a temporary contract at year *t* and had/started a permanent contract with the same employer in the following calendar year. Local labor markets are defined based on 4-digit occupations and NUTS-3 regions (districts in Portugal), rather than Functional Areas, as in our baseline regressions. Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before hiring, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other NUTS-3 regions for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.31 – Labor market concentration and conversions from temporary to permanent contracts – IV estimates using the leave-one-out HHI as an instrument – New hires on temporary contracts only.

Dep. Var Conversion	Italy	Spain
Log HHI	-0.0299***	-0.0035***
	(0.0067)	(0.0009)
KP F Test	67.3	2,583.1
Observations	9,012,917	4,105,317

Note: 2SLS estimates. The dependent variable is a dummy variable equal to one when the individual was hired on a temporary contract at year *t* and had/started a permanent contract with the same employer in the following calendar year; it is equal to 0 otherwise. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before hiring, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of $Log(HHI)$ in other FAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.32 – Labor market concentration and conversions from temporary to permanent contracts – IV estimates – New hires on temporary contracts only – controlling for the share of 4-digit occupations in new hires at the national level.

Dep. Var Conversion	Italy	Spain
Log HHI	-0.0127**	-0.0025**
	(0.0062)	(0.0010)
Share of occupation *o* in hiring at the national level	yes	yes
KP F Test	118.9	2570.78
Observations	9,012,917	4,105,317

Note: 2SLS estimates. The dependent variable is a dummy variable equal to one when the individual was hired on a temporary contract at year *t* and had/started a permanent contract with the same employer in the following calendar year. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Additional control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before hiring, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. $Log(HHI)$ is instrumented by the average of the log inverse number of firms with positive hiring in other FAs for the same occupation. Standard errors are clustered at the labor-market-by-year level. KP F Test: Kleibergen-Paap Wald F Test. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

Table 2.33 – Labor market concentration and conversions from temporary to permanent contracts – New hires on temporary contracts only – Plausibly exogenous instrument regressions.

Dep. Var Conversion	Italy	Spain
(1) Reduced-form estimate of α from eq. (5)	-0.0174*** (0.0033)	-0.0024*** (0.0008)
(2) Minimum γ for which β is significant at the 10% level in eq. (4) using 2SLS	-0.0116	-0.0011
(2)/(1)	0.67	0.46

Note: The dependent variable is a dummy variable equal to one when the individual was hired on a temporary contract at year *t* and had/started a permanent contract with the same employer in the following calendar year. Local labor markets are defined based on 4-digit occupations and Functional Areas (FAs). Control variables include gender, education (4 categories), yearly dummies for workers' age, whether the individual was employed the year before hiring, whether he/she works full time or not, as well as firm-by-municipality-by-year fixed effects, sector and establishment fixed effects (where not collinear with firm-by-municipality fixed effects), and local labor market fixed effects. Standard errors are clustered at the labor-market-by-year level. *** p<0.01, ** p<0.05, * p<0.1. Observations include singletons.

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