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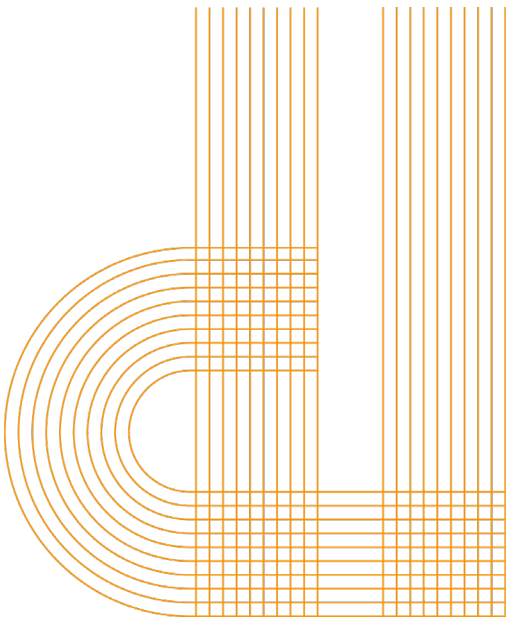

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Occupational segregation of female and male immigrants in the European Union: accounting for cross-country differences*

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Abstract

The paper studies occupational segregation by gender and immigration status in the European Union using the 2005–2015 European Labour Force Survey. Compared to prior studies, it quantifies the levels of segregation that female and male immigrants experience in each country, while undertaking counterfactual and regression analyzes to account for cross-country differences. Overall, male immigrants have lower occupational segregation than their female counterparts and the second-generation is less segregated than the first one. Regarding the geographical differences, a larger union density and involuntary part-time employment are associated with higher segregation, whereas a larger welfare provision, unemployment rate and policies easing family reunion or access to nationality reduce segregation.

JEL Classification: D63; J15; J16; J71

Keywords: Occupational segregation; gender; immigration; European Union

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1. Introduction

The 2004 and 2007 enlargements of the European Union (EU), the Great Recession and the recent refugee and care crisis have dramatically increased immigration flows in Europe. Between 2006 and 2015, the number of immigrants entering one of the 28 European member states rose from 3.5 to 4.7 million annually (Eurostat, 2017). This rising number of immigrant workers challenges the host country's labor market, as individuals with different languages, cultures and educational levels need to make a living, and finding a job is not always easy. Indeed, given their lower human capital endowments or the existing institutional and cultural barriers, their distribution across occupations is far from being homogeneous. They tend to be concentrated in a few occupations, usually with lower salaries, although significant cross-country differences exist in the type of occupations they have.

This is not surprising because Europe integrates countries with different economic structures, welfare provisions and migration histories. Western and Northern Europe[1] have traditionally attracted a large number of immigrants, whereas the South only shifted from a migrant-sending to a migrant-receiving region at the beginning of the 1990s. Eastern countries had to wait for the enlargement of the European Union to become a new source of migrant labor and, to a smaller extent, a destination for non-European workers (De Haas, 2018). The types of immigrants that the countries receive also varies. While western and southern economies mainly attract labor immigrants, northern countries are characterized by receiving more humanitarian immigrants, such as refugees and asylum seekers.

Despite the effort made to draw up a common European migration legislation, only irregular migration, asylum policy and external borders management have achieved certain convergence (Cangiano, 2014). Most migration policies remain under national regulation: member states decide how many workers they admit. Regarding national integration and naturalization policies, the EU does not provide juridical harmonization, so visa laws and requirements are decided within each country (European Parliament, 2018).

So far, the literature that studies the relation between immigrants and labor markets has mainly been concerned with their integration. The seminal papers of Chiswick (1978) and Borjas (1994) showed that newly arrived immigrants often occupy low-level positions in the occupational ladder and earn lower wages than their counterpart natives. European studies have also given evidence of the persisting inequalities immigrants face even after controlling for individual characteristics. Lower participation rates, wages, occupational status, higher unemployment and over qualification rates have been found, with these disadvantages being larger for females than for male immigrants (Büchel and Frick, 2005; Rubin et al., 2008; Koopmans, 2010; Bisin et al., 2011; Reyneri and Fullin, 2011; De la Rica et al., 2015). Dustamn and Frattini (2011) went beyond the canonical integration analysis and apply Duncan's dissimilarity index to the occupational distribution of EU/non-EU immigrants and natives, finding higher incidences of segregation among non-EU immigrants.

On the other side, wide differences concerning gender occupational segregation have also been identified among European countries, with Estonia, Slovakia, Latvia and Finland being the four most segregated in 2007 (Bettio and Verashchagina, 2009). Previously, Dolado et al. (2003) had shown higher gender segregation levels in Europe than in the United States (US). More recently, Sparreboom (2018) studied occupational segregation by hour of work in 15 European countries, finding higher levels for males than for females and the young rather than adult workers. However, research on occupational segregation tackling the intersection between immigration

[1] We will consider Northern Europe as Norway, Sweden, Finland, Denmark and Iceland; Southern Europe as Portugal, Spain, Italy, Greece and Cyprus; Western Europe as the United Kingdom (UK), Ireland, France, Belgium, the Netherlands, Luxembourg, Germany, Austria and Switzerland; and Eastern Europe as the rest ex-communist countries.

status and gender has been limited. Therefore, little is known about the segregation experience of immigrant men and women in Europe, the differences that exist with respect to male and female natives and about the cross-country differences.

As Alonso-Villar and Del Río (2010) suggested, one reason behind this literature gap may be related to the measurement tools that have traditionally been used when more than two groups are analyzed. On the one hand, the dissimilarity index popularized by Duncan and Duncan (1955) can be used in a multigroup context, but because pairwise comparisons among all groups are required, drawing conclusions is complicated. On the other hand, scholars have developed several multigroup segregation indices (Silber, 1992; Reardon and Firebaugh, 2002; Frankel and Volij, 2011), but they do not allow measuring each particular group's segregation. They just offer a general picture by simultaneously quantifying the disparities among all groups.

The objective of the paper is to study occupational segregation by gender and immigration status in the EU. For it, we use the second quarters of the 2005–2015 European Labour Force Surveys and the local segregation indices developed by Alonso-Villar and Del Río (2010), which allow for studying the particular situation of each group, distinguishing four groups (male or female natives and male or female immigrants) and quantifying their levels of segregation in each country. Moreover, we take a step further and also consider first- and second-generation immigrants. Comparing segregation between countries shows how different the situations are for immigrants in European labor markets, but we can deepen the analysis by considering variables that explain the existing cross-country differences, such as immigrants' characteristics, the institutions and the economic structure. Accounting for these factors, we first follow Gradín (2013) to generate a counterfactual distribution, removing the effect that immigrants' education and years of residence have in explaining segregation disparities across countries. The remaining differences, which are attributed to institutional and other latent factors, are analyzed in a second step using a fixed-effects regression.

The paper contributes to the existing literature by quantifying the segregation levels that male and female immigrants experience in the EU labor markets, by considering the first- and second-generation immigrants and, specially, by determining the role that institutional and country specific variables play in explaining the exiting cross-country differences.

The remainder of the paper is structured as follows. Section 2 presents the methodology and the data. Section 3 studies immigrants' occupational segregation in 2015, the segregation trends of six reference countries in the 2005–2015 decade and the differences between first- and second-generation immigrants in 2014. Section 4 accounts for cross-country differences in segregation by undertaking counterfactual and regression analyzes. Section 5 concludes.

2. Methodology and Data

2.1 Measuring unconditional occupational segregation

Most occupational segregation studies focus on two group cases, mainly considering men and women or natives and immigrants. In this binary context, segregation exists if the groups' occupational distributions differ from each other. Regarding the indices applied in the literature, despite its well-known limitations, the dissimilarity index popularized by Duncan and Duncan (1955) is the most used, although more recently, the Karmel and MacLachlan (1988) I_p index has been gaining ground (Bettio and Verashchagina, 2009) due to its better normative properties.

In a multigroup context, the dissimilarity index implies making pairwise comparisons between all groups, complicating the interpretation of the results, because the comparisons are limited to analyzing how the groups relate to one another. Overcoming these limitations, Silber (1992) extended to the multidimensional case the binary segregation index developed by Karmel and MacLachlan (1988). Likewise, Reardon and Firebaugh (2002) and Frankel and Volij (2011) proposed several multigroup segregation indices that allow measuring the overall segregation by simultaneously quantifying the disparities among all groups. These indices offer an overview of

the segregation each area of analysis has, whether it is a country, state, district or neighborhood. But getting this summarized picture comes at a cost: the indices quantify the overall rather than each specific group`s segregation, deterring us from knowing about their particular situation.

However, when we are interested in a specific group, separately measuring its segregation becomes indispensable. Following Moir and Selby Smith (1979), who first addressed this concern for the binary case, Alonso-Villar and Del Río (2010) axiomatically derived what they labelled local segregation indices, measuring the segregation of each specific group. In this framework, the distribution of a target group across organizational units is compared with the distribution of the whole population. In our context, a group is segregated if its distribution across occupations differs from the occupational structure of the economy.

In order to check the robustness of our results and to exploit the link between local indices and other well-known overall-segregation measures, three of these local indices will be applied[2].

$$D^g = \frac{1}{2}\sum_j \left| \frac{c_j^g}{C^g} - \frac{t_j}{T} \right|$$

$$G^g = \frac{\sum_{ij} \frac{t_i}{T}\frac{t_j}{T} \left| \frac{c_i^g}{t_i} - \frac{c_j^g}{t_j} \right|}{2\frac{C^g}{T}}$$

$$\Phi_1^g = \sum_j \frac{c_j^g}{C^g} ln\left(\frac{c_j^g / C^g}{t_j / T} \right)$$

Where c_j^g denotes the number of individuals of group g in occupation j, t_j is the number of jobs in that occupation, $C^g = \sum_j c_j^g$ is the size of the group g in the economy and T= $\sum_j t_j$ is the total number of jobs in the economy.

The adaptation of the dissimilarity index is D^g and equals the I_p index developed by Karmel and MacLachlan (1988) in the dichotomous context. It ranges from 0 to 1 and has a straightforward economic interpretation: it expresses the percentage of the group under study that would have to change occupations so as to eliminate their segregation while keeping the occupational structure of the economy unchanged. G^g is based on an adequate version of the classic Gini index and also takes values between 0 and 1. Φ_1^g is related to the generalized entropy family measures, which, resembling the literature on income distribution, allow for choosing a segregation-aversion parameter (α). In this case, $\alpha = 1$, Φ_1^g is a modification of the Theil index and is bounded between 0 and the maximum value of $\ln(T)$. As shown in Alonso-Villar and Del Río (2010), G^g and Φ_1^g show better normative properties, but D^g has an easier interpretation.

These indices are also consistent with several overall measures. The latter are weighted means of the local segregation indices applied to each of the mutually exclusive groups, with weights equal to their shares on the total workforce. The D^gindex is consistent with the I_p index proposed by Karmel and MacLachlan (1988) and extended by Silber (1992):

$$I_p = \frac{1}{2}\sum_j \left| \frac{c_j^g}{T} - \left(\frac{t_j/T}{C^g/T} \right) \right| = \sum_g \frac{C^g}{T} D^g.$$

[2] Gradín's (2011) "localseg" stata command is used.

The Gini index proposed by Alonso-Villar and Del Río (2010) is the weighted mean of the G^g index and coincides with the unbounded version of the multigroup Gini index developed by Reardon and Firebaugh (2002):

$$G = \sum_{gij} \frac{t_i t_j}{2T^2} \left| \frac{c_i^g}{t_i} - \frac{c_j^g}{t_j} \right| = \sum_g \frac{C^g}{T} G^g.$$

Finally, the mutual information index proposed by Theil and Finizza (1971) and characterized by Frankel and Volij (2011) can be expressed as the weighted mean of our local index, Φ_1^g:

$$M = \sum_g \frac{C^g}{T} \ln\left(\frac{T}{C^g}\right) - \sum_j \frac{t_j}{T} \left[\sum_g \frac{c_j^g}{t_j} ln\left(\frac{t_j}{c_j^g}\right) \right] = \sum_g \frac{C^g}{T} \Phi_1^g.$$

2.2 Measuring conditional occupational segregation

To analyze the geographical disparities in occupational segregation, we use the propensity score method proposed by DiNardo et al. (1996) and adapted by Gradín (2013) to our context. This methodology generates counterfactuals by reweighting the observations such that the covariates describing the characteristics of a group follow the distribution that its corresponding group has in a reference country. By measuring the segregation of these counterfactual distributions, we isolate the effect that these covariates have in explaining segregation disparities across countries, attributing the remaining differences to institutional and latent factors. We set the UK's immigrants as the reference. Although the UK presents one of the most flexible labor markets in Europe and lacks the strong welfare model of the western and northern states, it is one of the old migrant-receiving countries, has a high share of immigrants and, as we will see, one of the lowest in segregation.

Being interested in the immigrants, the methodology will only be applied to them on a "one at a time" basis: when analyzing group *g* (e.g. immigrant men), we will just estimate their reweights, keeping the other three groups' weights unaltered. To do so, we first select the covariates and use their combinations to classify group *g* into mutually exclusive subgroups. Next, we build the counterfactual density function that country *A* would have if group *g* was given the distribution of covariates that it has in the UK while keeping the distribution of the subgroups across occupations in *A* unchanged. This is, group *g*'s subgroups in country *A* have the same relative size as in the reference country. Denoting by *Sg* the categorical variable representing countries and groups and $z \equiv (z_1, \ldots, z_k)$ the vector of covariates describing the attributes, the reweights for group *g* can be estimated from the data:

$$\Psi_z = \frac{\frac{\Pr(Sg = UK|\, z)}{\Pr(Sg = UK)}}{\frac{\Pr(Sg = A|\, z)}{\Pr(Sg = A)}} = \frac{\Pr(Sg = A)}{\Pr(Sg = UK)} \frac{\Pr(Sg = UK|\, z)}{\Pr(\, Sg = A|\, z)}$$

The first component is just the ratio between the population samples of group *g* in both countries. The second component is calculated using a binary probability model that estimates the probability that an individual from group *g* with attributes *z* belongs to the UK rather than to its own country *A*. This is the logit model we estimate after pooling group g's samples of the UK and country *A*:

$$\Pr(Sg = UK|\, z) = \frac{\exp(z\hat{\beta})}{1 + \exp(z\hat{\beta})}$$

Where $\hat{\beta}$ is the vector containing the estimated coefficients.

By applying local segregation indices to this new counterfactual distribution, we calculate what Gradín (2013) named conditional occupational segregation. Following Gradín et al (2015), we

define the "compositional effect" as the difference between unconditional and conditional segregation, and the "intrinsic segregation effect" as the segregation differences that remain between countries once the group under study has the same distribution of covariates in all the countries. The latter effect will further be studied using a regression analysis.

2.3 Data

The data comes from the second quarters of the 2005–2015 European Labour Force Survey (LFS), avoiding possible seasonality problems (Guinea-Martin et al., 2018). The survey includes 31 countries, all the 28 EU member states, Iceland, Norway and Switzerland.

Our cross-sectional database provides detailed information on labor market and demographic characteristics of workers. Information on gender and country of birth[3] is used to create the four groups of interest: male/female natives and male/female immigrants. We limit the study to those individuals aged between 16 to 64 and who were employed during the reference week in which the survey took place.

Regarding occupations, the International Standard Classification of Occupations (ISCO) is used. It suffered an important update in 2011: ISCO-08 replaced ISCO-88. For the temporal analysis, we convert ISCO-08 into ISCO-88 using the harmonization codes made available by Ganzeboom and Treiman (2019). Choosing the level of occupational disaggregation requires thinking about the small-unit bias problem, where the segregation levels of groups with small samples are overestimated. Indeed, the level of disaggregation largely determines the minimum amount of observations needed per group, country and year to avoid this problem: the larger the number of jobs we consider, the more observations we need.

Given that immigrants are less than 1% of the sample in several countries (Romania, Bulgaria, Poland and Hungary), we will start considering the 1-digit level (10 occupations) and two groups (natives and migrants) to measure overall segregation and analyze all countries. We will then improve the analysis by studying the four group and considering the maximum level of occupational disaggregation: the 3-digit level, which respectively includes 116 and 130 categories in ISCO-88 and ISCO-08. This implies dropping the countries where the level of disaggregation is either lower (Bulgaria, Poland, Slovenia and Malta) or the number of observations for any of the groups is less than 200 (Estonia, Croatia, Iceland, Lithuania, Latvia, Romania and Slovak Republic).

With respect to the covariates used in the counterfactuals, given the data availability, only those with a larger explanatory capacity are used: the level of education and the years of residence[4]. In particular, the level of education follows the International Standard Classification of Education (ISCED), and it is divided in three categories: low, medium and high. We also aggregate years of residence into three categories: less than 5 years, between 5 and 10 years and more than 10 years.

[3] Germany only provides this information for the nationals (individuals born there), other places of birth are not reported. Thus, we cannot distinguish between the immigrants and the observations for which "country of birth" is truly missing. We solve the problem and identify immigrants using "years of residence," which takes a value of zero for nationals and positive values for foreigners. However, "years of residence" is only available from 2008 onward, so all the missing values of "country of birth" are considered immigrants in the previous years. This method may overestimate the number of immigrants by including the real missing values, but, using "years of residence", we have checked that "country of birth" has few missing values after 2008. We assume the same applies for the previous three years.

[4] Our data also notes their ages, but the limited number of observations several countries have makes us lose degrees of freedom when we consider more than two covariates. Moreover, despite age and years of residence being highly correlated, the latter shows greater heterogeneity across countries.

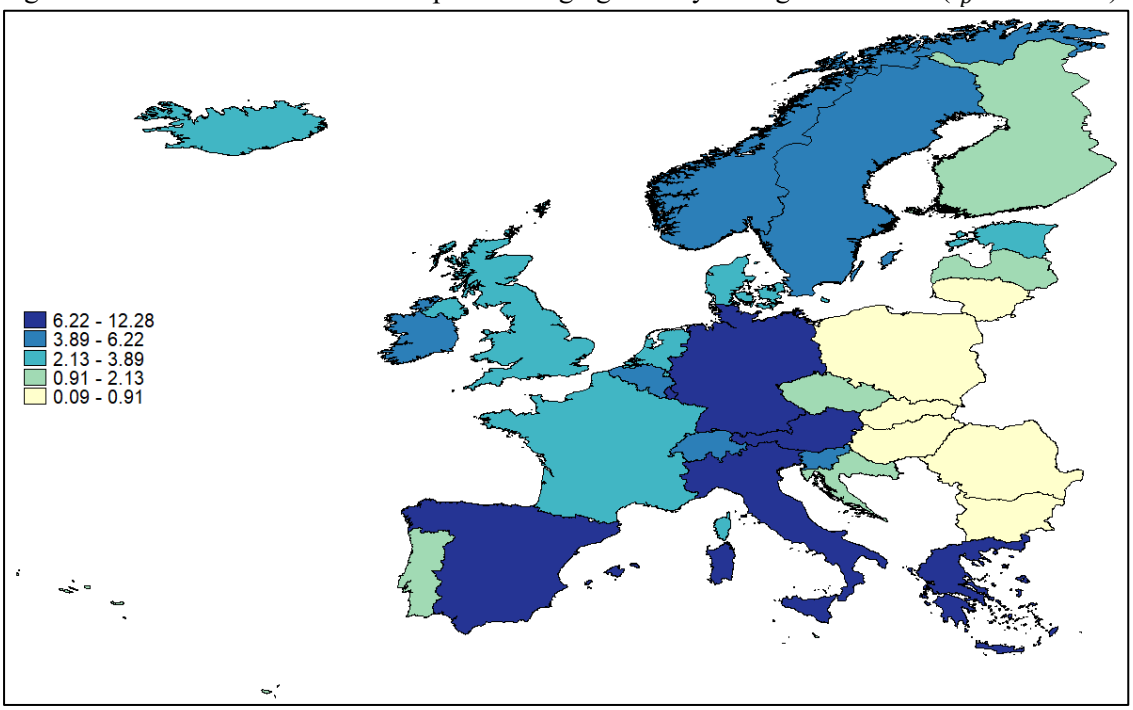
Finally, the LFS does not provide information to distinguish first- and second-generation immigrants, so the 2014 ad hoc module[5] on "the labour market situation of migrants and their immediate descendants" is used to do so. We identify the second generation looking at the natives and the country of birth of their fathers and mothers: either one or both were born abroad.

3. Occupational segregation by gender and immigration status

3.1 Overall segregation by immigration status and immigrants' population shares

In order to get an idea of the general situation, we begin the analysis by considering the largest possible number of European countries and investigating their levels of occupational segregation by immigration status in 2015. For it, given the data limitations already discussed, we consider occupations at a 1-digit level (10 categories), two groups (natives and immigrants) and measure overall segregation. In this manner, Figure 1 groups countries based on the I_p index[6]. The class breaks correspond to quintiles of the distribution of this variable. The result for the rest of the indices are given in Appendix Table A2[7].

Figure 1. Overall unconditional occupational segregation by immigration status (I_p index in %)



Source: EU-LFS 2015 Q2

According to the map, most eastern countries, Finland and Portugal show the lowest segregation. The Netherlands, Estonia, the UK, France, Denmark and Iceland follow them. Ireland, Belgium, Norway, Sweden, Slovenia and Switzerland encompass the next group. Finally, the other western and southern countries experience the highest segregation: the values increase from approximately 6–7% in Germany, Spain, Austria and Greece, to 8.7% in Italy, 10% in Cyprus and to the largest values, 12%, in Luxembourg. These differences across countries are not an

[5] The module presents some shortcomings. First, Germany, Denmark, Ireland, Iceland and the Netherlands do not provide this module. Second, we eliminate the countries where any group has less than 200 observations. We examine Austria, Belgium, Switzerland, the Czech Republic, Estonia, Spain, Finland, France, Greece, Italy, Norway, Portugal, Sweden, Slovenia and the UK.

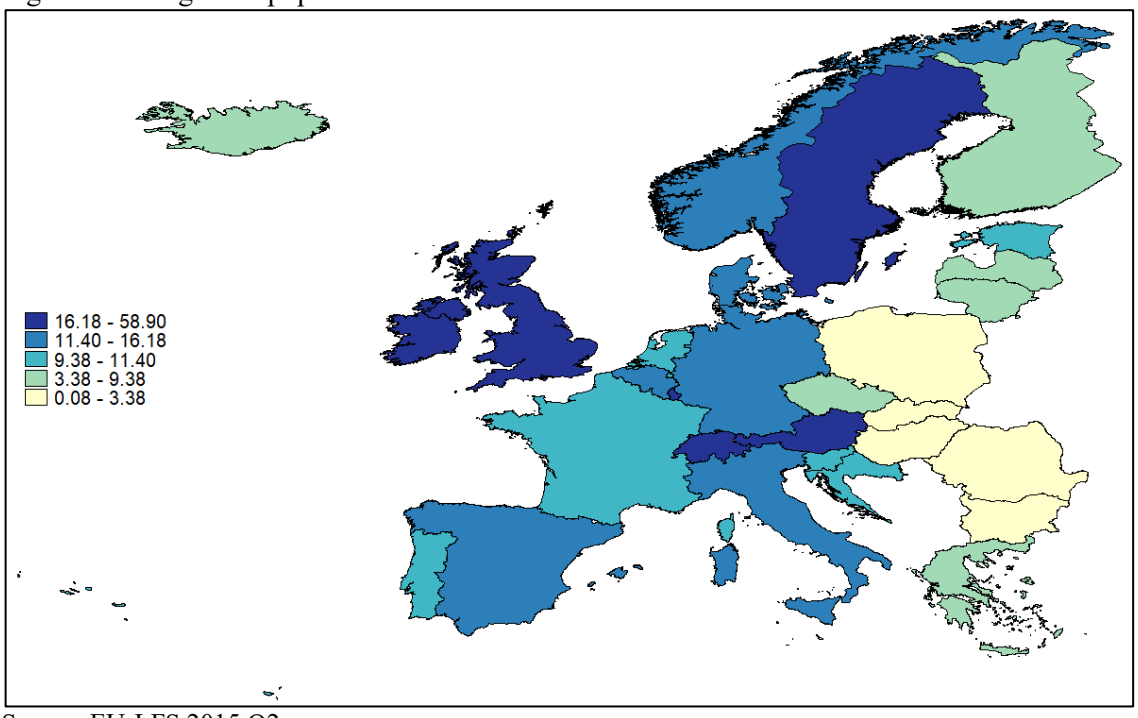
[6] In this two group case, it equals Karmel and MacLachlan's (1988) index.

[7] Country codes are shown in Appendix Table A1.

exclusive feature of the year 2015, we find a similar pattern and variation in 2005, Italy being the only country where overall segregation was much lower: 4%.

The levels may seem small, but depending on the size of country, they can imply a huge structural rearrangement. For instance, 6.5% of the Spanish workers would have to change occupations to make segregation by immigration status disappear while keeping the occupational structure of the economy unchanged. This is, in absolute terms, more than 1.1 million individuals would be required to change jobs. This number gets even larger in Italy, where 1.9 million people would have to move.

Figure 2. Immigrants' population shares.



Source: EU-LFS 2015 Q2

We have previously seen that overall and local measures are connected; the former are the weighted sum of the local segregation that each group experiences, with weights equal to their demographic shares. We may wonder if our results are linked to the demographic composition: are the countries with a larger percentage of immigrants more segregated? Figure 2 uses quintiles to classify them according to their proportions of immigrant workers. Comparing both figures, we see that countries with a low share of immigrants, mostly those of Eastern Europe, also have low overall segregation. Indeed, the UK and Greece are the only countries that belong to very different quintiles. While Greece belongs to a lower quintile in immigrants' proportions than in overall segregation (the 9% are immigrants and segregation is 7%), the UK has a more heterogeneous population (16% are foreigners) and lower overall segregation (2.9%). Nevertheless, on average, a relation exists between overall segregation and the demographic composition, this being true for the remaining years and measures.

This relation is driven by two main channels. First, if natives fill most jobs, their weights are large, and the overall index practically just captures the segregation they experience. Second, local segregation is measured by comparing each group's occupational distribution with the employment structure of the economy. So, when natives are the vast majority of the population, the whole occupational structure resembles their distribution and lower segregation levels are estimated for the group.

We can address these problems by studying the segregation that each particular group (immigrants and natives) experiences, but further methodological issues should also be considered to properly quantify the segregation that male and female immigrants face in European labor markets. First, the limited occupational disaggregation we have used hides part of the reality. The more aggregated the occupations are, the smaller the differences we find on how the groups are distributed across those jobs, and the smaller the segregation we obtain. Besides, gender should also be considered to form the groups and exploit the information that the gendered concentration of labor gives. Without this additional distinction, if women and men are concentrated in feminized and masculinized occupations, segregation is underestimated.

3.2 Segregation of female and male immigrants

To separately analyze the situation that male and female immigrants experience and to overcome the undesirable situation explained above, keeping the focus on 2015, we consider a more detailed occupational classification, the 3-digit level (130 occupations), to estimate local segregation measures when the workforce is divided into four groups (native males, native females, immigrant males and immigrant females). We drop the countries whose data limitations have already been described[8] in the Data section and keep 20 for the remaining empirical analysis. Although Appendix Table A3 reports the population share and the overall and local segregation levels for the four groups, we will now focus on the immigrants.

First of all, we are interested in knowing if, as in the case of overall segregation, any relation exists between male and female immigrants' segregation and their demographic shares. Table 1 shows the correlation coefficient between these two variables. The correlation is negative and weak, especially for the males, and holds throughout the entire period[9]. Regarding its evolution, the three indices show the same pattern for both groups. Interestingly, the correlation was weaker before 2009 and became a bit stronger afterward.

Table 1. Correlation coefficients: immigrants' segregation and population shares in 2015.

Group	D^g index	Φ^g index	G^g index
Male immigrant	-0.21	-0.27	-0.26
Female immigrant	-0.30	-0.30	-0.32

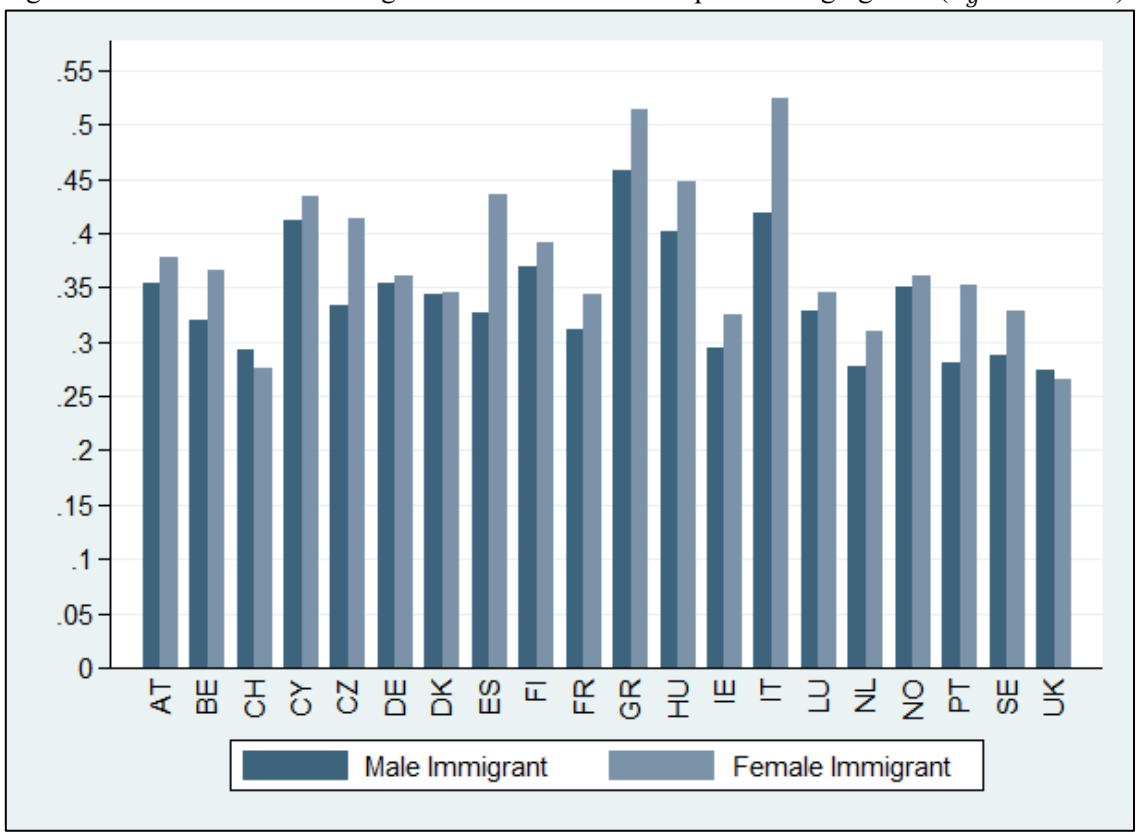
This negative correlation suggests that lower segregation levels are found in countries with wider demographic diversity. This is not surprising because the measures are not standardized, and although some are bounden between 0 and 1, the maximum vale that a group can achieve depends on its size (Del Río and Alonso-Villar, 2019). Even so, the correlation is not strong enough to claim that segregation differences between countries can be explained by geographical variations in their demographic compositions. In fact, countries with the same proportions of immigrants experience different segregations. In 2015, 13% of the workers were foreigners in Norway and Italy, but the latter had higher segregation for both immigrant groups. The same applies to Germany and the UK, with the segregation being higher in the former. Likewise, countries with similar segregations have different demographic compositions. Switzerland and the UK score almost the same regarding segregation, but the Swiss live in a more heterogeneous society, where 30% are immigrants. Ireland and the Netherlands also provide an example, despite having similar segregation, the proportion of Irish immigrants (20%) doubles the Dutch (10%).

[8] Bulgaria, Estonia, Croatia, Iceland, Lithuania, Latvia, Malta, Poland, Romania, Slovenia and Slovak Republic

[9] There is an exception in the case of male immigrants in 2005, 2006 and 2007: the correlation coefficients are positive but miniscule (0.04, 0.01, and 0.05, respectively).

Using the D^g index, Figure 3 shows the unconditional local segregation of male and female immigrants in the year 2015. Comparing these results with the ones displayed in Figure 1 and Table A2, where overall segregation is measured using two groups (therefore, without distinguishing males and females) and 10 occupations, big differences are found when it comes to determining the most or the least segregated countries. According to Figure 1, Luxembourg and Switzerland have one of the highest levels of overall segregation, but looking at Figure 3, immigrant men and women experience low segregation, especially in Switzerland. Similarly, the overall I_p index considers Ireland and Sweden as highly segregated, but the local segregation indices present them as lowly segregated. While overall segregation is low in Finland, Hungary and Czech Republic, immigrants show high local segregation levels. These differences are the result of the limitations we have previously discussed and urge us to apply local segregation indices to a more detailed classification of occupations and groups.

Figure 3. Male and female immigrants' unconditional occupational segregation (D_g index in %)



Source: EU-LFS 2015 Q2

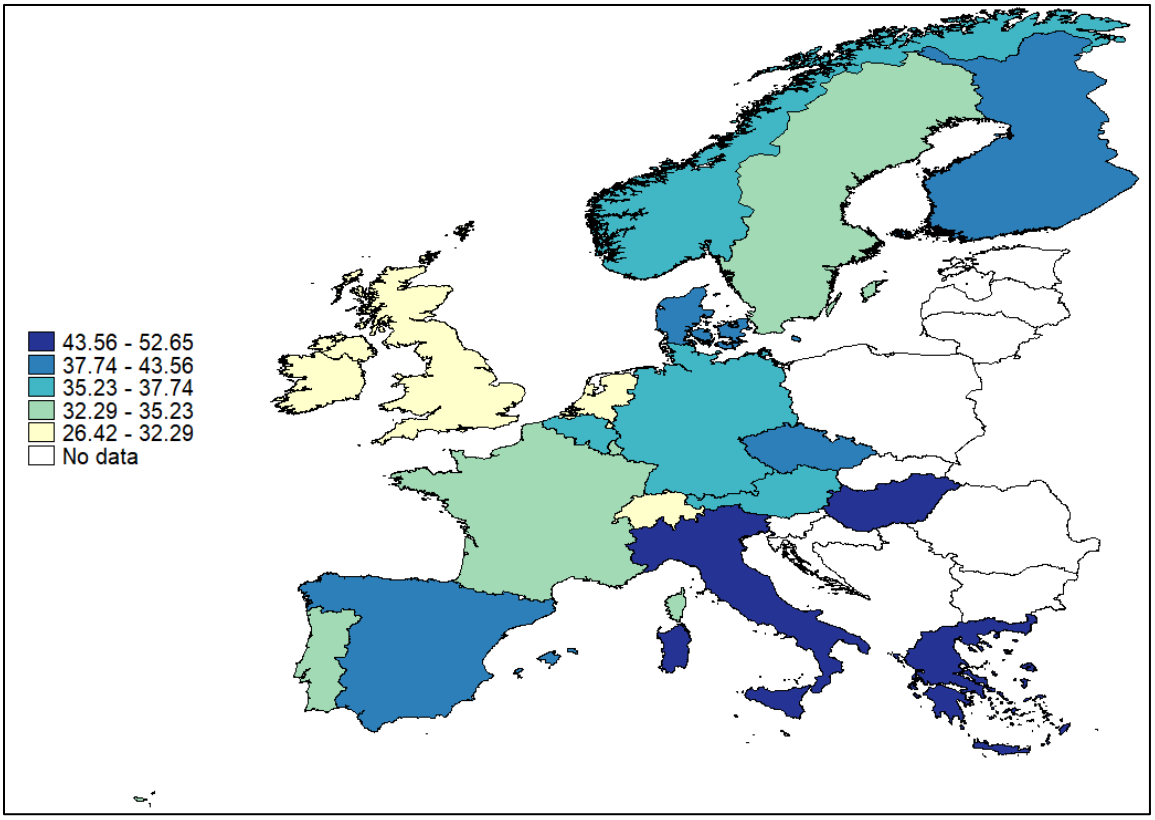
Focusing on Figure 3, we find large disparities in the segregation levels that immigrants experience in Europe. In the case of females, the UK scores the lowest with a value of 0.26, while Italy presents the highest value, 0.52, closely followed by Greece, which scores 0.51. This indicates, while one out of two of the immigrant women in Italy and Greece would have to change occupations in order to make segregation disappear, one out of four would have to move in the UK. The maximum variation the index exhibits is a bit smaller for the males: the UK still has the lowest value, 0.27, but Greece has the highest, 0.45. In fact, the coefficient of variation of the D_g index is larger for females than for males in every single year.

It is also remarkable that male immigrants have lower segregation values than females in all countries but Switzerland and the UK, their levels being two and one percentage points higher. Looking at Appendix Table A3, these two exceptions are not found with the other local indices; in every country, female immigrants are more segregated than their male counterparts. This result

goes in-line with the literature that studies the gender occupational segregation in Europe (Bettio and Verashchagina, 2009): females experience higher labor concentration than males.

In order to find a geographical pattern, Figures 4 and 5 use quintiles to cluster countries according to the segregation values that each group has in 2015. Starting with females, western and northern countries, with the exception of Finland and Denmark and the inclusion of Portugal, present the lowest segregation, whereas southern (Spain, Italy, Greece and Cyprus) and eastern countries (the Czech Republic and Hungary) show higher values. Moreover, the distribution over economic activities exhibits an interesting pattern. Appendix Table A4 shows that depending on the region, female immigrants are highly concentrated in either one of the following two activities: "Human Health and Social Work Activities" or "Activities of Households as Employers and Undifferentiated Goods- and Services-Producing Activities of Households for Own Use." While households have a great importance as employers in southern countries, they are almost nonexistent in western-northern countries. This division results from the policies facilitating reconciliation between work and family life. The limited provision of social services and protection, the importance of the informal economy and the increasing female immigration flows have created a southern "migrant in the family" care regime (Bettio et al, 2006; Benería, 2008), a pattern that is not observed in the rest of the countries, especially in the North, where the share of female immigrants working in "activities of households as employers" is practically zero. France and Luxembourg are the only exceptions, households employ around 6% of female immigrants.

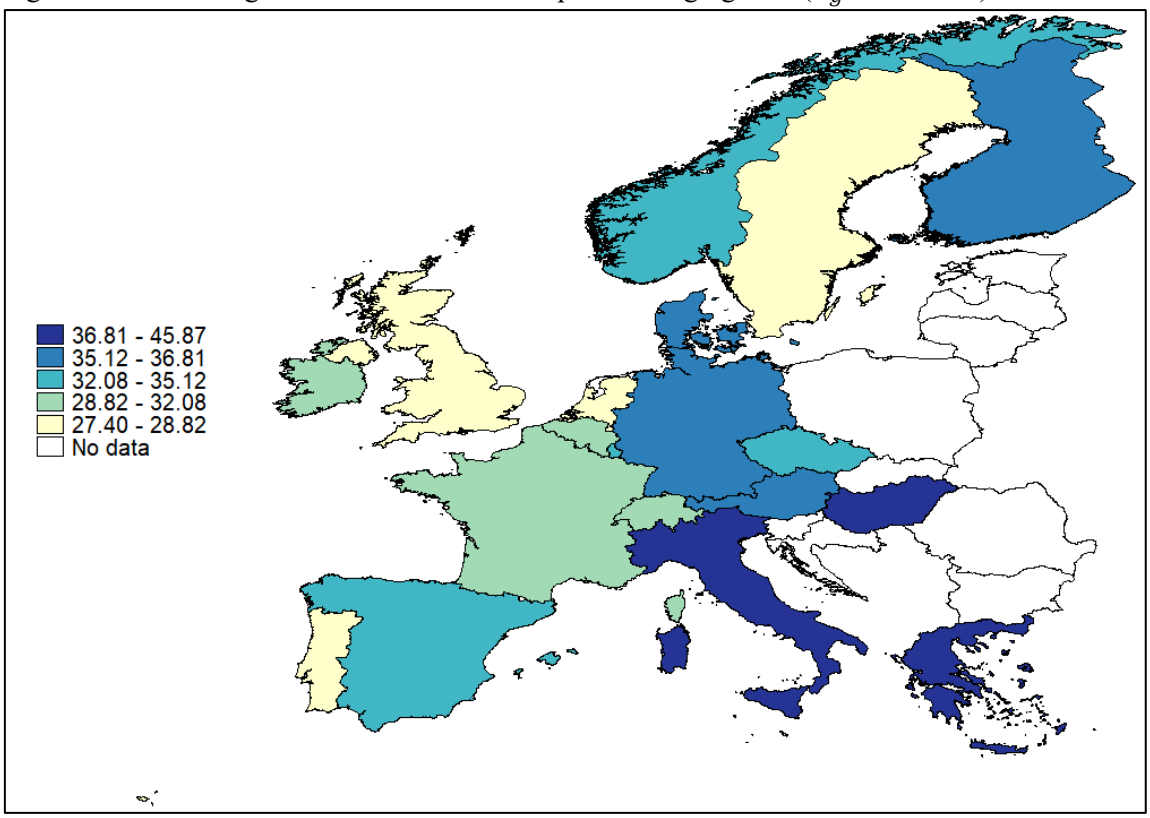
Figure 4. Female immigrants' unconditional occupational segregation (D_g index in %).



Source: EU-LFS 2015 Q2

The situation slightly changes when we have a look at immigrant men. Although most western countries, Sweden and Portugal still have the lowest segregation, Spain and the Czech Republic are also included in this category. The rest of the southern countries (Cyprus, Italy and Greece) and Hungary, Denmark and Finland still have the highest segregation, but Austria and Germany are now included here. Regarding the jobs, they are mainly concentrated in elementary occupations, with the concentration rates being larger in the most segregated areas.

Figure 5. Male immigrants' unconditional occupational segregation (D_g index in %).



Source: EU-LFS 2015 Q2

In general, European countries are differently ranked depending on the group that is considered. In the case of females, the division of the highest versus the lowest segregated countries can, on average, be expressed as the west-north versus the south-east. For males, the division is simpler: countries located to the east of Germany and Italy, both included, generally present higher segregation than the ones situated at their west. Finally, two details are noteworthy in the north: the absence of a common pattern and the lower segregation that Sweden presents. These patterns are also visible if we look at the Φ_1^g and G^g indices[10].

3.3 Trends

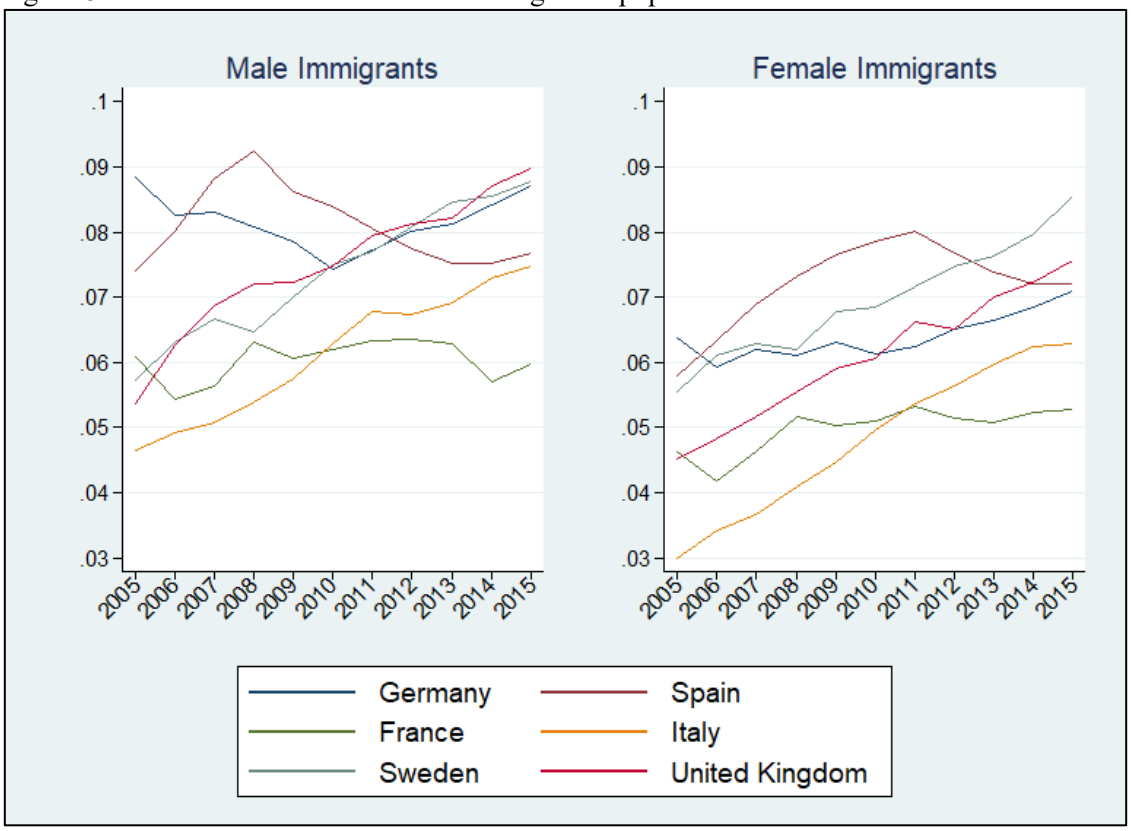
For the moment, we focus on the year 2015, but, given all the events that occurred in the 2005–2015 decade—the Great Recession, the implementation of the austerity policies and the refugee crisis—we wonder how they may have affected migration flows and segregation. To get a picture of their evolution, we have selected six reference countries based on their economic relevance, welfare regimes (Esping-Andersen, 1990) and the different levels of segregation immigrants present there. Moreover, this selection allows us to compare the trends between old (Sweden, the UK, Germany and France) and new (Italy and Spain) migrant-receiving countries and by the type of immigrants they get. While the UK and southern countries attract more labor immigrants, Sweden and West Europe receive more refugees and asylum seekers (Reyneri and Fullin, 2011).

We start by analyzing how the demographic composition evolved in the six countries. Looking at Figure 6, the percentage of male and female immigrants has generally been increasing. In particular, while their shares grow around three percentage points in Italy, Sweden and the UK, it also goes up, although more moderately, in France and, from 2010 onward, in Germany. Spain is

[10] Although some countries scale up or down one or two positions in the ranking, the geographical division is clearly maintained.

the only country where the proportion declines due to the crisis: it starts falling in 2008 for males and a bit later in 2011 for females.

Figure 6. Evolution of male and female immigrants' population shares.



Source: EU-LFS 2005-2015 Q2

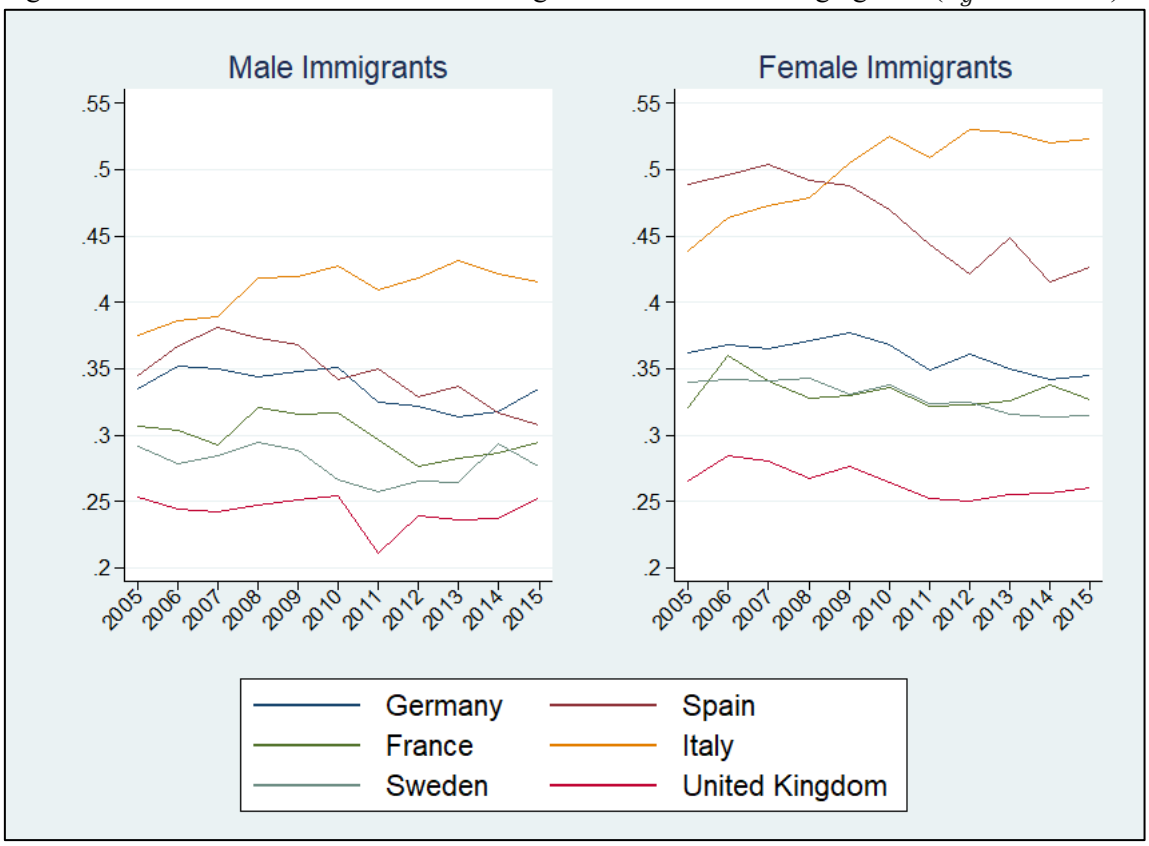
According to Figure 7, segregation is stable in all countries but Spain and Italy. Thus, it seems that increasing immigration did not bring higher segregation. Italy is the main exception. Even though it shares the increasing migrant population with Germany, France, Sweden and the UK, it is the only country where segregation goes up dramatically: the levels grow by 8.8 (females) and 4.3 (males) percentage points. The trends go in the opposite direction in Spain. Segregation for male and female immigrants starts declining in 2007, before the crisis exploded and their population shares began to fall.

The particular cases of Spain and Italy have already been the subject of study in the literature. According to Del Río and Alonso-Villar (2012) and Alonso-Villar and Del Río (2017), the economic growth model that Spain followed from the middle 90s to the 2008 crisis allowed many national and immigrant workers to find a job, but it also boosted a segmented labor market. Immigrants were concentrated in the worst paid and more masculinized and feminized occupations, especially in the construction, manufacturing and caring sectors. At the outbreak of the crisis, when the Spanish unemployment rates sharply increased and especially hit the occupations where most immigrants had their jobs, many decided to leave the country, leading to a reduction in their population shares. In the same way, the loss of formal employment implied a decrease in segregation.

The opposing Italian segregation trends can be explained by looking at the different employment adjustments that Spain and Italy underwent during the crisis. As Fellini (2017) noted, many manufacturing jobs were lost in both countries, but job destruction in construction mainly affected Spain. We have checked, and, from 2007 to 2012, the share of manufacturing jobs in total employment fell from 15% to 12% in Spain and from 21% to 18% in Italy, whereas employment in construction declined from 13% to 6.8% in the former country and was maintained around 8%

in the latter. Moreover, the share of activities of household as employers remained constant in Spain but doubled in Italy, reaching 3% of total employment in 2012. Since many female immigrants work in this activity, their job opportunities and concentration increased in Italy during the crisis.

Figure 7. Evolution of male and female immigrants' unconditional segregation (D_g index in %).



Source: EU-LFS 2005-2015 Q2

3.4 Second-generation immigrant

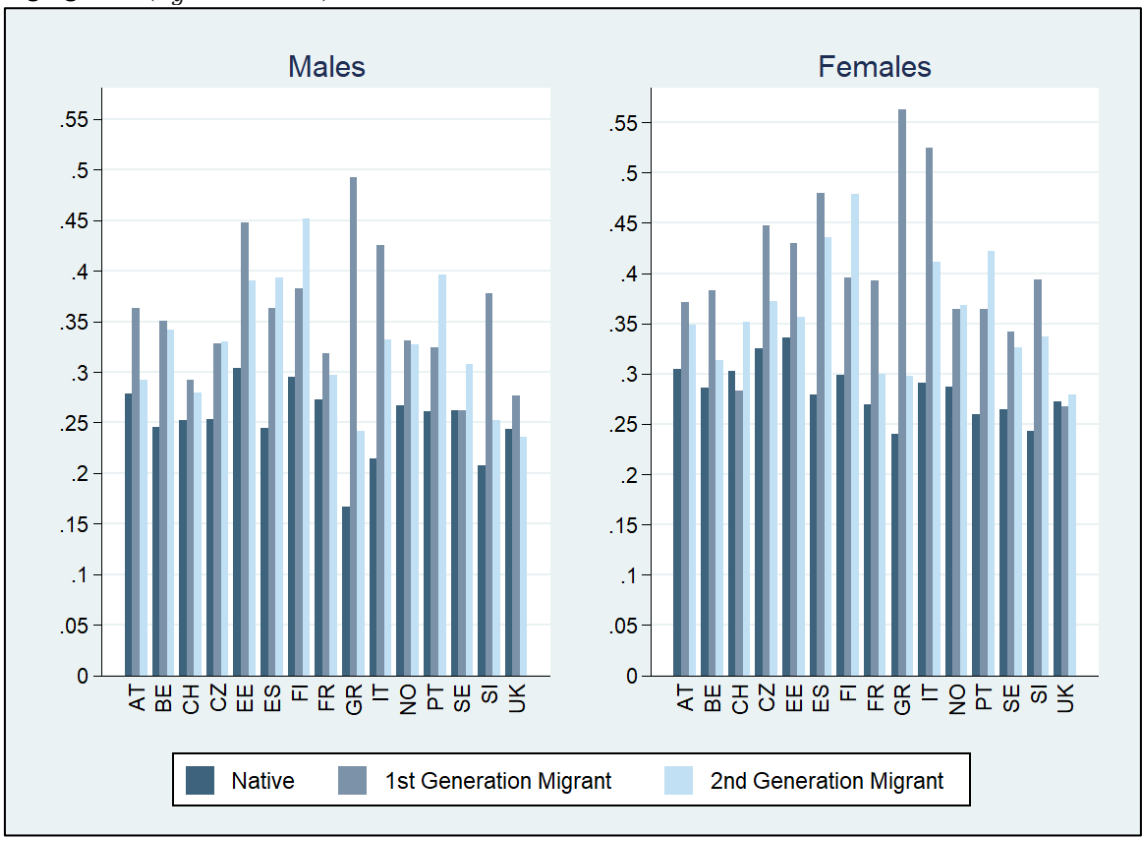
So far, our study looked into the situation that first-generation immigrants confront in several European labor markets. However, it is also relevant to analyze the segregation that the second generation faces. As they were born in the host countries, they are expected to better integrate into the societies and economies (Portes and Rumbaut, 2001). If these expectations were fulfilled, there would be evidence in favor of the assimilation theory. Otherwise, the segmented assimilation approach would gain ground: either the socioeconomic background or the discriminatory practices that take place in the host countries hinder their adaptation to the labor markets.

Prior studies analyzing second-generation labor market achievements yielded different results across and within regions. According to Heath and Cheung (2007), being a second-generation immigrant in the Anglo-Saxon countries (US, Canada and Australia) was not associated with greater disadvantages in the labor market, whereas the results are negative in Europe (Austria, Belgium, France, Germany, the Netherlands and the UK). Similarly, Gorodzeisky and Semyonov (2017) analyzed nine "old immigration" Western European countries, finding that the likelihood of becoming economically active and finding employment was lower for the first- and second-generation immigrants with non-European origins. However, they also found that once economically active, the disadvantages for attaining high-status occupations vanished in the second generation. In contrast, Fernández-Macías and Paniagua de la Iglesia's (2018) results suggested that the integration of immigrants into the labor market in Europe was mostly affected

by the origins rather than by the generation, the disadvantages being larger in terms of occupational level and mismatch than in terms of labor market participation. Moreover, they also grouped the countries according to the degrees of integration that the immigrants presented. In the Southern European countries, immigrants' participation rates were higher than in Continental Europe, but this came at the cost of facing more occupational disadvantages. The best employment and occupational integration outcomes were found in Sweden and the UK.

Most of these studies looked at the employment and occupational status, but we would like to know whether differences exist in the segregation levels that first- and second-generation immigrants present. To address this concern, we use the 2014 LFS ad hoc module and distinguish both generations. Although we still consider occupations at the 3-digit level, we now have six groups: male/female natives and male/female first- and second-generation immigrants. Appendix Table A5 reports the detailed results, and Figure 8 graphically represents the results.

Figure 8. First- and second-generation male and female immigrants' unconditional occupational segregation (D_g index in %).



Source: EU-LFS 2014 Ad-hoc module

As can be seen from Figure 8, second-generation immigrants do better than the first generation in most of the countries. These results go in-line with the characteristics they present. We have checked and, on average, the second generation is not only more educated than the first one but also faces less over qualification[11]. Moreover, the countries where the second generation is more educated, compared to the first one, are precisely those presenting larger segregation differences between generations (Greece, Italy and Slovenia). Still, some exceptions exist. Second-generation females are worse off in Portugal, Switzerland and Finland, where segregation is 5.8, 6.8 and 8.2 percentage points higher than for the first generation, respectively. The same happens to males in

[11] The module includes a Yes/No question about the perceived over qualification.

Spain, Sweden, Finland and Portugal, where segregation is 3.7, 4.5, 6.8 and 7.1 percentage points higher for the second generation[12].

If we focus on segregation differences between generations by gender, females present larger variation in all countries but Austria, Portugal, Sweden, Slovenia and the UK. This implies that females benefit more from being the second generation. However, excluding Estonia, France and Slovenia, the segregation levels that second-generation females present are larger than those faced by both generations of males. Even in the exceptional cases, Estonia is the only country where the second generation of females is less segregated than all immigrant men; as in the case of France and Slovenia, they are only better than first-generation males. No matter the generation, overall, female immigrants are more segregated than their male counterparts.

Finally, we get an overall picture by comparing the six groups. We see that natives generally have lower segregation than immigrants. Indeed, despite natives not always being more educated than both immigrant generations and, although over qualification rates are particularly high for the natives in Spain and Portugal, their rates are lower in all countries but in the Czech Republic. The only exceptions are found in Switzerland, where first-generation female immigrants are less segregated than native women, and in the UK, where the same applies to the second generation of male immigrants.

Nevertheless, despite the relatively consistent less segregation found for natives, we also find evidences in favor of the assimilation theory: the second-generation is less segregated than the first one in most countries.

4. Differences across countries

Geographical differences in occupational segregation may be the result of the characteristics the countries or the immigrants present. Focusing on demand-side factors, the literature has developed institutional and labor market segmentation theories (Piore, 1983; Standing, 1989). According to De la Rica et al. (2015), employment rates of immigrants appear to be more sensitive to the business cycle than that of natives, while more flexible labor markets, with lower minimum wages or trade-union densities and a larger welfare provision increase immigrants' employment opportunities (Koopmans, 2010; Bisin et al., 2011; Ballarino and Panichella, 2018). Other lines of thought put the emphasis on the discrimination immigrants suffer in the labor market. Theories of statistical discrimination (Phelps, 1972) support that their capacities are evaluated based on stereotyped group characteristics rather than on individual virtues.

Other approaches emphasize the role supply-side factors play. According to human capital theories (Becker, 1962; Chiswick and Miller, 2008), job disparities across groups result from the different characteristics individuals bring into the labor market, such as education, experience or language proficiency. Indeed, although we know that it is not always true and that significant differences exist across countries, the analysis carried out by Dustmann and Frattini (2013) revealed that in Europe, on average, immigrants are less educated than natives. The years of residence are also relevant. More settled immigrants seem to have better segregation and employment results due to the human capital or cultural knowledge they acquired living in the host countries (Alonso-Villar and Del Río, 2013; Zwysen, 2018). The networks are also important upon and after arrival. They provide basic information of the host country's functioning, while introducing the contacts needed to find a job or, even, by hiring them in their businesses (Boyd, 1989). However, the networks can narrow career options and reduce social-mobility opportunities (Stirling, 2015).

[12] However, the shares of the second generation are rather small in Finland, Spain and Portugal, and their results should be interpreted cautiously.

This way, although the human capital theory is one of the most supported rationales, the difficulties immigrants face to transfer their educational qualifications and the lack of social networks or basic knowledge about the countries also hamper their outcomes (Kogan et al., 2011; Reyneri and Fullin, 2011). Thus, the facilities that each country provides to ease their inclusion may explain part of the geographical differences on segregation.

4.1 Conditional segregation

Given all the different elements mentioned above, we may wonder about the role that immigrants' characteristics play in explaining segregation disparities across countries. Accounting for these factors, we create counterfactual distributions, removing the cross-country heterogeneity in immigrants' education and years of residence, and measure conditional segregation. By doing so, we are first able to determine the contribution that both variables make to the geographical disparities and, second, make segregation more comparable, attributing the remaining differences to other institutional factors, which are studied down below.

Taking as a reference the UK's male and female immigrants characteristics, Table 9 (Appendix Table A3) reports the conditional segregation values for 2015. At first sight, it seems that homogenizing education and years of residence does not bring mayor changes[13]. However, some countries have a larger compositional effect (i.e., the difference between the unconditional and the conditional segregation), which depends on the characteristics immigrants present with respect to the reference country (the UK[14]). To analyze this relation, we focus on the most remarkable cases. On the one side, Hungary, Portugal and the Czech Republic have the largest negative compositional effect for both male and female immigrants: segregation increases with the counterfactual distribution[15]. But looking at their characteristics (Appendix Table A6), the effect is not surprising. The counterfactual distribution forces them to sharply increase the amount of immigrants who have lived in the country for less than 5 years. Moreover, the proportions of the less educated are lower in Hungary and the Czech Republic than in the UK; thus, apart from increasing the share of the more educated, the counterfactual distribution also increases the less educated by reducing the share of the middle educated, which is, precisely, the least segregated group in these three countries.

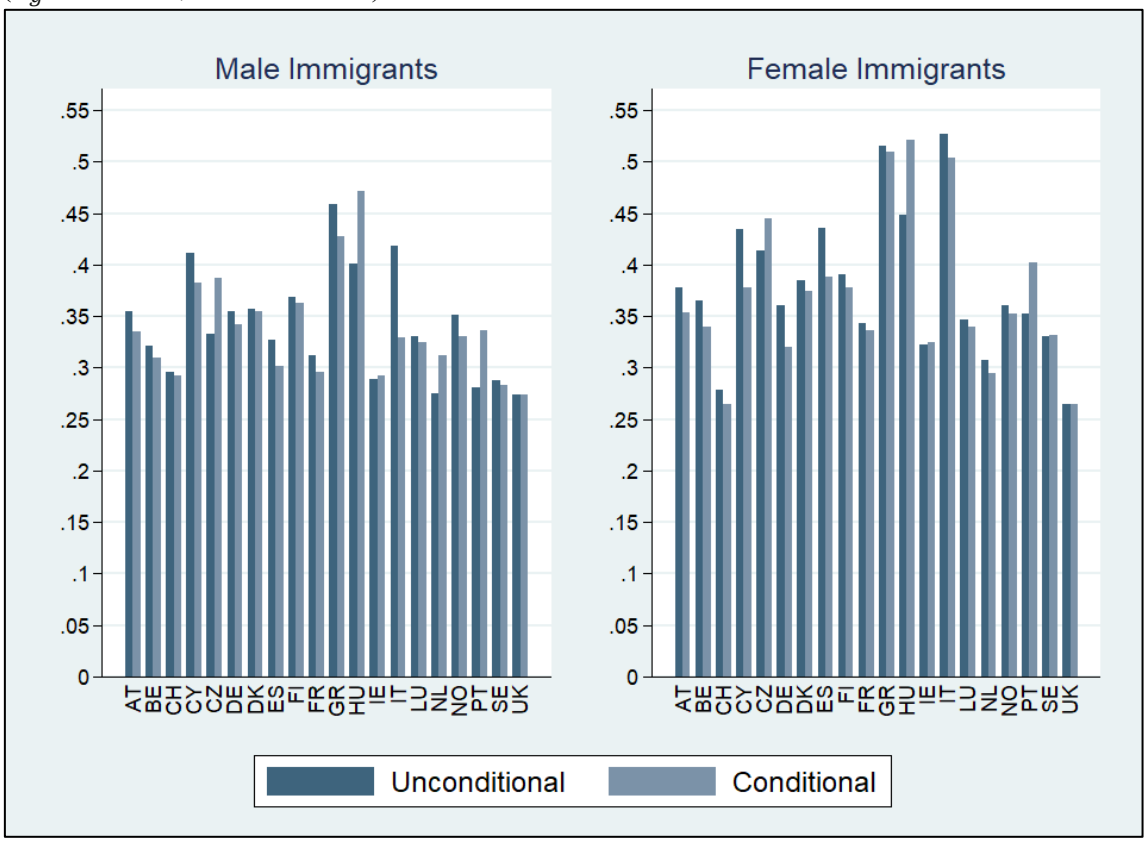
On the other side, the countries where the compositional effect is positive (i.e., segregation decreases with the counterfactual distribution) are not the same for both groups. Females experience the biggest reductions in Cyprus, Spain and Germany (5.6, 4.7 and 4.1 percentage point decreases) and males in Italy, Greece and Cyprus (8.9, 3 and 2.8 percentage point reductions). These reductions can again be explained with their characteristics. Even if the proportion of the less settled immigrants raises in all the countries but Cyprus, the share of the high educated, which present less segregation, increases for all, especially in Italy, Greece and Germany. In fact, we have checked that education makes a larger contribution to the compositional effect than years of residence in most of the countries. So, while both covariates reduce segregation in Cyprus, the effect of reducing the share of the more settled is offset by increasing the proportion of the more educated in the rest of the countries.

[13] Regardless of the index used and the group considered, the average segregation and the coefficient of variation remain very similar in the conditional and unconditional cases.

[14] The measurement of the conditional segregation forces us to drop those observations of immigrants for which, despite their occupation being known, the information related to the covariates is not available. We have re-estimated the unconditional segregation so that the compositional effect is calculated based on the same sample. The restriction affects Denmark and Ireland, where around 2% of their samples are lost, but segregation remains unchanged.

[15] Compared to the unconditional case, segregation increases by 7.2, 5 and 3.2 percentage points for the females and 7, 5.5 and 5.4 for males in Hungary, Portugal and Czech Republic, respectively.

Figure 9. Male and female immigrants' unconditional and conditional occupational segregation (D_g index in %; Reference: UK).



Source: EU-LFS 2015 Q2

In-line with our previous results, conditional segregation is higher for immigrant women than men in all countries but Switzerland, Cyprus, the Netherlands and Germany, with the maximum difference being 2.3 percentage points in the latter. Similarly, we have checked that the geographical patterns found in the unconditional case largely remain after homogenizing immigrants' characteristics[16].

4.2 Controlling for the characteristics of the country: a regression analysis

As we have seen, the significant differences found in the levels of education and years of residence that the immigrants present in Europe do not seem to largely explain segregation differences across countries. In order to account for the role that institutional and country-specific variables play in explaining the different levels of conditional segregation, we conduct a fixed-effects regression analysis[17] with clustered standard errors, the dependent variable being the conditional segregation levels that male and female immigrants present every year in each country. We split the analysis in two parts. First, we only include those factors that affect all workers (Model 1 and 2) and, then, incorporate the variables that specifically concern our groups of interest, the immigrants (Model 3 and 4).

For the first part, we analyze the 2005–2015 time period and consider variables related to the general economic situation, labor market flexibility and welfare benefits. Particularly, we use a dummy variable (*women*) that takes a value 1 for women; the percentage of refugee population over the total population (*refugee %*), the unemployment rate (*unemployment %*) and the income Gini (*Gini income)* the World Bank provides; the percentage of precarious employment

[16] The results are maintained overall when France is set as the reference, Portugal and Ireland are the only countries where conditional segregation is significantly lower and larger, respectively.
[17] A Hausman test was conducted to select a fixed-effects rather than a random-effects specification.

(*precarious employment%*), the share of involuntary part-time employment (*Involuntary part-time Emp. %*) and the total per capita expenditure (in thousand euros) that each country makes on social protection programs (*social expenditure*) that Eurostat calculates; and the International Labour Organization's trade union density rate (*union* %).

Model 1 in Table 2 reports the results obtained from this analysis. The regression confirms our previous findings: immigrant women have higher segregation than men. In accordance with labor market flexibility theories, higher union density and involuntary part-time employment also increase segregation. In contrast, higher social expenditure and unemployment are associated with lower segregation. While a larger welfare provision may increase immigrants' socioeconomic security and opportunities, in-line with the results explained in section 3.3, the effect of unemployment may be explained by the situation that Spain and other countries experienced in the crisis period. Unemployment rates sharply increased, many immigrants were dismissed from the occupations where they were more concentrated and, thus, segregation decreased. In order to make this analysis more comparable with Models 3 and 4, where less years are considered, we estimate Model 2 for the period 2007–2014. The results are maintained, all the signs are unchanged and only union density loses its significance.

In the second part, the Migrant Integration Policy Index (MIPEX) directed by the Barcelona Centre for International Affairs and the Migration Policy Group is employed to analyze the 2007-2014 period, the only years with available data. Based on 140 policy indicators, the index assesses several migrant integration policy areas, assigning a scalar that ranges from 0 (migrants have no rights) to 100 (migrants and nationals have the same rights) to each category. The independent variables are precisely the score that each country has in the following areas: 'labor market mobility,' 'anti-discrimination,' 'family reunion,' 'access to nationality' and 'permanent residence.'

According to Model 3, where the abovementioned variables are solely considered, two policies have a significant negative effect: facilitating family reunion and, specially, access to nationality reduce segregation. Evidence of a naturalization "premium" has already been found. As referenced in Zwysen (2018), the literature identified small but positive advantages on labor market outcomes from naturalization in Europe. This effect may arise from several channels, either the costs associated with the work permits or job restrictions are reduced when nationality is granted.

Finally, Model 4 joins the two parts of the analysis: the factors that affect all workers and the significant variables that mainly concern immigrants. The general results remain unchanged: social expenditure is the only variable that, despite maintaining its sign, loses its explanatory power.

Table 2. Fixed-effects regression for segregation of migrants across Europe.

VARIABLES	Model 1	Model 2	Model 3	Model 4
Woman	3.862***	3.623***	4.070***	3.929***
	(0.948)	(0.960)	(0.914)	(0.958)
Unemployment (%)	-0.496***	-0.419***		-0.403***
	(0.113)	(0.113)		(0.095)
Precarious Employment (%)	0.564	0.246		0.332
	(0.412)	(0.372)		(0.344)
Involuntary Part-time Emp. (%)	0.110*	0.100**		0.091**
	(0.059)	(0.046)		(0.039)
Social Expenditure	-1.282**	-1.238**		-0.891
	(0.536)	(0.560)		(0.643)
Union Density (%)	0.436**	0.238		0.193
	(0.178)	(0.282)		(0.291)
Refugee (%)	0.350	-0.561		-0.856
	(1.120)	(1.440)		(1.623)
Gini Income	0.029	0.145		0.259
	(0.212)	(0.185)		(0.178)
Labor Market Mobility			-0.019	
			(0.052)	
Antidiscrimination			0.004	
			(0.034)	
Family Reunion			-0.130***	-0.074*
			(0.040)	(0.042)
Access to Nationality			-0.062**	-0.124***
			(0.025)	(0.038)
Permanent Residence			0.050	
			(0.075)	
Observations	386	286	302	268
Number of country	20	20	20	20
Adjusted R-squared	0.393	0.354	0.392	0.387
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Time-period	2005-15	2007-14	2007-14	2007-14

Note: Cluster-Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ The dependent variable is multiplied by 100: segregation is expressed in percentages.

5. Conclusions

The literature has shown that immigrants often experience difficulties integrating in the labor market, as their participation rates, wages or occupational status tend to be lower. However, little is known about their occupational segregation. Filling this gap, we use different measures to quantify this phenomenon. Our results show that, compared to the overall measures, the analysis carried out with the local indices allows for obtaining a more accurate picture of the distribution that male and female immigrants follow across occupations. In 2015, European countries are differently ranked depending if men or women are considered, but, in general, the UK, the Netherlands, Ireland and Switzerland are the least segregated countries, whereas Italy, Greece, Cyprus and Hungary present the highest segregation. Indeed, the south shows an interesting employment pattern: households employ a large amount of female migrants and create the southern "migrant in the family" care regime, which is almost nonexistent in the rest of the countries. Surprisingly, the northern countries do not show a common low-segregation pattern:

while segregation is low in Sweden, Finland and Denmark present quite large levels. Regarding the eastern countries, they share a tiny proportion of immigrants, which has prevented us from undertaking a detail segregation analysis in all countries except Hungary and the Czech Republic, where segregation is high. Focusing on gender, male immigrants generally have lower segregation than their female counterparts. Evidence in favor of the assimilation theory is also found: the second generation is less segregated than the first one in most countries.

The reasons behind these results are related to different aspects. Labor market segmentation and statistical discrimination theories focus on demand-side factors, claiming that immigrants' job opportunities are influenced by the working environments and the social and economic contexts. Other approaches look at supply-side factors, with the human capital theory being one of the most supported rationales. According to them, individuals' education, experience or language proficiency explain most job disparities across groups. Accounting for these factors, we first create counterfactual occupational distributions and remove the effect that immigrants' education and years of residence have in explaining segregation disparities across countries. Surprisingly, although immigrants present different characteristics in Europe, the abovementioned pattern is maintained overall. Second, we conduct a fixed-effects regression analysis to determine which institutional and country-specific variables explain the remaining differences. We have shown that being a woman, having a larger union density and involuntary part-time employment are associated with higher segregation, whereas a larger welfare provision and policies easing family reunion or access to nationality reduce segregation. The unemployment rate, a countercyclical variable, is also related to lower segregation: the Great Recession increased unemployment rates, especially in the southern economies, largely destroying jobs where immigrants were highly concentrated and, thus, reducing their segregation levels.

Our results, despite being limited by the data available, clearly open the field for further investigation. We encourage researchers to study the implications that occupational segregation has for the immigrants in Europe. It would also be interesting to analyze case studies to account for specific legislations and political decisions.

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APPENDIX

Table A1. Country codes

CODE	COUNTRY NAME
AT	Austria
BE	Belgium
BG	Bulgaria
CH	Switzerland
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GR	Greece
HR	Croatia
HU	Hungary
IE	Ireland
IC	Iceland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
NO	Norway
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovak Republic
UK	United Kingdom

Table A2. Overall segregation by immigration status and immigrants' population shares in 2015.

Country	Duncan and Duncan	I_p	M	G	Immigrants' Population Shares
AT	0.2277	0.0685	0.0273	0.0948	0.1843
BE	0.1681	0.0422	0.0123	0.0571	0.1473
BG	0.2580	0.0014	0.0007	0.0021	0.0028
CH	0.1415	0.0603	0.0195	0.0897	0.3080
CY	0.2754	0.1028	0.0513	0.1347	0.2482
CZ	0.1317	0.0093	0.0019	0.0129	0.0365
DE	0.2405	0.0640	0.0228	0.0806	0.1580
DK	0.1770	0.0361	0.0131	0.0540	0.1153
EE	0.1369	0.0268	0.0076	0.0387	0.1100
ES	0.2573	0.0652	0.0253	0.0863	0.1489
FI	0.1251	0.0126	0.0045	0.0198	0.0532
FR	0.1515	0.0303	0.0068	0.0400	0.1127
GR	0.4146	0.0692	0.0485	0.0908	0.0919
HR	0.1025	0.0201	0.0039	0.0289	0.1104
HU	0.1166	0.0053	0.0010	0.0074	0.0235
IE	0.1228	0.0409	0.0121	0.0611	0.2114
IS	0.2231	0.0369	0.0160	0.0517	0.0909
IT	0.3668	0.0871	0.0461	0.1102	0.1376
LT	0.1029	0.0089	0.0020	0.0127	0.0453
LU	0.2536	0.1228	0.0432	0.1499	0.5890
LV	0.1035	0.0170	0.0029	0.0229	0.0901
MT	0.2028	0.0123	0.0053	0.0175	0.0312
NL	0.1183	0.0225	0.0048	0.0313	0.1065
NO	0.1953	0.0458	0.0148	0.0605	0.1356
PL	0.3233	0.0018	0.0008	0.0023	0.0028
PT	0.0884	0.0159	0.0024	0.0214	0.0998
RO	0.5418	0.0009	0.0009	0.0012	0.0008
SE	0.1642	0.0470	0.0136	0.0605	0.1732
SI	0.2995	0.0518	0.0209	0.0665	0.0957
SK	0.1935	0.0025	0.0006	0.0031	0.0066
UK	0.1075	0.0297	0.0066	0.0438	0.1656

Table A3. Conditional and unconditional occupational segregation of natives and immigrants in 2015.

			Unconditional Segregation						Conditional segregation (Reference: UK)		
				Overall			Local			Local	
Country	Group	Population-shares	Ip	M	G	D^g	Φ_1^g	G^g	D^g	Φ_1^g	G^g
AT	Male native	0.4298	0.3003	0.2759	0.3933	0.2704	0.2122	0.3534			
AT	Female native	0.3859	0.3003	0.2759	0.3933	0.3025	0.2804	0.3902			
AT	Male immigrant	0.0982	0.3003	0.2759	0.3933	0.3547	0.3530	0.4639	0.3356	0.3202	0.4426
AT	Female immigrant	0.0862	0.3003	0.2759	0.3933	0.3771	0.4862	0.5253	0.3535	0.4141	0.4874
BE	Male native	0.4558	0.2827	0.2510	0.3728	0.2583	0.1972	0.3371			
BE	Female native	0.3969	0.2827	0.2510	0.3728	0.2886	0.2591	0.3768			
BE	Male immigrant	0.0771	0.2827	0.2510	0.3728	0.3208	0.2960	0.4262	0.3097	0.2653	0.4033
BE	Female immigrant	0.0702	0.2827	0.2510	0.3728	0.3654	0.5048	0.5229	0.3395	0.4329	0.4853
CH	Male native	0.3605	0.2676	0.2302	0.3649	0.2323	0.1727	0.3202			
CH	Female native	0.3315	0.2676	0.2302	0.3649	0.2890	0.2522	0.3830			
CH	Male immigrant	0.1716	0.2676	0.2302	0.3649	0.2932	0.2536	0.3922	0.2921	0.2459	0.3876
CH	Female immigrant	0.1363	0.2676	0.2302	0.3649	0.2765	0.2994	0.4047	0.2646	0.2658	0.3802
CY	Male native	0.4056	0.3326	0.3673	0.4437	0.2873	0.2570	0.3841			
CY	Female native	0.3462	0.3326	0.3673	0.4437	0.3193	0.3170	0.4183			
CY	Male immigrant	0.1005	0.3326	0.3673	0.4437	0.4117	0.5040	0.5393	0.3828	0.4596	0.5130
CY	Female immigrant	0.1477	0.3326	0.3673	0.4437	0.4340	0.6949	0.6018	0.3773	0.5480	0.5307
CZ	Male native	0.5415	0.2874	0.2603	0.3758	0.2550	0.1993	0.3317			
CZ	Female native	0.4220	0.2874	0.2603	0.3758	0.3220	0.3201	0.4209			
CZ	Male immigrant	0.0207	0.2874	0.2603	0.3758	0.3331	0.4081	0.4721	0.3872	0.5460	0.5465
CZ	Female immigrant	0.0158	0.2874	0.2603	0.3758	0.4132	0.5597	0.5526	0.4453	0.6496	0.5976
DE	Male native	0.4420	0.2726	0.2339	0.3615	0.2384	0.1676	0.3173			
DE	Female native	0.4000	0.2726	0.2339	0.3615	0.2770	0.2374	0.3613			
DE	Male immigrant	0.0870	0.2726	0.2339	0.3615	0.3544	0.3695	0.4744	0.3420	0.3312	0.4512
DE	Female immigrant	0.0710	0.2726	0.2339	0.3615	0.3609	0.4603	0.4995	0.3198	0.3801	0.4596

DK	Male native	0.4665	0.2747	0.2336	0.3613	0.2544	0.1769	0.3295			
DK	Female native	0.4182	0.2747	0.2336	0.3613	0.2781	0.2438	0.3623			
DK	Male immigrant	0.0589	0.2747	0.2336	0.3613	0.3438	0.3947	0.4782	0.3550	0.4349	0.4970
DK	Female immigrant	0.0563	0.2747	0.2336	0.3613	0.3460	0.4583	0.4962	0.3745	0.5236	0.5319
ES	Male native	0.4692	0.2805	0.2486	0.3693	0.2468	0.1767	0.3233			
ES	Female native	0.3819	0.2805	0.2486	0.3693	0.2833	0.2509	0.3692			
ES	Male immigrant	0.0768	0.2805	0.2486	0.3693	0.3271	0.3402	0.4498	0.3012	0.2759	0.4097
ES	Female immigrant	0.0721	0.2805	0.2486	0.3693	0.4355	0.6071	0.5835	0.3884	0.4877	0.5253
FI	Male native	0.4809	0.2877	0.2479	0.3723	0.2801	0.2249	0.3620			
FI	Female native	0.4659	0.2877	0.2479	0.3723	0.2851	0.2464	0.3672			
FI	Male immigrant	0.0288	0.2877	0.2479	0.3723	0.3687	0.4247	0.4914	0.3625	0.4027	0.4792
FI	Female immigrant	0.0244	0.2877	0.2479	0.3723	0.3919	0.5217	0.5297	0.3783	0.4779	0.5079
FR	Male native	0.4561	0.2670	0.2169	0.3516	0.2527	0.1859	0.3282			
FR	Female native	0.4312	0.2670	0.2169	0.3516	0.2664	0.2125	0.3491			
FR	Male immigrant	0.0598	0.2670	0.2169	0.3516	0.3119	0.2970	0.4230	0.2962	0.2761	0.4082
FR	Female immigrant	0.0528	0.2670	0.2169	0.3516	0.3433	0.4299	0.4925	0.3357	0.3784	0.4656
GR	Male native	0.5257	0.2201	0.2131	0.3085	0.1662	0.0999	0.2396			
GR	Female native	0.3824	0.2201	0.2131	0.3085	0.2305	0.2027	0.3194			
GR	Male immigrant	0.0496	0.2201	0.2131	0.3085	0.4587	0.7704	0.6206	0.4278	0.6432	0.5829
GR	Female immigrant	0.0424	0.2201	0.2131	0.3085	0.5149	1.0601	0.6995	0.5098	0.9494	0.6810
HU	Male native	0.5297	0.2881	0.2619	0.3758	0.2641	0.2020	0.3437			
HU	Female native	0.4469	0.2881	0.2619	0.3758	0.3095	0.3137	0.4034			
HU	Male immigrant	0.0127	0.2881	0.2619	0.3758	0.4013	0.5664	0.5542	0.4715	0.7861	0.6299
HU	Female immigrant	0.0108	0.2881	0.2619	0.3758	0.4480	0.7005	0.6003	0.5209	0.9135	0.6792
IE	Male native	0.4252	0.2874	0.2592	0.3851	0.2678	0.2107	0.3543			
IE	Female native	0.3635	0.2874	0.2592	0.3851	0.2977	0.2846	0.3977			
IE	Male immigrant	0.1130	0.2874	0.2592	0.3851	0.2945	0.2813	0.4076	0.2921	0.2779	0.4051
IE	Female immigrant	0.0984	0.2874	0.2592	0.3851	0.3259	0.3495	0.4465	0.3250	0.3471	0.4451

IT	Male native	0.5023	0.2763	0.2670	0.3684	0.2158	0.1437	0.2890			
IT	Female native	0.3601	0.2763	0.2670	0.3684	0.2880	0.2797	0.3896			
IT	Male immigrant	0.0748	0.2763	0.2670	0.3684	0.4180	0.5012	0.5431	0.3289	0.3392	0.4477
IT	Female immigrant	0.0628	0.2763	0.2670	0.3684	0.5247	0.9007	0.6744	0.5037	0.7992	0.6445
LU	Male native	0.2223	0.3544	0.4005	0.4715	0.3514	0.3805	0.4697			
LU	Female native	0.1887	0.3544	0.4005	0.4715	0.4138	0.5280	0.5436			
LU	Male immigrant	0.3212	0.3544	0.4005	0.4715	0.3283	0.3438	0.4415	0.3250	0.3538	0.4456
LU	Female immigrant	0.2678	0.3544	0.4005	0.4715	0.3464	0.3953	0.4582	0.3402	0.3910	0.4523
NL	Male native	0.4769	0.2596	0.2107	0.3465	0.2408	0.1704	0.3182			
NL	Female native	0.4167	0.2596	0.2107	0.3465	0.2726	0.2360	0.3634			
NL	Male immigrant	0.0557	0.2596	0.2107	0.3465	0.2777	0.2497	0.3839	0.3123	0.3098	0.4278
NL	Female immigrant	0.0508	0.2596	0.2107	0.3465	0.3098	0.3382	0.4325	0.2945	0.3242	0.4215
NO	Male native	0.4494	0.2726	0.2323	0.3580	0.2502	0.1707	0.3235			
NO	Female native	0.4151	0.2726	0.2323	0.3580	0.2697	0.2344	0.3522			
NO	Male immigrant	0.0741	0.2726	0.2323	0.3580	0.3512	0.3791	0.4703	0.3309	0.3318	0.4416
NO	Female immigrant	0.0615	0.2726	0.2323	0.3580	0.3608	0.4919	0.5141	0.3526	0.4569	0.4992
PT	Male native	0.4566	0.2683	0.2301	0.3552	0.2616	0.2065	0.3477			
PT	Female native	0.4436	0.2683	0.2301	0.3552	0.2637	0.2326	0.3462			
PT	Male immigrant	0.0468	0.2683	0.2301	0.3552	0.2808	0.2457	0.3810	0.3359	0.3450	0.4517
PT	Female immigrant	0.0531	0.2683	0.2301	0.3552	0.3523	0.3988	0.4717	0.4026	0.5230	0.5426
SE	Male native	0.4314	0.2682	0.2182	0.3542	0.2565	0.1822	0.3358			
SE	Female native	0.3954	0.2682	0.2182	0.3542	0.2635	0.2170	0.3435			
SE	Male immigrant	0.0877	0.2682	0.2182	0.3542	0.2885	0.2504	0.3898	0.2836	0.2360	0.3773
SE	Female immigrant	0.0855	0.2682	0.2182	0.3542	0.3284	0.3726	0.4592	0.3315	0.3715	0.4569
UK	Male native	0.4383	0.2491	0.2013	0.3380	0.2299	0.1582	0.3117			
UK	Female native	0.3961	0.2491	0.2013	0.3380	0.2617	0.2254	0.3478			
UK	Male immigrant	0.0898	0.2491	0.2013	0.3380	0.2735	0.2346	0.3781	0.2740	0.2355	0.3787
UK	Female immigrant	0.0758	0.2491	0.2013	0.3380	0.2655	0.2857	0.3924	0.2642	0.2835	0.3908

Table A4. Share of female immigrants employed in the two main economic activities in 2015.

Country	Human health and social work activities	Activities of households as employers and undifferentiated goods- and services-producing activities of households for own use
AT	0.1615	0.0140
BE	0.2406	0.0051
CH	0.2302	0.0355
CY	0.0466	0.3342
CZ	0.1132	0.0122
DE	0.2051	0.0270
DK	0.2679	0.0050
ES	0.0773	0.2519
FI	0.2359	0.0000
FR	0.2493	0.0557
GR	0.0608	0.2302
HU	0.1660	0.0009
IE	0.2173	0.0229
IT	0.0823	0.3787
LU	0.1194	0.0641
NL	0.2217	0.0021
NO	0.3302	0.0000
PT	0.1322	0.0725
SE	0.3040	0.0000

Note: values in percentage.

Table A5. Unconditional occupational segregation of natives, first- and second-generation immigrants in 2014.

Country	Group	Population share	D^g	Φ^g	G^g
AT	Male Native	0.388	0.279	0.222	0.363
AT	Female Native	0.350	0.304	0.285	0.391
AT	1st generation Males	0.093	0.363	0.373	0.473
AT	2nd generation Males	0.046	0.293	0.246	0.383
AT	1st generation Females	0.085	0.371	0.472	0.517
AT	2nd generation Females	0.038	0.348	0.411	0.468
BE	Male Native	0.404	0.245	0.185	0.326
BE	Female Native	0.359	0.286	0.256	0.374
BE	1st generation Males	0.078	0.351	0.372	0.470
BE	2nd generation Males	0.051	0.342	0.352	0.456
BE	1st generation Females	0.066	0.383	0.530	0.539
BE	2nd generation Females	0.042	0.313	0.345	0.421
CH	Male Native	0.284	0.252	0.206	0.343
CH	Female Native	0.250	0.303	0.293	0.405
CH	1st generation Males	0.170	0.292	0.264	0.399
CH	2nd generation Males	0.082	0.280	0.284	0.400
CH	1st generation Females	0.140	0.284	0.309	0.409
CH	2nd generation Females	0.075	0.352	0.394	0.464
CZ	Male Native	0.520	0.254	0.194	0.328
CZ	Female Native	0.399	0.325	0.322	0.423
CZ	1st generation Males	0.021	0.328	0.424	0.473
CZ	2nd generation Males	0.025	0.330	0.362	0.445
CZ	1st generation Females	0.014	0.448	0.657	0.597
CZ	2nd generation Females	0.021	0.372	0.461	0.499
EE	Male Native	0.350	0.304	0.281	0.397
EE	Female Native	0.322	0.336	0.360	0.439
EE	1st generation Males	0.057	0.448	0.640	0.589
EE	2nd generation Males	0.110	0.391	0.465	0.516
EE	1st generation Females	0.054	0.430	0.594	0.568
EE	2nd generation Females	0.107	0.356	0.418	0.476
ES	Male Native	0.464	0.245	0.178	0.323
ES	Female Native	0.378	0.280	0.247	0.368
ES	1st generation Males	0.073	0.363	0.391	0.486
ES	2nd generation Males	0.007	0.394	0.537	0.547
ES	1st generation Females	0.071	0.480	0.736	0.635
ES	2nd generation Females	0.007	0.436	0.576	0.560
FI	Male Native	0.474	0.296	0.248	0.379
FI	Female Native	0.458	0.299	0.275	0.382
FI	1st generation Males	0.027	0.383	0.502	0.527
FI	2nd generation Males	0.009	0.451	0.684	0.601
FI	1st generation Females	0.025	0.396	0.571	0.552
FI	2nd generation Females	0.008	0.479	0.739	0.623
FR	Male Native	0.362	0.272	0.214	0.357
FR	Female Native	0.353	0.270	0.231	0.358
FR	1st generation Males	0.063	0.318	0.338	0.441
FR	2nd generation Males	0.086	0.297	0.263	0.389
FR	1st generation Females	0.050	0.392	0.507	0.536
FR	2nd generation Females	0.087	0.300	0.297	0.404
GR	Male Native	0.491	0.167	0.101	0.239
GR	Female Native	0.347	0.240	0.221	0.335

GR	1st generation Males	0.053	0.493	0.836	0.656
GR	2nd generation Males	0.037	0.242	0.238	0.354
GR	1st generation Females	0.042	0.563	1.168	0.736
GR	2nd generation Females	0.030	0.298	0.337	0.414
IT	Male Native	0.495	0.215	0.143	0.288
IT	Female Native	0.353	0.291	0.278	0.389
IT	1st generation Males	0.073	0.426	0.526	0.555
IT	2nd generation Males	0.010	0.332	0.419	0.476
IT	1st generation Females	0.062	0.524	0.902	0.677
IT	2nd generation Females	0.007	0.411	0.516	0.522
NO	Male Native	0.411	0.267	0.207	0.351
NO	Female Native	0.383	0.287	0.259	0.374
NO	1st generation Males	0.089	0.331	0.346	0.452
NO	2nd generation Males	0.021	0.327	0.335	0.439
NO	1st generation Females	0.075	0.364	0.486	0.514
NO	2nd generation Females	0.020	0.368	0.457	0.490
PT	Male Native	0.446	0.261	0.208	0.351
PT	Female Native	0.420	0.260	0.240	0.346
PT	1st generation Males	0.045	0.325	0.329	0.442
PT	2nd generation Males	0.018	0.396	0.526	0.531
PT	1st generation Females	0.053	0.364	0.441	0.501
PT	2nd generation Females	0.018	0.422	0.539	0.544
SE	Male Native	0.377	0.263	0.196	0.347
SE	Female Native	0.344	0.264	0.220	0.350
SE	1st generation Males	0.091	0.262	0.242	0.371
SE	2nd generation Males	0.051	0.307	0.291	0.415
SE	1st generation Females	0.082	0.342	0.364	0.459
SE	2nd generation Females	0.055	0.327	0.333	0.432
SI	Male Native	0.421	0.208	0.123	0.275
SI	Female Native	0.374	0.243	0.211	0.323
SI	1st generation Males	0.060	0.377	0.422	0.495
SI	2nd generation Males	0.059	0.252	0.190	0.344
SI	1st generation Females	0.042	0.393	0.616	0.555
SI	2nd generation Females	0.044	0.337	0.339	0.427
UK	Male Native	0.389	0.244	0.176	0.330
UK	Female Native	0.351	0.272	0.237	0.357
UK	1st generation Males	0.090	0.277	0.231	0.376
UK	2nd generation Males	0.051	0.235	0.171	0.316
UK	1st generation Females	0.073	0.268	0.270	0.386
UK	2nd generation Females	0.047	0.280	0.268	0.374

Table A6. Educational Level and Years of Residence of the Immigrants in 2015.

		Education			Years of Residence		
	Country	**Low**	**Medium**	**High**	**0-5 years**	**6-10 years**	**10 + years**
Male immigrant							
	AT	0.200	0.488	0.312	0.205	0.140	0.654
	BE	0.295	0.351	0.354	0.234	0.202	0.564
	CH	0.221	0.376	0.403	0.269	0.164	0.567
	CY	0.215	0.405	0.380	0.299	0.318	0.383
	CZ	0.093	0.610	0.297	0.127	0.222	0.651
	DE	0.276	0.483	0.240	0.183	0.079	0.738
	DK	0.207	0.392	0.401	0.265	0.209	0.526
	ES	0.389	0.336	0.275	0.082	0.236	0.682
	FI	0.252	0.467	0.281	0.178	0.262	0.560
	FR	0.324	0.337	0.339	0.080	0.116	0.804
	GR	0.539	0.340	0.121	0.063	0.167	0.770
	HU	0.079	0.576	0.345	0.163	0.158	0.679
	IE	0.092	0.392	0.516	0.213	0.312	0.476
	IT	0.467	0.427	0.106	0.060	0.236	0.705
	LU	0.245	0.222	0.533	0.345	0.208	0.447
	NL	0.272	0.415	0.313	0.061	0.097	0.841
	NO	0.209	0.391	0.400	0.358	0.201	0.441
	PT	0.379	0.345	0.277	0.040	0.097	0.863
	SE	0.266	0.360	0.375	0.154	0.207	0.639
	UK	0.145	0.356	0.500	0.239	0.253	0.508
Female immigrant							
	AT	0.232	0.438	0.330	0.192	0.169	0.640
	BE	0.231	0.340	0.430	0.206	0.191	0.603
	CH	0.220	0.345	0.435	0.236	0.159	0.604
	CY	0.249	0.407	0.344	0.347	0.262	0.391
	CZ	0.102	0.604	0.295	0.126	0.186	0.688
	DE	0.265	0.481	0.254	0.119	0.068	0.813
	DK	0.181	0.360	0.459	0.254	0.207	0.538
	ES	0.345	0.341	0.314	0.084	0.292	0.624
	FI	0.203	0.411	0.386	0.147	0.221	0.631
	FR	0.311	0.320	0.369	0.072	0.113	0.815
	GR	0.377	0.411	0.212	0.035	0.156	0.809
	HU	0.113	0.540	0.347	0.029	0.122	0.850
	IE	0.059	0.337	0.605	0.191	0.333	0.476
	IT	0.352	0.460	0.188	0.067	0.277	0.656
	LU	0.222	0.225	0.553	0.343	0.174	0.483
	NL	0.251	0.423	0.326	0.069	0.108	0.823
	NO	0.182	0.312	0.506	0.300	0.198	0.502
	PT	0.299	0.317	0.384	0.038	0.117	0.846
	SE	0.193	0.315	0.492	0.134	0.177	0.689
	UK	0.109	0.321	0.571	0.231	0.249	0.520

Note: values in percentage.