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## ORIGINAL ARTICLE

# Britain and BrExit: Is the UK more attractive to supervisors? An analysis of the wage premium to supervision across the EU

Leone Leonida<sup>1</sup>  | Antonio Giangreco<sup>2</sup> | Sergio Scicchitano<sup>3</sup> | Marco Biagetti<sup>3</sup>

<sup>1</sup>King's Business School, King's College London, London, England

<sup>2</sup>IESEG School of Management - Univ. Lille, CNRS, UMR 9221 - LEM - Lille Economie Management – 59000, Lille, France

<sup>3</sup>National Institute for Public Policies Analysis (INAPP), Rome, Italy

## Correspondence

Leone Leonida, Level 4, Bush House, 30 Aldwych, London, King's Business School King's College London, WC2B 4BG, England.

Email: [leone.leonida@kcl.ac.uk](mailto:leone.leonida@kcl.ac.uk)

## Abstract

We studied which European Union (EU) economy was more attractive prior to Brexit for employees in supervisory positions. We estimate the extra wage that supervisors earn relative to their subordinates—the wage premium to supervision (WPS)—at different quantiles of distribution of wages for 26 European economies. We find that the UK rewards supervisors more than other EU economies. Moreover, the WPS increases with wage and so increases wage inequality. Over 10% of the WPS depends on the national economic context. We discuss the implications for immigration and policymakers in relation to the post-Brexit process.

## 1 | INTRODUCTION

The mobility of European citizens is among the pillars of the European Union (EU) common market that, fuelled by globalisation and cross-border operations, has been growing since the beginning of the 21st century. According to the 2016 Annual Report on Intra-EU Labour Mobility, in 2015, the year prior to the Brexit referendum, 11.3 million people of working age were living in an EU country different from that for which they hold nationality (Fries-Tersch et al., 2016). It is, therefore, inevitable that Brexit—which took place on 1st January 2021—triggered a passionate debate about the mobility of European citizens within EU borders.

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A critical point of discussion throughout the Brexit negotiation process between the EU and the UK has been whether workers from the EU could continue to stay in or to move to the UK and, conversely, whether British citizens could stay in or move to other EU labour markets post-Brexit. The Migration Advisory Committee, in its final report on European migration in the UK (MAC, 2018), proposed a differentiated strategy ‘based on what skills you have to offer, not which country you come from’ (PM Boris Johnson’s talk at the Conservative Party conference in 2018). The British government has finalised a point-based immigration system, similar to that adopted in Australia, according to which citizens of EU states would not be favoured over non-EU citizens, and priorities would include securing a job offer, having the necessary skills to secure that job and speaking English.<sup>1</sup>

The above is relevant because EU economies compete to attract high-skilled workers, as ‘the war [...] for talent is especially prevalent amongst knowledge workers as the economy has shifted from an industrial economy to a knowledge economy’ (Schlechter et al., 2014:2). Undoubtedly, the UK has been a winner in this competition. Since the 90s, the proportion of skilled immigrants in the UK has risen significantly, doubling that of unskilled immigrants (Hatton, 2005). These talented and highly qualified immigrants often act as supervisors of other employees and/or production processes (D’Amuri & Peri, 2014); they are important in several respects, including for the transmission of knowledge that leads to economic growth (Beaudry & Francois, 2010), and for the generation of new ideas and innovation (Hammond et al., 2011).

Some national economic contexts are more attractive to high-skilled workers because they offer a higher wage premium to supervision (WPS), that is, the extra wage that supervisors earn because of their role relative to other employees. Here, we investigate the hypothesis that the UK is more attractive to supervisors because it pays a higher WPS than the other EU economies. Should this be the case, it would be valuable to understand whether the above-mentioned immigration policy can satisfy its objectives—to crowd-out unskilled workers and crowd-in skilled employees, including those with supervisory experience—or, conversely, whether it would have the unintended effect of reducing the number of qualified supervisors from the EU working in the UK. We ask: (1) How much are supervisors paid on account of their role in different country systems? (2) Does the WPS increase with wage, therefore, increasing inequality? (3) How much of the WPS can be attributed to the national context in which supervisors work?

The empirical literature identifies several individual and labour-market characteristics likely to shape wage distribution and influence wage inequality (Di Nardo et al., 1996; Pendleton et al., 2017). Even though the WPS is likely to impact the degree of inequality in the distribution of wages, to our knowledge, no previous study has shed light on the contribution of the former in determining the latter: labour economics and corporate finance scholars focus prevalently on the determinants of the minimum wage (Di Nardo et al., 1996), or on the premium for employees at the top of the wage distribution (Tosi et al., 2000). We are interested, instead, in studying the additional remuneration of supervisors located at all positions of wage distribution for the EU economies and the UK. To this end, we built upon a non-parametric density estimation to measure the WPS attributed to each supervisor in different countries. This is critical because supervisory responsibilities, skills and wages differ between employees within and among EU economies. In doing so, we were able to understand whether the WPS contributes to attract employees in supervisory positions, and specifically whether this is the case in the UK. By building on Blau and Kahn’s (1996) analysis of the mean of the distribution of wages, we generalise Di Nardo et al.’s (1996) and Leonida et al.’s (2020) methodology to multi-country international comparisons. The approach we propose yields credible and robust estimates of the impact of the national context on the WPS.

The rest of this article is organised as follows. In section 2, we present and discuss the research questions that motivate our research. In Section 3, we present the data and analytical strategy for estimating the WPS and the impact of each national context on the WPS in 26 European economies. In section 4, we present our empirical results. In section 5, we discuss our contribution. We also discuss the limitations of our study and policy implications with reference to post-Brexit immigration policy. In section 6, we offer some conclusions.

## 2 | BACKGROUND: THE SUPERVISORY ROLE AND THE UK LABOUR MARKET

Skilled supervisors are rewarded for playing a role marked by significant complexity, diversified impact and an articulated system of expectations. They organise and oversee the work of other employees (Beaudry & Francois, 2010) and identify the goals and the role of each subordinate (Hsieh, 2012). Guerrero and Sire (2001) found that supervisors in France played a significant role in enhancing their motivation to train. Kuvaas and Dysvik (2010) demonstrated that perceived supervisor support plays a central role in the implementation of HR practices by influencing employees' positive attitudes and performance, in Norway. Moncada et al. (2014) showed that social support from supervisors in Spain is inversely correlated with mental health problems, stress and burnout. Along the same lines, Galletta et al. (2011) reported that perception of supervisors' actions was a significant predictor of employees' job satisfaction among nurses in Italy. Prins et al. (2007) found that dissatisfaction with emotional support from the supervisor had a greater impact on burnout in comparison with dissatisfaction with emotional, appreciative and informative support from fellow residents, nurses and patients in the Netherlands. Roxana (2013) investigated the relationship between emotional demands and job satisfaction in Romania and found evidence that supervisor (and co-workers) support can mediate the effect of emotional demands on job satisfaction. In their meta-analysis based on 80 different studies, Hammond et al. (2011) observed that supervisory support enhances creativity and innovation, which is particularly relevant for the UK as an EU leader in innovation. Škerlavaj et al. (2014) showed that employees who perceived less supervisory support showed lower creativity, while those who perceived greater support displayed a nearly linear positive correlation between idea generation and implementation. Consistently, Binnewies and Gromer (2012) found that supervisory and co-worker support were good predictors of idea promotion and generation.

Although the evidence points at recognition of the importance that supervisors have across the different EU economies, and that their role should be adequately rewarded with a premium, it is not the case that the different economies necessarily reward supervisors similarly. On the contrary, supervisors' compensation packages and practices differ considerably between economies because they depend upon factors, such as national pay structures, fiscal policies, specific regulations and financial participation schemes, that may be defined at the national level in some economies, and at the regional or corporation level in others (Thelen, 2009; Farndal et al., 2017). The first question we ask is: how much are supervisors paid on account of their role in the different country systems?

In addition, differences might exist in the nuances of the supervisory role in each of the EU economies. In a context like that of the UK, supervisors need to be particularly skilled because, in contrast to settings with more hierarchical relationships and authoritarian models, solutions to workplace issues rely on supervisors' relational skills and professionalism in managing people (Cieslik, 2011). This suggests that not all supervisors in the same economy are paid the same, but

that the WPS is likely to reflect the heterogeneity that the supervisory role includes. In our view, because the supervisory job is a relational activity, the WPS is likely to depend on the wage of the supervisee. In this case, the WPS would grow along the distribution of wages, so that it would be higher at the right tail of the distribution of wages. In turn, and especially for the UK, the WPS would contribute to increasing wage inequality.

In the UK, there is a long-term trend of increasing wage inequality (Belfield et al., 2017), and it is not clear what the main determinants of these changes in the wage distribution are. One explanation looks at the increasingly generous pay of executives and supervisors: in fact, the British labour market tends to have larger compensation differences among the different layers of the hierarchy than other countries (Piketty, 2013). In exploring whether the WPS contributes to raising inequality, analysis of the mean of the distribution only cannot reveal the wealth of results that analysis of the full distribution can offer. To this end, we estimate the WPS for the full distribution of wages, and the second question we ask is: does the WPS grow along the distribution of wages, thus, increasing wage inequality?

National contexts may play a role in determining the WPS. Calvo and Wellisz (1979) considered WPS to be exogenous to the firm and determined by contextual elements, such as laws, contracts, practices and conventions, aimed at protecting workers and redistributing income (Marsden & Belfield, 2010; Eichhorst, 2015). These elements also include the specification of permissible types of employment contracts, salary limits, working hours and working conditions, industrial relations regulations and social protection standards (Betcherman, 2012). Moreover, depending on the external context and the firm's internal organisation, WPS might shape the distribution of wages (Acemoglu & Newman, 2002). We expect, therefore, that the national context will affect the level of WPS so that the more framed and regulated the context, the weaker its effect on the level of WPS, while the more flexible and liberalised the contextual conditions, the stronger its effect on the level of WPS. According to Gomez (2018), the British labour market has the strongest ability to appeal to and retain qualified workers who are generally younger and better educated than their British colleagues. These immigrants benefit from a liberalised legal framework, worldwide diffusion of the English language (favouring inbound mobility) and the openness of the British higher-education system. Indeed, European students, in particular, tend to remain in the UK and enrich its qualified workforce (Tharenou & Kulik, 2020). The third question we ask is: how much of the WPS can be attributed to the national context where the supervisor works?

Answering the research questions above would make it possible to understand whether the WPS contributes to attracting employees in the UK—especially if, as we expect—the latter paid the highest WPS across the EU economies pre-Brexit. In turn, the results will aid analysis of the current situation in the UK, where the post-Brexit immigration policy might contribute to the British labour market being perceived as less attractive for supervisors. Indeed, since the 1st of January 2021, migrants must apply, as above mentioned, for a visa according to a point-based system, where a minimum of 70 points is required to live and work in the UK. A job offer from an approved employer for a skilled job, and being able to speak English, contribute 50 points. The migrant may achieve the remaining points from a specified minimum yearly wage, or from qualifications, where a relevant PhD gives 10 points—20 points if the PhD is in a STEM discipline. All this is clearly likely to impact the attractiveness of the UK to skilled supervisors: the textual analysis of the UK point-based immigration document shows that about half of the job descriptions explicitly mention words such as 'manager' and 'supervisor' when defining eligible occupations for the skilled-worker route. Possibly more importantly, none of the job descriptions for which this route is banned contain them.

### 3 | DESCRIPTIVE STATISTICS AND ANALYTICAL STRATEGY

Our empirical exercise uses the EU-SILC database released in 2009. The data were collected during 2007; the relative attractiveness of the economies, therefore, is not influenced by events such as the Global Financial Crisis and its recovery, announcements and outcome of the Brexit referendum and the more recent COVID-19 pandemic. This homogenised survey, which supplanted the European Community Household Panel (ECHP) in 2005, has two main advantages. First, the set of economies is comparable because the survey builds on common guidelines, definitions and procedures, with information on 440,400 individuals in 26 European countries of the EU-28—excluding Bulgaria and Romania, which joined the EU in January 2007. Second, it covers 26 EU member states, including new entrants, whereas the old ECHP only covered 14 economies. Our comparison, therefore, assesses EU states with heterogeneous economic and organisational contexts in a tranquil year.

As is common in wage distribution research, we exclude students, people undertaking compulsory military service, self-employed workers and people over the age of 25–65 years. We also exclude individuals with missing values for any of the variables used. This selection resulted in a sample of 126,435 individuals.

#### 3.1 | Descriptive statistics

Table 1 reports the average wage in euros, our dependent variable; the percentage difference between supervisors and production employees; the ratio of supervisors to production workers and the number of observations for each of the 26 European economies under analysis. We present statistics by the employees' roles (supervisors and production employees), and by country, because these are our main independent variables. Closely following the theoretical definition of supervisor used in Acemoglu and Newman (2002), and Beaudry and Francois (2010), the EU-SILC survey defines supervisors as individuals whose:

responsibility includes formal responsibility for supervising a group of other employees (other than apprentices), whom they supervise directly, sometimes doing some of the work they supervise. It implies that the supervisor or foreman takes charge of the work, directs the work and sees that it is properly done. (2006:193)

In our sample, 31,689 individuals are supervisors. The percentage difference in the average wage between supervisors and production workers is positive in all economies, with large variability in the wages of supervisors and production employees. This difference ranges from 40.5% in Slovenia, to more than 100% in Portugal and Cyprus. The lowest wage for the subsample of production employees is paid in Latvia, and the highest in Denmark. There is a large variation in the wages that supervisors earn in the EU: Slovakia pays the lowest wage, while the highest is paid in Luxembourg. Supervisors are, on average, remunerated more in the UK than in almost all the other national economic contexts. The ratio of supervisors to production employees also shows large variability, ranging from 12.9% in Latvia to 65.3% in Austria. These differences are substantial between economies at different stages of development, as well as between those classified as developed by the OECD.

The difference between wages for supervisors and non-supervisors also depends on personal characteristics. Table 2 reports data on job characteristics (percentage of permanent and full-time positions), individual characteristics (percentage of males, marital and citizenship status,

**TABLE 1** Wage for supervisors and production employees, supervisors to production employees ratio and number of observations by country

Economy	Wage (Euros)			Supervisors to production employees	Observations (#)
	Supervisors	Production employees	% Difference		
Austria	2559	1620	57.970	0.653	5146
Belgium	3213	2000	60.670	0.406	4524
Cyprus	2284	1140	100.350	0.411	3412
Czech Republic	827	514	60.976	0.246	7244
Denmark	4393	3081	42.584	0.210	2796
Estonia	656	415	57.992	0.181	4563
Finland	3434	1953	75.832	0.311	3716
France	2406	1564	53.849	0.499	6796
Germany	2911	1601	81.851	0.248	9068
Greece	2345	1187	97.488	0.189	2818
Hungary	647	375	72.666	0.235	6015
Iceland	3852	2644	45.662	0.952	1329
Ireland	3627	1897	91.149	0.564	3120
Italy	2474	1564	58.170	0.326	12,310
Latvia	578	330	75.277	0.129	3341
Lithuania	612	344	77.769	0.207	3969
Luxembourg	4695	2392	96.229	0.398	3564
Netherlands	3377	2199	53.537	0.411	4001
Norway	4119	2680	53.696	0.470	2929
Poland	685	395	73.325	0.191	10,158
Portugal	1544	759	103.483	0.259	2631
Slovakia	548	360	51.951	0.170	5040
Slovenia	1428	1016	40.527	0.390	221
Spain	1896	1168	62.324	0.258	9035
Sweden	2730	1859	46.887	0.240	3333
UK	3478	1923	80.832	0.388	6574

Reports the average monthly wage for supervisors and production employees in euros (PPP); the wage difference between supervisors and production employees (%); the ratio of supervisors to production employees and the total number of observations.

education and skills<sup>2</sup>) and firm characteristics (percentage with more than 10 employees, sector of economic activity) in the UK.

There are noticeable differences between the two groups. Supervisors have higher skills and education levels than production workers. Unskilled supervisors represent less than 10% of the sample. UK supervisors are, on average, younger than production employees. Most supervisors are educated to the upper-secondary level, with a large fraction educated up to the tertiary level. The UK has a large skills difference between supervisors and production employees, suggesting that this context is more likely to facilitate the movement of skilled employees into supervisory positions. Men occupy supervisory positions more often than women.

TABLE 2 Descriptive statistics

Variable	Subsample	Supervisors	Production employees
Job characteristics			
Permanent position		98.590	95.600
Full-time position		70.860	88.980
Individual characteristics			
Age (average)		43.778	44.310
Gender (% male)		55.090	43.560
Married		65.400	62.380
Local		96.870	96.270
Education	Tertiary	42.790	23.550
	Post-secondary non-tertiary	3.640	4.300
	Upper secondary	48.590	58.450
	Lower secondary	4.980	13.700
	Primary	0.000	0.000
Skills (ISCO-88)	Level 4	72.180	32.170
	Level 3	16.850	39.040
	Level 2	5.170	7.960
	Level 1	5.800	20.840
Firm characteristics			
Firm size (% >10 employees)		86.170	82.620
Sector of economic activity			
Agriculture and fishing		0.710	0.700
Manufacturing, mining, electricity		14.470	15.910
Construction		6.270	5.020
Wholesale, retail trade, repair services		10.230	14.100
Hotels and restaurants		2.980	2.140
Transport, storage, and comm.		5.170	6.910
Financial intermediation		4.860	4.720
Real estate, renting, business act		11.950	10.490
Public administration and defence		12.070	10.020
Education		11.290	13.530
Health and social work		14.810	12.510
Other		4.700	3.950

Reports information on our sample's job characteristics (% of individuals with a permanent position and a full-time position), individual characteristics (average age, % of males, marital status, local status, educational level, skill level) and firm characteristics (% with more than 10 employees, sector of economic activity).

### 3.2 | Analytical strategy

These differences in wages are not due to the supervisory position alone. Controlling for variables, such as skills, education level and gender, is important because, in supervisory positions, for example, some economies value skills more than experience (Goergen et al., 2012). Di Nardo et al. (1996) propose an analysis building upon the counterfactual distribution of wages, that

compares the actual distribution of wages for all the employees with the distribution of wages that would prevail if none of the employees was a supervisor, other things being equal. The counterfactual distribution can be obtained by reweighting the distribution of the subsample of production workers. Because this subsample has a different distribution of personal characteristics with respect to the entire sample of employees, a set of weights can be used to rebalance it to ensure that the characteristics of the two samples are uniform. Once reweighted, the actual and counterfactual distribution of wages differ only because, in the latter, other things being equal, there are no supervisors. The WPS is measured as the horizontal difference between these two distributions.

To obtain the set of weights, Di Nardo et al. (1996) suggest estimating the probability of supervising other employees—the dependent variable—as a function of characteristics of the employee, the firm and the firm's sector of activity. In our case, the specification must be as complete and flexible as possible to enable comparison of the WPS among the 26 economies. Therefore, we estimate 26 equations independently and, for the sake of comparability, we adopt the same empirical specification. We do not adopt the standard general-to-specific approach, which would make the resulting preferred model specific to the economy. Instead, we test for the joint significance of the following groups of variables:

- (i) Individual characteristics: education (four categories: lower-secondary, upper-secondary, post-secondary, at least tertiary); work experience (and its square, cube and quartic); gender; marital status and citizenship (two dummies: national/non-national, European/non-European)
- (ii) job characteristics (part-time, full-time, temporary, permanent)
- (iii) firm characteristics (size, measured by three dummies, 13 economic sector dummies); and
- (iv) individual skills (four dummies measuring the skills required for the task)

We adopt the model that maximises the number of accurate predictions.

To estimate how much of the WPS can be attributed to the national context, it is necessary to have a measure of how much EU supervisors would earn if, other things being equal, they were working in the UK. This amount reveals the impact of the national economic context where they work compared with the British context. Here, we generalise the methodology of Blau and Kahn (1996) to the analysis of multi-country distributions. Fortin et al. (2011) argue that, after estimating the set of weights needed to produce the distribution that would prevail if no individual were a supervisor in each economy, we need to estimate the set of weights necessary to produce the distribution of wages that would prevail if, other things being equal, the employees in each EU country worked in the UK. The interaction between the two sets of weights gives the wage distribution that would prevail in each EU country if no individual were a supervisor and they all worked in the UK. The horizontal difference between the actual wage distribution and this distribution of wages yields the WPS that supervisors would earn, other things being equal, in the UK. To obtain this new set of weights, we pool the subsample of UK and, say, individuals for each of the other EU economies, and we fit the probability of working in the UK versus that of working in that particular EU economy. The horizontal difference between the two counterfactual distributions of wages reveals the impact of the UK context on the WPS of the particular EU economy under examination (Gottschalk & Joyce, 1998). This exercise is done 25 times, one for each of the economies in our sample.

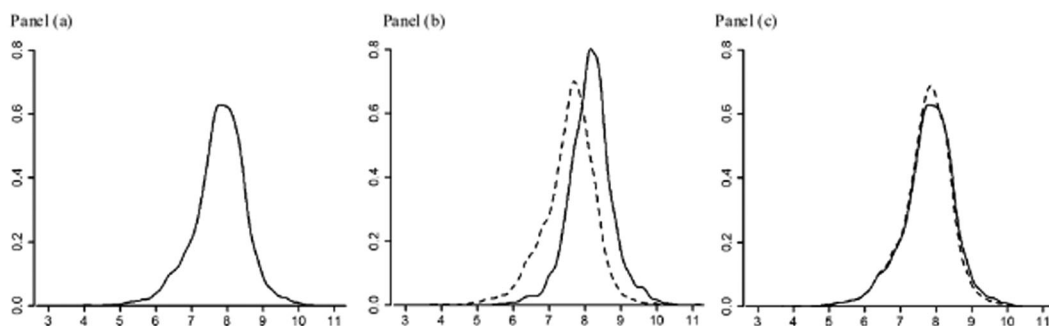


FIGURE 1 Distribution of wages for all employees, supervisors and production employees in the UK. This figure reports the distribution of the log of wages in the UK (Panel 1), the distribution of log wages for the subsamples of supervisors and production workers (Panel 2, solid and dashed line, respectively) and the comparison of the actual distribution of wages with the counterfactual distribution of wages (Panel 3, solid and dashed line, respectively)

## 4 | EMPIRICAL RESULTS

### 4.1 | How much are supervisors paid on account of their role in the different economies?

Appropriate estimates of the wage at quantiles of the distribution of earnings can be obtained by taking the log of wages and smoothing the wage distribution for the sample of UK employees, and for the subsample of supervisors and production workers. Estimates are obtained by the Gaussian kernel, which uses the height of the standard normal distribution as the underlying kernel density function, and the average of the optimal bandwidths across all the samples (Silverman, 1986). This approach makes the resulting distributions of wages comparable for the two groups of employees across countries (Marron & Schmitz, 1992).

In Figure 1, Panel (a) reports the estimate of the distribution of wages for the UK, and Panel (b) reports the distributions of wages for supervisors and production workers. Results suggest that the distribution for the former is to the right of the distribution for the latter. This means that supervisors located at a given quantile of the distribution have a wage premium over the corresponding production employees because of their role. As discussed, the difference between wages also reflects the differences in the personal characteristics of the two subsamples of employees. To control for these differences, Panel (c) reports the estimates for the actual and counterfactual distributions of wages for the UK, which illustrates the impact of the WPS on the distribution of wages, other things being equal. The counterfactual distribution of wages in the UK is to the left of the actual distribution. The evidence, therefore, supports the hypothesis that the WPS shifts the wage distribution to the right.

We estimate the WPSs for each of the country systems under examination. Figure 3 reports the WPS as measured at the mean of the distribution of wages for each economy. Table 3 reports results of the Kolmogorov–Smirnov test for the null hypothesis that the counterfactual and the actual distribution are equal, rejecting it for all the economies except Belgium, Ireland, Lithuania, the Netherlands, Slovakia and Sweden. The evidence is consistent with the hypothesis that in Ireland and the UK, the effect of supervisory jobs on the average wage is higher than in all the other economies. This makes the UK labour market more attractive to supervisors than the

**TABLE 3** Test for significance of the wage premium for supervision across 26 EU economies

Country	KS statistic	Country	KS statistic	Country	KS statistic	Country	KS statistic
Austria	0.059 (0.030)	France	0.081 (0.000)	Latvia	0.120 (0.000)	Slovakia	0.044 (0.192)
Belgium	0.029 (0.687)	Germany	0.063 (0.018)	Lithuania	0.043 (0.210)	Slovenia	0.092 (0.000)
Cyprus	0.122 (0.000)	Greece	0.104 (0.000)	Luxembourg	0.083 (0.001)	Spain	0.050 (0.100)
Czech Republic	0.063 (0.018)	Hungary	0.054 (0.059)	Netherlands	0.048 (0.121)	Sweden	0.039 (0.316)
Denmark	0.115 (0.000)	Iceland	0.134 (0.000)	Norway	0.054 (0.059)	UK	0.083 (0.000)
Estonia	0.152 (0.000)	Ireland	0.068 (0.016)	Poland	0.133 (0.000)		
Finland	0.093 (0.000)	Italy	0.081 (0.001)	Portugal	0.063 (0.02)		

Reports the Kolmogorov–Smirnov (KS) statistics for equality of actual and counterfactual distributions; *p*-values are reported in brackets.

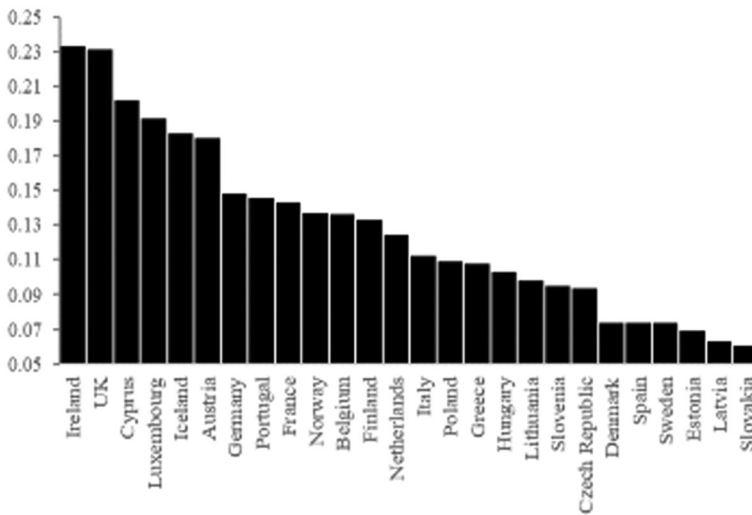


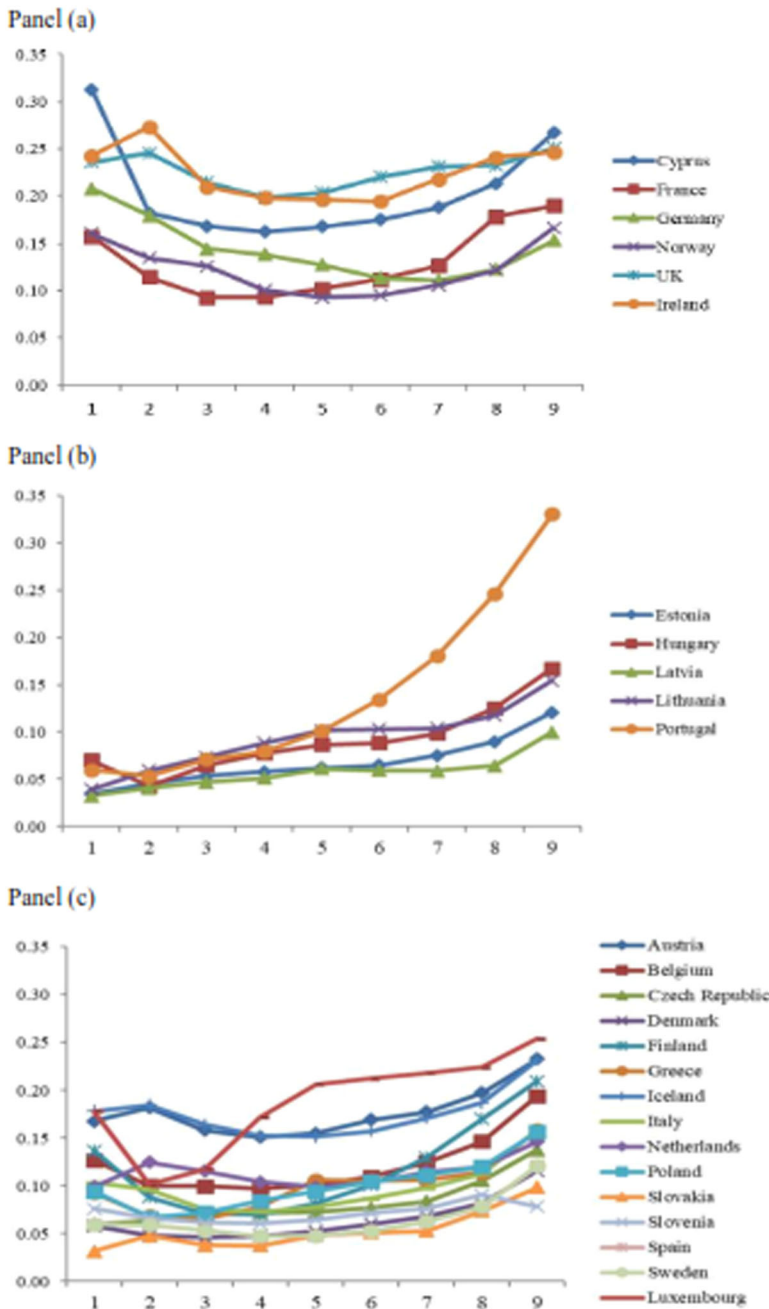
FIGURE 2 . The average wage premium to supervision across countries. This figure reports the average WPS estimated at the mean of the distribution of wage across all 26 EU economies

other EU economies. The evidence reported in Figure 2 suggests that there are substantial differences across countries. Economies can be roughly grouped according to the average WPS. In the first group, Ireland and the UK pay the highest average premium (23.4 and 23.2%, respectively), followed by Cyprus (20%), Luxembourg (19.2%), Iceland (18.3%) and Austria (18.1%). The second group includes Germany, Portugal, France, Norway, Belgium, Finland and the Netherlands. The third group comprises Italy, Poland, Greece, Hungary, Lithuania, Slovakia and the Czech Republic, and the fourth group includes Denmark, Spain, Sweden, Estonia, Latvia and Slovakia, with the lowest WPS (6.1%).

## 4.2 | Does the WPS grow along the distribution of wages, thus, increasing wage inequality?

Panel (c) of Figure 1 also shows that for the case of the UK, the impact of the WPS on the distribution of wages is greater on the right tail. This suggests that supervisors located at different quantiles of the wage distribution have a different WPS.

To examine whether this is the case, we estimated the WPS at the deciles of the distribution of wages. Figure 3 presents results that provide valuable additional information with respect to the analysis of the mean only. Remarkably, all the economies have a higher WPS at the highest quantile than at the median. For 11 of the 26 economies, the WPS is higher at the median than at the first decile. The highest WPS at the first decile is paid by Cyprus and at the ninth decile by Portugal. The lowest WPS at those deciles is paid by Slovakia and Slovenia, respectively. The evidence rebuts the hypothesis of an equal WPS for individuals located at the same deciles of the wage distribution in different economies and supports the hypothesis that the WPS exacerbates wage inequality. We can group economies according to the shape of the WPS across the deciles of the distribution of wages. The first group of economies consists of six countries where the curve is U-shaped (UK, Ireland, Cyprus, Norway, Germany and France). Germany is the only country with



**FIGURE 3** The wage premium to supervision at deciles of the distribution of wages by groups of economies. This figure reports the WPS at deciles of the distribution of log wages for high-WPS economies (Panel a); medium-WPS economies (Panel b) and low-WPS economies (Panel c) [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

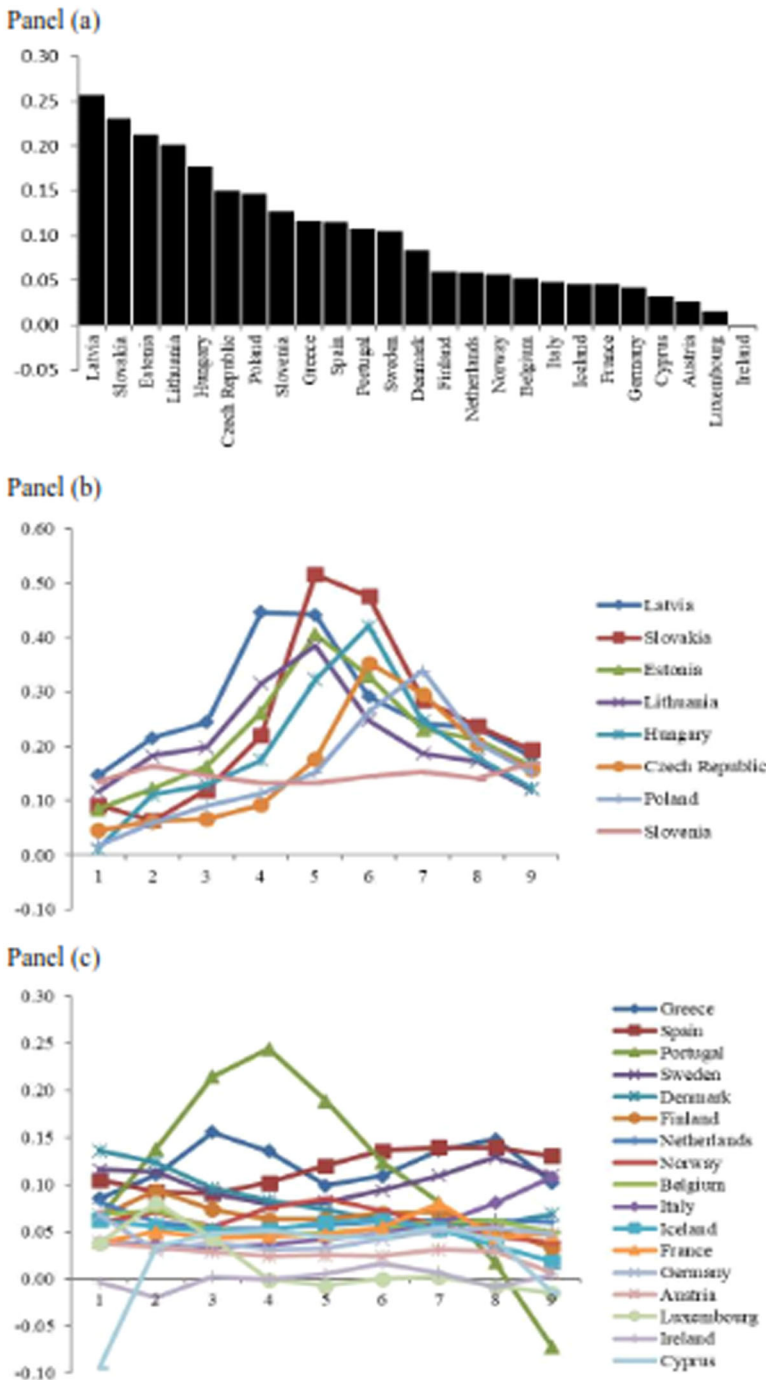
the highest WPS value at the lowest decile. The position of all the deciles confirms that this group of economies rewards supervisors, on average, more than others. Members of the second group of five economies, namely Estonia, Hungary, Latvia, Lithuania and Portugal, pay supervisors a low WPS, and the premium tends to increase monotonically over all the deciles (apart from the first decile for Hungary). In the third group, including the remaining 15 economies, premia are lowest between the 10th percentile and the median, and are therefore likely to take a J-shape. Our evidence suggests that, apart for Germany, the WPS tends to raise inequality.

### 4.3 | How much of the WPS can be attributed to the national context in which supervisors work?

We next estimate the probability of working in each economy and combine the resulting set of weights with those from our previous analysis. This exercise provides the counterfactual distribution that would prevail if, other characteristics being equal, all the employees from other EU economies worked in the UK. This distribution, once compared with the actual distribution of wages prevailing in that economy, would give the role of the national context in shaping the WPS. The analysis is done for each of the 25 economies, using the UK as the reference economy in all the cases. Note that the additional WPS is computed as difference between premia; in turn, this contributes to addressing any residual bias due to self-selection in the role.

Figure 4 reports the difference between the WPS earned in the economy, where the employees work and the WPS they would earn if they worked in the UK. These differences measure what we defined as the additional WPS. The analysis of these differences suggests that, apart from Ireland, the average effect of the national context on the average WPS is positive; accordingly, a supervisor working in the UK instead of in the country where they hold nationality would earn a higher WPS. The so-called new EU entrants—Latvia, Slovakia, Estonia, Lithuania, Hungary, the Czech Republic, Poland and Slovenia—can be grouped among economies where the national context has the largest impact. In the second group of economies that, apart from Cyprus, are the initial bulk of the EU, the national context has a somewhat lower impact.

Because the shape of the WPS across the deciles of the distribution of wages of these economies is similar, we adopt the same grouping when presenting results for deciles. We define the EU8 group of economies as the ‘high additional WPS’, as opposed to the ‘low additional WPS’ group, that includes Greece, Spain, Portugal, Sweden, Denmark, Finland, Netherlands, Norway, Belgium, Italy, France, Germany, Austria, Ireland and Cyprus. As for the case of the analyses of the WPS, the results at the deciles for the additional WPS show a more detailed picture. Except for five deciles in Ireland and four in Luxembourg, the extreme deciles in Cyprus, and the ninth decile in Portugal, the impact of the WPS is always positive. That is, the effect of the British context on WPS is positive for almost all countries at almost all deciles. Economies in the EU8 group, apart from Slovenia, display an inverted U-shaped impact of the national economic context on the WPS, suggesting that employees located at the centre of the distribution of wages in these economies would have the highest benefit if worked in the UK. The remaining group of economies, defined as the group of low additional WPS, have a slightly increasing impact of the national context through the deciles, suggesting that supervisors relocating from these economies to the UK would all earn a premium, and that this premium would be higher the higher the wage. Exceptions in this group are the first and ninth deciles in Cyprus, and Germany, as discussed, that shows the highest impact at the first decile. Also, Portugal displays the largest impact of the national context before the median.



**FIGURE 4** The additional WPS and at the mean and at deciles of the distribution of wages by countries. This figure reports the average additional WPS (panel a), the additional WPS at deciles of the distribution of the log wages for high-additional-WPS economies (Panel b) and low-additional-WPS economies (Panel c) [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

**TABLE 4** The WPS as incentive for supervisory roles and to migrate to the UK

Panel (a)		
	Supervisors (% of employees)	
Wage for supervisors—Wage for production workers	0.516*	
Wage for supervisors without WPS—Wage for production workers	0.286	
Panel (b)		
	Managers and professionals migrating to the UK from other EU countries (‰ of population)	Managers and professionals migrating to the UK from EU countries net of emigration (‰ of population)
Wage for supervisors (UK—EU countries)	0.571*	0.620*
Wage for supervisors (UK—EU countries without WPS)	0.529*	0.562*
Panel (c)		
	Additional WPS—WPS (% of UK wage for supervisors)	Managers and professionals migrating to the UK from other EU countries (‰ of population)
EU8 countries (weighted average)	21.360	3.600
EU15 countries (weighted average)	11.740	1.100
Other EU countries (weighted average)	4.000	0.900

#### 4.4 | Additional analysis

After assessing the relative attractiveness of the UK economy with respect to the other EU economies, we conducted additional analysis by asking both whether the WPS helps attract employees to the supervisory position, and whether it has contributed to attracting supervisors to the UK.

To answer the first of the questions above, we estimate the correlation between the wage that supervisors earn on top of the wage for production employees and the percentage of supervisors in our sample of economies. We compare this correlation with the correlation, we would observe if there was no WPS attached to the supervisory wage. Table 4, Panel (a) reports the results of this analysis. The analysis suggests that the correlation between the wage that includes the WPS and the percentage of supervisors in each economy is positive and significant at the 1% level (Na. This is not the case if the WPS is subtracted from the wage: the correlation is significantly lower, and it is not statistically significant. The evidence is in support of the hypothesis that the WPS is positively correlated with employees in the supervisory position in the group of economies under analysis.

Similarly, we ask whether the WPS attracted employees with supervisory skills to the UK. In Panel (b), we report the correlation between the wages that supervisors from each EU economy would earn in the UK on top of the wage that they actually earn, and the fraction of managerial and professional employees that migrated to the UK from each EU economy—which we take as a proxy for supervisors migrating to the UK from the EU economies.<sup>3</sup> We compare this correlation with the correlation we would observe if the WPS was deducted from both the wages for

supervisors in the UK and in each of the EU economies. The results suggest that the correlation is positive and statistically significant.<sup>4</sup> Once the WPS is deducted from the wages, the correlation is about 7.4% lower—9.2% if we consider the correlation with net migrants. The comparison suggests that the WPS, taken as part of the wage, helps attract supervisors from other EU economies to the UK. We note that that the correlations are statistically significant even when the WPS is taken out of the wages. This result supports the hypothesis that, for individuals in supervisory roles, the WPS is not the only reason to migrate to the UK.

In Panel (c), we present some more circumstantial evidence. We report the (weighted) average percentage wage for EU8, EU14 and other EU economies, as grouped by the ONS.<sup>5</sup> This grouping is convenient for our analysis. Indeed, we note that the additional WPS is in descending order, where the EU8 economies have the highest average additional WPS, followed by the EU15, and ending with Cyprus, which shows among the lowest WPS. We report the average difference between the wage in the UK and the average wage in these groups of economies, and the percentage average difference we would observe if the WPS is taken out of the wages—the resulting percentage in this case is the percentage difference between the additional WPS and the country-level WPS. We contrast these statistics with the percentage of managers and professionals migrating to the UK as a fraction of the population. Results from this analysis confirm that, as the WPS increases, the presence of managers and professionals in the UK migrating from these groups of economies increases. The conclusion is consistent with that of the correlation analysis.

## 4.5 | Robustness checks

We ran several robustness checks. The first set involved 16 exercises where we studied the role of the choice of bandwidth selector in the results we have reported—where we build on the average of optimal bandwidth according to the Silverman's (1986) rule of thumb.<sup>6</sup> We studied the differences between the WPS we have discussed and those obtained by adopting the average bandwidth computed under the other three optimal bandwidth selectors—namely, the Sheather and Jones's (1992) plug-in method, the cross-validation method, and the normal distribution assumption. We also examined how the results differ if we consider the geometric, instead of the simple, average of the bandwidths. Results do not substantially differ from those presented.

The second set of exercises studies the role of potentially omitted variables when deciding the specification of the probability model, which we use to build the set of weights for our 'what if' exercises. The model we have adopted has an extended subset of variables, whose aim is mainly to control for issues raised by self-selection in the supervisory role. We did check for robustness in two directions. In the first exercise, we added the wage to the set of regressors of the estimating probability model and instrumented this variable by adopting the health condition of the employee—the exogeneity test being in favour of this choice, at least for the UK case. In the second exercise, we wanted to control for the hours worked because this variable is of interest in our context. Following Di Nardo et al. (1996), among others, we therefore, estimated the WPS building on the distribution of the (log of) hourly wage for the case of the UK. None of the exercises above has a relevant impact on our conclusions. However, given that other omitted variables may play a role, it is safe to take the WPS, we have reported and discussed as the upper bound.

Finally, we build upon Magda et al. (2016), who compare different years of the WPS. Following this approach, we estimated the WPS in the UK using data from EU-SILC 2010. We used this WPS to calculate the percentage change of the WPS between 2007 and 2008, and we contrasted it with the variation in the number of managerial and professional individuals migrating to the UK

from the EU during the same period. This analysis provides some circumstantial evidence about the ability of the WPS in UK to attract supervisors from the EU, if we consider the latter a single group. The analysis shows that, over the 2007–2008 period, the UK experienced a reduction in the wage in real terms, most likely because of the GFC. The reduction in wage is more pronounced for supervisors than for production employees. We note that the WPS has been slightly increasing from 2007 to 2008, therefore, helping to mitigate the reduction in the wage for supervisors. This component of the wage increased, and so did the flow of EU immigrants going in the UK to work as supervisors. Results of all the exercises above are available upon request from the authors.

## 5 | DISCUSSION

Our findings have several theoretical contributions and policy implications. First, they suggest that the supervisors are rewarded, other things being equal, on account of their role, in all of the country systems studied. The WPS is a significant amount of money, and it helps make the wage package attractive for those able to perform the complex tasks that the role involves. This suggests, in turn, that the role creates value for the economy. Also, supervisors are paid differently according to where they work, and the UK—together with Ireland—pay the highest average WPS. The differences between WPSs are remarkable and point at the differing importance that supervisors have in each of the economics.

Second, the WPS is higher at the right tail of the wage distribution, and so the WPS is higher for higher wages. The premium differs between supervisors at the same quantiles of the distribution of wages, but in different economies. The evidence suggests that the premium is likely to heighten wage inequality and rebuts the idea that the EU market for supervisory positions is a true common market. In other words, the evidence supports the hypothesis that the WPS is likely to increase inequality, and that the EU market for supervisors is unable to equalize the marginal product of supervisors having similar characteristics. This is especially evident for the UK, which pays a higher WPS that monotonically increases with deciles of the distribution of wages, thus, confirming that the WPS is one of the main drivers of the increasing wage inequality in Britain (Piketty, 2013).

Third, our results show that the specific national context affects the WPS differently in different economies and at different deciles of the wage distribution. In general, where the WPS is higher, the national context has a lower impact. Supervisors should work in the UK because it pays the highest premium at all the deciles on the right tail of the distribution of wages. Everything else being equal, a higher impact of the national context on WPS signals that the supervisors located in that section of the distribution have a higher incentive to move to the UK. This helps to individuate a group of supervisors, usually located in the 50–80% range of the distribution of wages among many of the analysed economies. We did not analyse the determinants of the WPS, apart from the role of the national context; however, one potential avenue involves thinking in terms of bargaining models and rent extraction—that is, supervisors in the UK are better at extracting rents with respect to their EU counterparts: we leave this question for further research.

Fourth, career progression within an economy leads to a related discussion about substitutability between supervisors from different economies. It is difficult to assume that supervisors with experience of supervision in one of the EU economies would be able to serve as substitutes for UK supervisors, by keeping the rank of the distribution where they are in their country, should they decide to move to the UK. However, the higher wage and higher WPS paid to all supervisors in the UK makes the move sensible, even if one accepted a lower rank until enough experience is

accumulated and progression is achieved—note that career progression is facilitated also by the shape of the WPS in the UK, which increases over the distribution of wages. Given this discussion, the additional estimated WPS should be taken as an upper limit, and the requirement by the current immigration scheme is likely to discourage more EU newcomers to the UK.

Fifth, the analysis suggests that the WPS plays a role in attracting supervisors to their position and to the UK. This conclusion is not surprising, given it is consistent with various indicators of talent competitiveness and attraction such as the Global Talent Index, the World Talent Ranking, the Talent Competitiveness Index and the OECD talent attractiveness (Tuccio, 2019). The first positions of the WPS ranking are occupied by the UK, Ireland and Luxembourg, whereas eastern European countries, such as Slovakia, Latvia and Estonia, are at the lowest positions. The Scandinavian and Mediterranean countries are located at the centre. The results for the deciles show that Germany has the highest value at the lowest decile of the distribution of wages, suggesting that supervisors in the early stage of their career are paid a higher WPS than others; meanwhile, in the UK, the WPS increases over the deciles, supporting the hypothesis that the WPS in the UK incentivises career progression.

Our study also offers some managerial implications and thoughts about immigration and industrial policy in the UK. The British labour market is attractive to supervisors because it rewards them, other conditions being equal, with a higher WPS. However, whether the UK's WPS edge will be sufficient to retain the present group of supervisors, or to attract new ones from abroad, will also depend on tangible and intangible elements. The tangible factors concern the extent to which the new immigration policy will attract new skilled workers, particularly from the EU. Eventually, EU skilled employees may elect to leave UK-based supervisory positions, and potential EU skilled immigrants may be discouraged from coming to the UK, owing to the more complex post-Brexit legal and administrative immigration requirements. This is already happening in terms of overall immigration flow (Office for National Statistics, 2021). The intangible elements concern the shared values of British society that contribute to whether EU skilled workers perceive the UK as welcoming. The relatively higher WPS may prove to be a necessary but not sufficient condition for retaining current supervisors and attracting others from the EU. Much will depend on the UK's economic policy choices and cultural ability to maintain an open and inclusive society.

Finally, we argue that the overemphasis on the new immigration policy aimed at crowding-in skilled workers might be rebalanced by minimising the crowding-out effect on unskilled workers because a drop in the latter could damage human-intensive sectors, such as agriculture, hotel and food, and large distribution procurement channels, where EU unskilled immigrants account for at least 15% of the workforce. In this context, integration between immigration policies and vocational training plans is better suited to respond to the needs of the British labour market, in which several sectors already suffer significant mismatch and a shortage of workers in frontline and operational positions. The COVID-19 pandemic has accelerated this because of the increasing demand for unskilled workers in large distribution procurement channels due to the forced closure of brick-and-mortar shops, the departure of many thousands of EU immigrants because of the inadequate and ineffectual response of the British government to (the first wave of) the pandemic in the UK, and the perception of not feeling welcome anymore. Policymakers, therefore, should take advantage of this experience to redefine the legal framework to better respond to the needs of the British labour market for both unskilled and skilled workers, rather than concentrating only on measures targeting the latter at the expense of the former.

Our findings should be treated with caution owing to a few limitations. First, the cross-sectional nature of the data does not allow the validation of the causal relationship. An instrumental

variable approach would also reduce concerns about potential omitted variable bias. Second, although functional to the aim of our study, the EU-SILC database relates to a period prior to the Brexit referendum and reports information dating to 2009. Third, future studies should ideally include longitudinal data about supervisors who moved to the UK to further address substitutability. This type of information would also help to determine whether, and the extent to which, the WPS determines immigration flows from the EU to the UK. Fifth, our study only focuses on a specific population of skilled employees—supervisors. Future research should also consider unskilled employees to enrich the sensitive ethical debate on most wealthy economies and the impact of the related immigration policies on society. Finally, once the COVID-19 crisis is resolved, future studies should be able to disentangle the consequences of the Brexit process on the British labour market for (un)skilled workers from the overshadowing effects that the pandemic has generated over the last 3 years.

## 6 | CONCLUSIONS

The rhetoric of the debate about the pre- and post-Brexit process has developed—significantly and unsurprisingly—around the free mobility of people. Driven by this issue, we centred our study on a specific population of skilled employees—supervisors—to understand how and why the WPS in the UK is more attractive and different from that of other EU members' labour markets prior to Brexit. Based on a comparative analysis of 26 EU economies, and using a dataset specifically built from the EU-SILC survey, we focused on the WPS that supervisors receive relative to their subordinates.

Our results show that (i) the UK pays a higher wage premium to supervisors; (ii) the WPS grows along the distribution of wages, especially of the UK, thus, increasing wage inequalities; and (iii) the type of national economic context impacts the WPS. In this, the WPS accentuates inequalities across most economies, and over 10% of the WPS is correlated to the specific national context. Our study identifies the British labour market as the most attractive to supervisors from EU countries. Brexit, therefore, should not represent a brain-drain mechanism for the UK because, all else being equal, the British labour market rewards supervisors with the highest WPS. However, we argue that the attractiveness of the UK to supervisors will also depend on the ability of policymakers to maintain an inclusive and diverse labour market.

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## DATA AVAILABILITY STATEMENT

This research was conducted with restricted access to the EU-SILC data. The views expressed here do not necessarily reflect the views of the EU-SILC.

## ORCID

Leone Leonida  <https://orcid.org/0000-0002-6721-8413>

## ENDNOTES

- <sup>1</sup><https://www.gov.uk/guidance/new-immigration-system-what-you-need-to-know>. Published on 28th January 2020.
- <sup>2</sup>As in Picchio and Mussida (2011), we use the International Standard Classification of Occupations (ISCO-88) as a proxy for skills. These variables are associated with the type of job chosen by the employee. The categories range from relatively low-skilled jobs, such as plant and machine operators and assemblers, to higher-skilled jobs, such as professionals, legislators, and senior officials, as well as CEO/non-CEO positions. The variables refer explicitly to the required skill level.
- <sup>3</sup>The ONS groups immigrants in the UK under three main categories: managerial and professional, clerical and manual and students. We adopt the first of these groups as a proxy for skilled supervisors migrating to the UK because, by looking at the definition of these categories, as defined in the Standard Occupation Classification, the supervision of other employees in one explicit task of most of the subcategories in the group of managers and professionals. The ONS experts we consulted also recommend the category. In a robustness check, we also adjusted the number of migrants from each EU economy in 2007 by using the percentage of supervisors in each economy from the EU-SILC database. Results are stronger than those reported in this case.
- <sup>4</sup>The data were grouped by country as follows: EU15, EU8, EU2 (Bulgaria and Romania) and other EU economies (Malta, Cyprus and Croatia). The ONS kindly agreed to provide a detailed set of data at the country level. In the new database, data for Belgium, Estonia, Latvia and Iceland are missing. Results do not qualitatively change if we calculate Estonia + Latvia and Belgium + Iceland from the aggregate groups. We thank the immigration team of the ONS for producing a new database for economies, available at International passenger survey estimates of long-term international migration flows by EU citizenship, main occupation prior to migration and sex, 2007 to 2019—Office for National Statistics (ons.gov.uk).
- <sup>5</sup>The ONS records Cyprus among the Other EU economies. For this analysis, we therefore, create an observation comprising of Cyprus only, to adapt our groupings to that proposed by the ONS when discussing migration flows.
- <sup>6</sup>To decide what bandwidth selector to adopt, we analysed the first two moments and the distributions of the optimal bandwidth under the most common bandwidth selectors: the cross-validation bandwidths; Silverman's (1986) rule of thumb; the plug-in smoothing parameter by Sheather and Jones (1992); and the distribution of the bandwidths under normality of the distribution of wages—to be taken as the superior bound. The best approach is Silverman's (1986) rule of thumb, which we use to report the results.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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