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## The Gender Aspect of Immigrants' Assimilation in Europe

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## ABSTRACT

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# The Gender Aspect of Immigrants' Assimilation in Europe\*

The labor market performance of immigrants relative to natives has been widely studied but its gender dimension has been relatively neglected. Our paper aims at revisiting labor market convergence between immigrants and natives and examining this under-studied dimension in a comprehensive study of the EU-15 countries and Switzerland over the period 1999-2018. We measure convergence of labor market outcomes for male and female migrants to similar natives before and after the Great Recession and across countries of destination. Our results show that in most countries female migrants start with a larger employment gap but converge more rapidly than male migrants do. We also provide a broad overview of the role of potential factors such as economic conditions, labor markets structure, institutions and attitudes towards immigrants and women and their association with employment convergence of all immigrants and female immigrants specifically. While the analysis provides an interesting insight, we do not identify very significant factors at the national level. We find a very strong correlation between attitudes towards immigrants and their employment convergence across sub-national regions.

**JEL Classification:** J61, J00, J16

**Keywords:** international migration, labor market integration, gender gaps

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# 1 Introduction

Since 1950 the countries of Western Europe have gone from being origin of, to being destination for world migrants. In the last two decades, since 1999, Western Europe has been one of the most important international destinations of migrants. Ferrie and Hatton (2015) documented that the share of new immigrants from Europe in the United States dropped from 56.2 percent in the 1950s to just 13.1 percent in the 2000s and in the same years, United Kingdom and Scandinavian countries first, followed later by Ireland, Italy and Spain, experienced a transition from net emigration to net immigration.

Figure 1: Share of Migrants among the Total Population

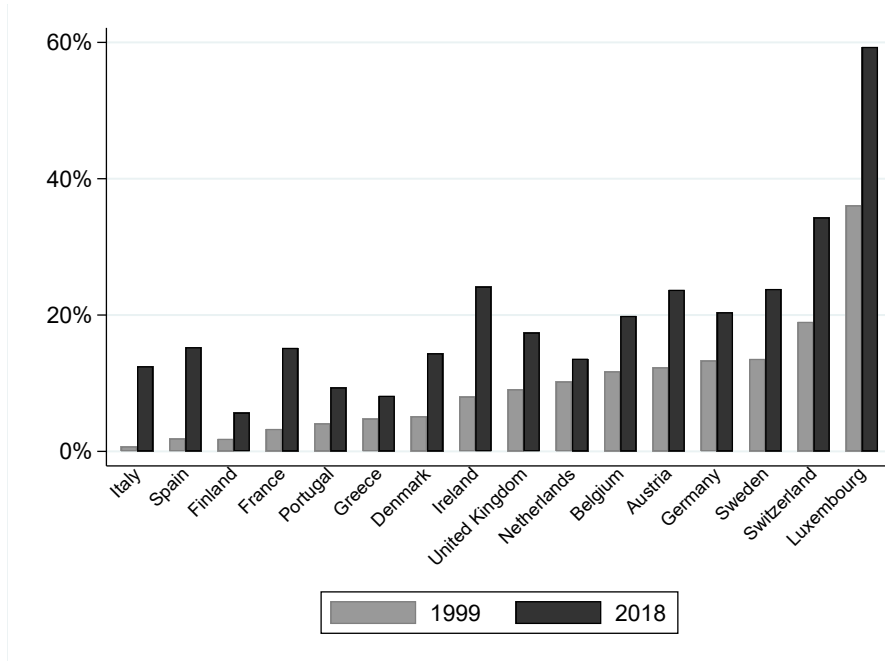


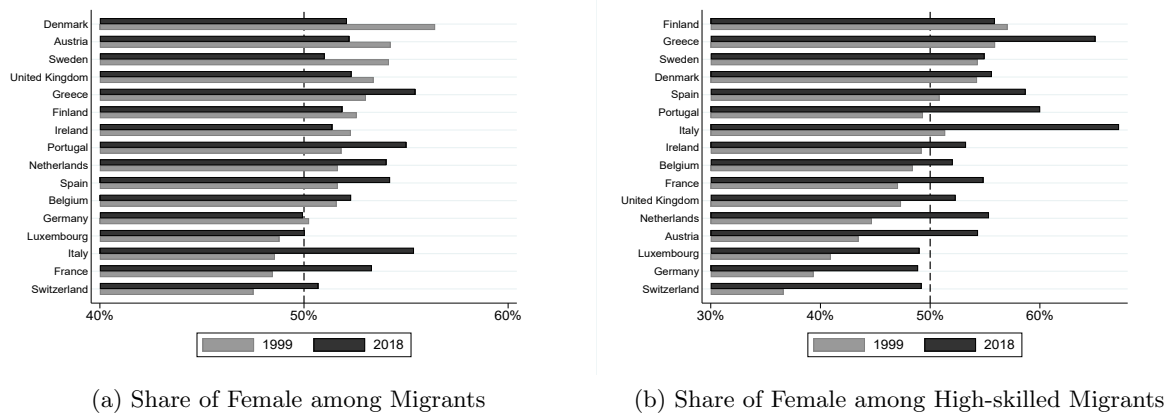
Figure 1 using the European Union Labor Force Survey (hereinafter, *EU-LFS*) documents this phenomenon and shows that the average share of immigrants in the total population almost doubled (on average from 10% to 20%) between 1999 and 2018 in 16 European countries. No single country experienced a decrease of that share. Some countries such as Italy, Spain and France have received a very large inflow of migrants over the past two decades and the population share of immigrants in these countries more than quadrupled.

There have been important economic and political consequences of international migration in Western European countries. While most research shows their positive contributions to European growth and to its economy (e.g. Docquier et al. (2014); Cattaneo et al. (2015)), the relatively sudden arrivals of large numbers of immigrants contributed to anti-immigration sentiment and political backlash (Mayda et al. (2018)). A very important aspect, in determining natives' view of immigrants, in Europe, is their ability to assimilate into the labor market by finding a job as this is seen as a fundamental step for them to contribute economically.

While economists have analyzed economic assimilation of immigrants in specific European countries, multi-country analysis is rare. Moreover the gender dimension has been relatively neglected even though it is quite important, due to both the increase in female immigration to Europe and the growing importance of women in labor markets. Figure 2a clearly shows the so called 'feminization of migration' in Western Europe. Female migrants have come to outnumber male migrants in many EU countries in the recent years, although female immigration was much lower in the early 2000s. If we look at high-skilled migrants with education above high school level, their sex ratio is even more favourable to women (Figure 2b). Switzerland had the lowest share of women immigrants in 1999 but the share climbed to parity in the most recent survey. Considering the occupation- and sector- distribution of migrants' employment by gender (using *EU-LFS* data), immigrants are more likely to be employed in elementary occupations - a group that employs less than 10% of native workers and over 20% of immigrants. Female migrants are even more likely (over 30%) to be employed in elementary occupations than male migrants (slightly below 20%), suggesting a double disadvantage that female migrants face (Figure A1.1). The sector-distribution also shows an employment gap that varies by gender. Female migrants are more likely to be employed in the service sector (e.g., in house keeping, personal services, restaurant and hotel sector in both periods) whereas male migrants are more likely to be employed in the construction sector (in Period 1) and in the hotel and restaurant sector (in Period 2) (Figure A1.2).

The performance of migrants relative to natives in the labor market has been widely studied but most of the research is confined to case studies of individual countries - mainly the English-speaking developed countries (i.e.,

Figure 2: Feminization of Migration



the U.S., Canada, and Australia)<sup>1</sup>. Comparative analysis on economic assimilation of international migrants is very limited. The focus of this study therefore is on comparing labor market convergence of immigrants, and female immigrants, across countries analyzing host country specific factors that may be related to differences in patterns of assimilation by gender in Western European countries. We first characterize how labor market convergence of female migrants differs from that of male migrants on average and across countries. Second, we provide a holistic analysis by documenting the variation in assimilation pattern across countries and by exploring correlates of such variation. Potential contributory factors include macroeconomic conditions, institutional settings, indicators of gender bias and measures of individual attitudes.

There are a few caveats to keep in mind. Our sample covers documented migrants only. Any form of undocumented migration is not included in our analysis. Also, while cultural integration of migrants is also important to understand their assimilation pattern, we only consider assimilation in the labor market. Still, given the broad country coverage and the extensive analysis of potential correlates, this study provides a comprehensive comparative analysis of assimilation of immigrants.

The paper is structured as follows: the next section reviews existing studies on labor market effects of migration, migrants' economic assimilation and the feminization of immigration. Section III estimates the size of the initial employment gap and employment convergence for immigrants and specifically female immigrants, across countries and in the decade before and after the 2009 economic downturn. Section IV examines the role of the macroeconomic conditions, structure of labor markets, institutional settings, gender indicators and attitudes as potentially associated with measures of employment convergence of immigrants. Section V provides concluding remarks.

## 2 Literature Review

### 2.1 Feminization of migration and economic assimilation of female migrants

Existing studies on the feminization of migration have emphasized that economic, cultural and institutional push factors affect women and men in different ways.<sup>2</sup> However, a focus on the economic assimilation of immigrant women has received less attention.

The literature on economic assimilation of migrants, following the seminal work of Chiswick (1978) focuses mainly on male migrants' labor market integration in a receiving country based on cross-section regression models. The regression specification introduced by Chiswick (ibid.) compares the current earnings of recently arrived immigrants with the current earnings of immigrants who migrated previously, finding an immediate disadvantage of immigrant men in terms of the earnings and a very high rate of immigrant assimilation in the U.S. However, Borjas (1985, 1995, 2015) argues that the observed convergence could be largely affected by the changing skill composition of the subsequent arrival cohorts in the U.S., suggesting a secular decline of the quality of immigrants. If these 'cohort effects' - skill differentials among immigrant cohorts, dominate the assimilation effects, a cross-sectional analysis yields an incorrect picture of the assimilation process. Chiswick (1978)'s study was followed by a study of white immigrant women in the United States by Long (1980) and Schoeni (1998) to test the robustness of the findings for women. And Adsera and Chiswick (2007) presents, for the first time, an analysis of immigrant earnings that is particularly interested in analyzing whether there is any variation in the labor

<sup>1</sup>Lalonde and Topel (1992) for the U.S.; Baker and Benjamin (1994) and Aydemir and Skuterud (2005) for Canada; Antecol et al. (2006) for Australia.

<sup>2</sup>Dumont et al. (2007), Bang and Mitra (2011), Docquier et al. (2012), Baudassé and Bazillier (2014), Naghsh Nejad (2013), Naghsh Nejad and Young (2014), Ruyssen and Salomone (2018).

market performance of immigrants between the genders. However, what is missing is a framework that provides consistent and comparable evidence of how assimilation patterns differ by gender.

## 2.2 Assimilation theory and European evidence on migrants' assimilation

According to the classic assimilation model, immigrants experience difficulties in the labor market of the host society as they have limited access to information and social networks, and have restricted knowledge of the new society's language and culture, inadequate professional skills, lack of host-country educational credentials, and little or no host-country labor market experience. Moreover, the costs of acquiring human capital in the post migration period (such as becoming proficient in a host-country language) are mainly incurred as foregone earnings, so that these initial human capital investments further depress entry wages for immigrants. However, after learning the local language and acquiring the local culture, immigrants tend to converge with comparable native-born counterparts or even experience faster wage growth than natives do.

All studies of the economic progress of immigrants use this human capital model as a point of departure (Borjas (2000, 2014)) and expect a negative correlation between entry wages and subsequent wage growth. However, a negative correlation between the log entry wage and the rate of wage growth can be misleading if we do not account for heterogeneity in the human capital stock among the immigrant population. In the case of relative substitutability between pre- and post-migration human capital, the skilled workers earn more at the time of entry and have slower wage growth, while in the case of strong relative complementarity in human capital, the skilled workers earn less at the time of entry and have faster wage growth. The possibility of heterogeneity among immigrants led the classic assimilation model to be reformulated in recent years and to be replaced by alternative theoretical models - segmented assimilation. According to the segmented assimilation model, there exist differential patterns of assimilation among migrants of different origins in a host country (Alba and Nee (1997)). The theory attributes this phenomenon to different degree of opportunities or disadvantages by migrants' origin. It does not consider immigrants in a host country as homogeneous, but rather focuses on the differences by country of origin, and hence, on differences by race and ethnicity. However, even with the segmented assimilation model, it is hard to find a theoretical background for gender-specific assimilation.

Many studies take into account the importance of years spent in host country as the assimilation theory suggests (Okoampah (2016) for Germany; Clark and Lindley (2009) for the UK; Amuedo-Dorantes and de la Rica (2007) for Spain; Venturini and Villosio (2008) for Italy; Zorlu and Hartog (2012) for the Netherlands; Bratsberg et al. (2017) for Norway) but the findings typically differ across countries.<sup>3</sup> Furthermore, from our own knowledge, the existing research has not carefully examined the international differences in the rate of economic assimilation. A series of OECD working papers (Causa and Jean (2007), Jean et al. (2010)) have looked at the role of migration policies but the role of other country specific factors have not been carefully studied.

Our paper contributes to the literature of economic assimilation of migrants in two ways. First, it provides a more systematic analysis of the differential assimilation of migrants by gender, period and country, covering most European countries. Second, it examines how many potential factors - either general or women-specific- are related to the variation in assimilation pattern across countries. Such a cross-country analysis is correlational rather than causal. We do not identify factors that are strongly correlated with employment convergence. However, we also perform a cross-regional analysis in Europe, finding that local attitudes towards migration are significantly correlated with the speed of employment convergence of immigrants, suggesting that immigrant assimilation may be differential even within a country.

## 3 Estimation of convergence

### 3.1 Data and sample

To perform our analysis we use the European Union Labor Force Survey, *EU-LFS*, which is the largest European household sample survey. It is harmonized and covers 28 EU member states plus Iceland, Norway and Switzerland starting in the year 1983. Individual Labor Force Surveys are conducted by each national statistical institute which is responsible for selecting a nationally representative sample, preparing the questionnaires, conducting the interviews among households, and forwarding the results to Eurostat. Eurostat harmonizes the data by using the same concepts and definitions, following International Labor Organisation guidelines, and using common classifications (NACE, ISCO, ISCED, NUTS). In 2018, the survey covered 1.5 millions of individuals and it contained rich information including demographics characteristics, educational attainment and socio-economic status. Based on information on the country of birth and on the length of residence in the host country, we define the main variables in our analysis as follows:

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<sup>3</sup>See the survey in Borjas (2014).

$$\text{migration status} = \begin{cases} 1, & \text{if years since migration} \neq 0 \\ 0, & \text{if years since migration} = 0 \end{cases}$$

$$\text{arrival cohort} = \begin{cases} \text{year} - \text{years since migration}, & \text{if one is migrant} \\ 0, & \text{if one is native} \end{cases}$$

Despite its richness in terms of scope and coverage, the dataset has two limitations. First the dataset is not an individual longitudinal panel but rather a repeated cross sections. Based on migrants' year of arrival and country of origin, however, we link "arrival cohorts" of immigrants over time to analyze their labor market integration. Second, as information on workers' wages/incomes is available only in a very limited way (the survey only includes income deciles to which an individual belongs with many missing observations), we focus on employment probability and occupational outcomes, rather than income, as is common in the existing literature using labor force survey data. These are important and policy relevant outcomes, especially in Europe where the employment rates of immigrants has been lagging relative to natives, and generous unemployment benefits (S. P. Kerr and W. R. Kerr (2011)) produce a significant fiscal cost of unemployment.

For our analysis, we pool data from the past 20 survey waves over 1999-2018 and divide them into two periods, one pre-Great Recession (1999-2008<sup>4</sup>) and one including Great Recession and recovery (2009-2018). We include 16 countries<sup>5</sup> and conduct the analysis separately for male and female, and for the entire population. We include individuals who are between 25 and 75 years of age to avoid the initial transition dynamics into labor market. Migrants in our sample are those who resided in the host country for less than 11 years (as the years since migration variable is top-coded and we are interested in assimilation within 10-year time span) and who entered into the host country at the age of 18 or older to isolate the effect of host country education in assimilation. In addition, each sample of Period 1 and Period 2 only includes the migrants from 1999 to 2008 and from 2009 to 2018, respectively. This is particularly important in terms of our sample construction because it allows to make the two samples perfectly comparable. Tables 1 and 2 report the sizes of individual cohorts and the native counterparts in Period 1 and Period 2.

Table 1: Sizes of Individual Cohorts in Period 1 (1999-2008)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
<b>Natives</b>	874,250	869,956	906,080	894,518	875,798	850,176	1,294,387	895,307	949,654	945,714	9,355,840
<b>Migrants (by arrival cohorts)</b>											
1999	0	1,982	2,196	2,379	2,494	2,718	4,499	2,922	3,170	3,668	26,028
2000	0	0	2,084	2,417	2,846	3,019	4,916	3,526	4,191	4,429	27,428
2001	0	0	0	2,527	3,267	3,628	5,520	4,176	5,066	5,274	29,458
2002	0	0	0	0	2,611	3,203	5,166	3,964	5,294	4,985	25,223
2003	0	0	0	0	0	2,330	4,532	3,619	4,401	4,684	19,566
2004	0	0	0	0	0	0	3,964	3,503	4,818	4,728	17,013
2005	0	0	0	0	0	0	0	2,696	4,947	5,051	12,694
2006	0	0	0	0	0	0	0	0	4,766	5,185	9,951
2007	0	0	0	0	0	0	0	0	0	3,923	3,923
<b>Total</b>	874,250	871,938	910,360	901,841	887,016	865,074	1,322,984	919,713	986,307	987,641	9,527,124

<sup>4</sup>2001-2008 for Switzerland.

<sup>5</sup>EU-15 area countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom) and Switzerland.



Table 2: Sizes of Individual Cohorts in Period 2 (2009-2018)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
<b>Natives</b>	901,513	944,243	932,619	1,144,147	1,124,725	1,115,937	1,097,398	1,102,477	1,114,216	1,088,810	10,600,000
<b>Migrants (by arrival cohorts)</b>											
2009	0	2,279	3,549	4,808	4,872	4,868	4,967	5,079	5,311	4,861	40,594
2010	0	0	2,565	4,573	4,907	5,089	5,064	5,379	5,401	5,217	38,195
2011	0	0	0	3,053	4,100	4,667	5,081	5,398	5,365	5,252	32,916
2012	0	0	0	0	2,835	4,359	5,040	5,440	5,555	5,480	28,709
2013	0	0	0	0	0	3,263	4,845	5,772	6,156	6,025	26,061
2014	0	0	0	0	0	0	3,406	6,058	7,098	7,457	24,019
2015	0	0	0	0	0	0	0	3,722	5,688	6,238	15,648
2016	0	0	0	0	0	0	0	0	3,468	5,258	8,726
2017	0	0	0	0	0	0	0	0	0	3,344	3,344
<b>Total</b>	901,513	946,522	938,733	1,156,581	1,141,439	1,138,183	1,125,801	1,139,325	1,158,258	1,137,942	10,800,000

Our final sample includes 20,563,136 individuals living in 16 countries in 152 regions (as defined by the NUTS2 statistical classification). Table 3 reports summary statistics of the variables used in our regression analysis for each of the two periods, by gender and migration status weighted by yearly weighting factor provided in *EU-LFS*.<sup>6</sup> The average share of migrants in the total population and in the female population goes up from 2.0% (Period 1) to 2.3-2.4% (Period 2) while the share for the male migrants decreases slightly. Average length of years since migration is about 4.0 years; as our sample only includes migrants who lived in the host country less than 11 years and arrived older than 17 years old, the average share represented here is necessarily lower than that of Figure 1.

Table 3: Descriptive Statistics For the Variables used in the Analysis

	All, Period 1	Male, Period 1	Female, Period 1	All, Period 2	Male, Period 2	Female, Period 2
<b>Total Population</b>						
Foreign-born (%)	2.09	2.35	2.04	2.31	2.14	2.4
<b>Natives</b>						
Employed (%)	61.32	70.33	52.55	63.69	69.2	58.26
High-skilled job (%)	41.74	41.62	41.9	47.02	46.66	47.43
Highly-educated (%)	21.71	23.43	20.02	29.63	30.1	29.17
Age	47.55 (13.75)	47.14 (13.62)	47.95 (13.86)	48.84 (13.65)	48.51 (13.60)	49.17 (13.69)
Married (%)	65.03	65.39	64.67	58.48	58.31	58.65
<b>Migrants</b>						
Employed (%)	63.54	76.24	51.77	62.91	75.69	50.85
High-skilled job (%)	28.52	29.02	27.85	39.82	40.17	39.33
Highly-educated (%)	29.06	29.29	28.85	44.42	43.24	45.53
Age	36.37 (9.92)	36.37 (9.75)	36.37 (10.08)	36.56 (9.83)	36.74 (9.76)	36.38 (9.89)
Married (%)	63.21	65.39	64.67	58.48	58.31	58.65
Years since migration	3.99 (2.23)	3.96 (2.23)	4.01 (2.22)	3.85 (2.12)	3.79 (2.10)	3.91 (2.15)

<sup>6</sup>Country-specific descriptive statistics are available from the Authors upon request.

### 3.2 Methodology

We first estimate a linear model of the probability of being employed on several covariates, arrival cohort fixed effects and a polynomial in years since migration, separately by gender group, period and for each country as follows:

$$y = \beta_0 + \beta_1 cohort + \beta_2 ysm + \beta_3 ysm^2 + \beta_4 ysm^3 + \beta_E edu + \beta_X X + \varepsilon \quad (1)$$

Alternatively we estimate a similar model, but capturing a common "intercept" for immigrants (rather than a set of cohort of arrival effects)

$$y = \beta_0 + \beta_1 immi + \beta_2 ysm + \beta_3 ysm^2 + \beta_4 ysm^3 + \beta_E edu + \beta_X X + \varepsilon \quad (2)$$

In both cases,  $y$  is a binary variable for one's employment status as defined below.

$$\text{employment status} = \begin{cases} 1, & \text{if employed} \\ 0, & \text{if unemployed or inactive} \end{cases}$$

The difference between the two models is that *cohort* is a set of dummy variables one for each year of arrival cohort (the reference group is the native) capturing the cohort-specific initial gap while *immi* is a binary variable for one's migration status capturing the average initial gap rather than the cohort-specific one. *ysm* is the number of years since migration, equal to zero for natives by construction. The squared and cubic terms are included to account for non-linear effects of the time since migration. *edu* is a 3-level categorical variable (Low, Medium and High) for education,  $X$  is a vector of control variables including individual characteristics (age, age-squared, and marital status) as well as a full set of fixed effects (year  $\cdot$  age  $\cdot$  education and region). The fixed effects for each combination of survey year, education and age captures most of the employment variation for corresponding groups of natives and their inclusion allow us to identify the convergence of immigrants' outcomes to the group of natives with the same education and age. The region-fixed effects capture unobserved characteristics of the region at the sub-national level (NUTS2) where the individual resides and errors are clustered at the sub-national regional level.

The number of years since migration included is expected to have a positive impact on employment probability and hence a positive coefficient capturing economic assimilation. The migration status or the cohort of arrival dummies should instead have a negative coefficient capturing the initial gap of immigrants. As discussed in the previous section, when migrants first arrive in the host country, they have relative disadvantages due to the lack of country-specific skills (e.g., language and different education outcomes) and information (e.g., network). As they remain in the host country, they start to accumulate those skills, build up a network, and catching up the native's labor market outcome. The next section presents the estimates from the two regressions.

### 3.3 Results

Table 4 and Table 5 show the regression results from equation (1) and (2) for Switzerland.<sup>7</sup> In Table 4, additional year since migration is positively associated with the probability of being employed for all genders in two periods and the coefficients are statistically significant except for the male in Period 2. The estimates imply that the first year spent in Switzerland in Period 1 for all migrants increases the probability of being employed on average by a 17.7% point ( $0.22039 + (-0.04663) + 0.0032 = 0.177$ ). The coefficients for the other samples can be interpreted in a similar fashion. Dummy variables for each arrival cohort are also of interest. They show the initial gap with natives in the probability of being employed for each arrival cohort. The estimates of the more recent period (Period 2) show smaller initial gaps for recent cohorts which suggests improvements in the initial performance of immigrants. This may be due to the increase in the high skilled/professional immigrants in Switzerland as documented in the existing literature (e.g., Grossmann and Stadelmann (2011), OECD (2015), OECD (2019)). In Table 5, the initial employment probability gap between immigrants and natives (the coefficient on migration status) is negative and significant in each period and for each group. It is interesting to notice that such a gap decreased in the second period and that it was significantly larger for women. Considering the more recent period we see that while immigrant men started at a 4 percent point of disadvantage in employment probability relative to natives, immigrant women had forty log points (about 34 percentage points) disadvantage. However, inspection of the linear term on "years since migration" reveals also a faster convergence of women employment probability.

Using the estimated coefficients we can calculate the value of the convergence after 10 years ( $ysm = 10$ ) as follows:  $10 \cdot \beta_2 + 100 \cdot \beta_3 + 1000 \cdot \beta_4$ . This value provides a compact indicator of the convergence between immigrants and natives employment probability during the first ten year. For example, from Table 4, the convergence after 10 years in Switzerland for the whole population in Period 1 was equal to  $10 \cdot 0.22039 + 100 \cdot (-0.04663) + 1000 \cdot 0.0032 = 0.736$ , i.e., 73.6% point increase. The initial gap estimate (coefficient on *immi* in the second regression) is the average estimate of initial gap; for example, from Table 5, it is  $-0.38339$ , i.e. -38.3% point, in Switzerland for the whole population in Period 1. Combining these two estimates, we obtain a 10-year gap estimate between the natives and migrants equal to  $-0.383 + 0.736 = 0.352$ . In other words, migrants' probability of being employed while starting with a gap relative to natives, was 35.2% point higher than that of the natives after 10 years of stay. This reflects a very strong employment performance of immigrants once in the Swiss labor market.

<sup>7</sup>Country-specific results related to the other 15 countries are available from the Authors upon request.

Table 4: Estimates of Additional year since Migration by Gender and Period in Switzerland

	All, Period 1	Male, Period 1	Female, Period 1	All, Period 2	Male, Period 2	Female, Period 2
Year since migration	0.220*** (0.032)	0.206*** (0.048)	0.167** (0.055)	0.072*** (0.013)	0.002 (0.017)	0.147*** (0.036)
Year since migration squared	-0.047*** (0.007)	-0.049*** (0.012)	-0.028 (0.015)	-0.012** (0.004)	0.001 (0.004)	-0.026** (0.010)
Year since migration cubed	0.003*** (0.001)	0.004*** (0.001)	0.002 (0.001)	0.001* (0.000)	-0.000 (0.000)	0.002* (0.001)
Year of arrival						
2001	-0.438*** (0.060)	-0.312*** (0.056)	-0.482*** (0.078)			
2002	-0.405*** (0.059)	-0.272*** (0.065)	-0.456*** (0.079)			
2003	-0.432*** (0.061)	-0.312*** (0.060)	-0.464*** (0.080)			
2004	-0.410*** (0.050)	-0.303*** (0.058)	-0.459*** (0.067)			
2005	-0.427*** (0.051)	-0.302*** (0.065)	-0.467*** (0.070)			
2006	-0.421*** (0.039)	-0.309*** (0.061)	-0.470*** (0.051)			
2007	-0.369*** (0.047)	-0.271*** (0.058)	-0.423*** (0.074)			
2009				-0.229*** (0.012)	-0.056 (0.029)	-0.415*** (0.031)
2010				-0.212*** (0.017)	-0.047* (0.019)	-0.413*** (0.039)
2011				-0.204*** (0.015)	-0.045* (0.021)	-0.394*** (0.039)
2012				-0.200*** (0.019)	-0.022 (0.025)	-0.405*** (0.038)
2013				-0.215*** (0.018)	-0.048 (0.030)	-0.411*** (0.033)
2014				-0.228*** (0.031)	-0.053 (0.041)	-0.425*** (0.058)
2015				-0.242*** (0.036)	-0.080 (0.045)	-0.435*** (0.051)
2016				-0.218*** (0.031)	-0.046 (0.036)	-0.425*** (0.065)
2017				-0.173*** (0.041)	-0.020 (0.022)	-0.372*** (0.100)
Observations	169,491	77,623	91,868	351,749	164,615	187,134
R-squared	0.361	0.439	0.330	0.356	0.389	0.348
Year Edu Age fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

Table 5: Estimated Average Initial Gap by Gender and Period in Switzerland

	All, Period 1	Male, Period 1	Female, Period 1	All, Period 2	Male, Period 2	Female, Period 2
Migration status	-0.384*** (0.050)	-0.272*** (0.061)	-0.436*** (0.072)	-0.204*** (0.016)	-0.042* (0.021)	-0.403*** (0.044)
Year since migration	0.187*** (0.038)	0.176** (0.051)	0.141* (0.064)	0.058** (0.016)	-0.005 (0.011)	0.135** (0.043)
Year since migration squared	-0.038** (0.011)	-0.041** (0.013)	-0.020 (0.018)	-0.008 (0.004)	0.003 (0.003)	-0.022* (0.011)
Year since migration cubed	0.002** (0.001)	0.003** (0.001)	0.001 (0.002)	0.000 (0.000)	-0.000 (0.000)	0.001 (0.001)
Observations	169,491	77,623	91,868	351,749	164,615	187,134
R-squared	0.361	0.439	0.330	0.356	0.389	0.348
Year Edu Age fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

### 3.3.1 Changes in the gaps over time

Table 6 reports three estimates, initial gap, linear convergence coefficient and the calculated 10-year gap, for each gender and country obtained from the regressions on employment status, as shown in Table 5, and here reported for each of the European countries in the sample. Each estimate should be interpreted as percentage point difference within the same gender. For example, the convergence coefficient represents the degree of convergence of male(female) migrants to similar male(female) natives. Mean and median value of each estimates suggest that on average there is significant initial disadvantage facing migrants in the labor market. However, there is a significant catching-up process by migrants, reducing on average the 10-year gap to a very small value.

In Period 1, initial gap for overall, male, and female migrants is larger in traditional destination countries: the Netherlands, France, Austria and Switzerland. Especially it is largest in the Netherlands (-0.672 for all, -0.515 for male, and -0.751 for female) while Ireland (-0.142), Luxembourg (-0.019) and Greece (-0.129) mark the smallest initial gap for overall, male and female migrants, respectively. The convergence coefficient is again higher in traditional destination countries. For overall and male migrants, it is highest in Switzerland (0.736 and 0.885) and for female migrants it is highest in the Netherlands (0.672). In Denmark, coefficient for the total and sub-populations is lowest (-0.072, -0.177, and -0.098). By looking at 10-year gap estimate for Period 1, we notice, remarkably, that in many countries immigrants not only catch up but overcome in employment probability, similar natives. In particular, Switzerland (0.352), Finland (0.186), Greece (0.069), Ireland (0.011), Luxembourg (0.144), Netherlands (0.030), Portugal (0.229) and UK (0.159) show positive differences between immigrants and natives after 10 years. In other countries, however, specifically in Austria (-0.224), Belgium (-0.017), Germany (-0.108), Denmark (-0.435), Spain (-0.212), France (-0.011), Italy (-0.091), and Sweden (-0.231) immigrants still have a disadvantage after 10 years. In terms of the convergence coefficient in the probability of being employed, migrants in Switzerland have the largest value while migrants in Denmark show the smallest. For female migrants full convergence or more than full convergence in 10 years is a more rare occurrence. In fact, only in Finland, Ireland, Luxembourg, Portugal and UK, the employment probability gap after 10 years is positive, while in other countries female immigrants still lag behind after 10 years. For male migrants the probability of being employed fully or more than converged to that of the natives after 10 years in 11 countries.

In Period 2 of the analysis, during and after the Great Recession, migrants in new destination countries such as Italy, Spain, Portugal and Greece, experience a larger initial gap while initial gap in traditional destination countries is not large as in previous period; for example, Italy (-0.607 and -0.554) and Sweden (-0.629) show the largest initial employment gap for the total immigrant population and also separately for men and women. Luxembourg (-0.175) had the smallest initial gap for the overall migrant population.<sup>8</sup> The initial gap for male immigrants is smallest in Switzerland (-0.042) and for female immigrants, it is smallest in Denmark (-0.258). The convergence coefficient is also higher in new destination countries in Period 2. For overall and male migrants is highest in France (0.638 and 0.795) and the one for female migrants was highest in Portugal (0.695). Convergence coefficient for the overall, male, and female migrants is lowest in Greece (0.163), Germany (0.035) and the Netherlands (0.063), respectively. 10-year gap estimates in Period 2 also reveal slower assimilation for female migrants.

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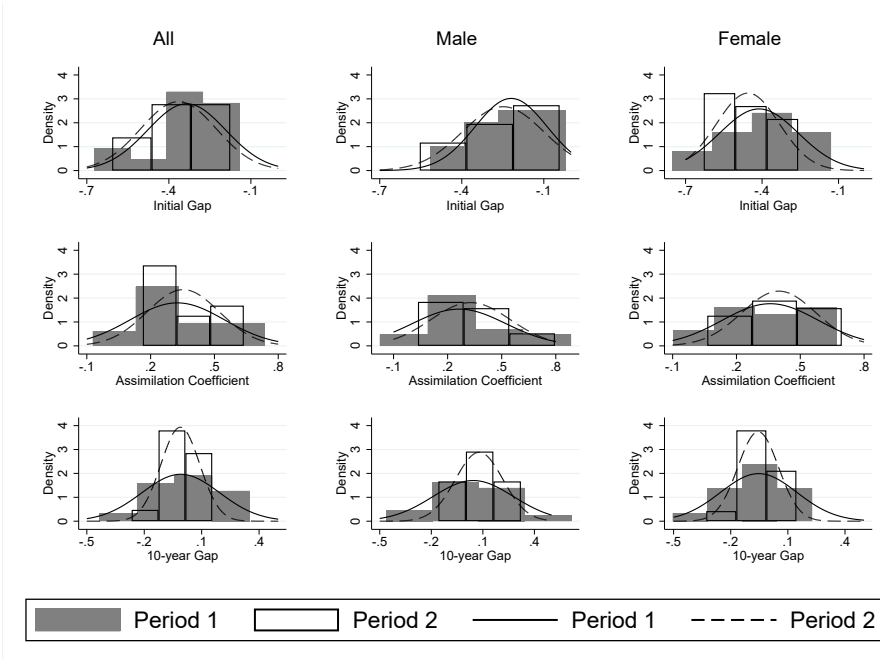
<sup>8</sup>Finland is excluded in this period of analysis. It shows very large imprecision in the estimates and appears to be an outlier. The country had a very small share of migrants (less than 1%), and due to such a small number of observations the estimates are subject to very significant error.

Table 6: Estimates of Probability of Being Employed

Country	Estimates	All, Period 1	Male, Period 1	Female, Period 1	All, Period 2	Male, Period 2	Female, Period 2
Austria	Initial Gap	-0.409	-0.222	-0.528	-0.268	-0.160	-0.361
	Convergence Coeff	0.185	0.161	0.247	0.212	0.143	0.272
	10-year Gap	-0.224	-0.06	-0.281	-0.056	-0.017	-0.088
Belgium	Initial Gap	-0.319	-0.118	-0.476	-0.250	-0.198	-0.306
	Convergence Coeff	0.302	0.166	0.446	0.217	0.234	0.194
	10-year Gap	-0.017	0.048	-0.030	-0.033	0.036	-0.113
Denmark	Initial Gap	-0.362	-0.285	-0.406	-0.224	-0.191	-0.258
	Convergence Coeff	-0.072	-0.177	-0.098	0.186	0.195	0.227
	10-year Gap	-0.435	-0.461	-0.505	-0.037	0.004	-0.032
Finland	Initial Gap	-0.228	-0.054	-0.361	0.434	0.008	0.467
	Convergence Coeff	0.414	0.171	0.584	-0.182	0.175	-0.368
	10-year Gap	0.186	0.116	0.223	0.252	0.183	0.099
France	Initial Gap	-0.557	-0.391	-0.626	-0.581	-0.474	-0.623
	Convergence Coeff	0.546	0.426	0.608	0.638	0.795	0.520
	10-year Gap	-0.011	0.036	-0.019	0.058	0.321	-0.104
Germany	Initial Gap	-0.372	-0.222	-0.521	-0.240	-0.067	-0.427
	Convergence Coeff	0.264	0.139	0.377	0.169	0.035	0.295
	10-year Gap	-0.108	-0.082	-0.145	-0.072	-0.031	-0.133
Greece	Initial Gap	-0.167	-0.147	-0.129	-0.429	-0.264	-0.569
	Convergence Coeff	0.237	0.263	0.096	0.163	0.159	0.418
	10-year Gap	0.069	0.115	-0.034	-0.266	-0.105	-0.151
Ireland	Initial Gap	-0.142	-0.120	-0.217	-0.325	-0.242	-0.413
	Convergence Coeff	0.154	0.129	0.260	0.367	0.331	0.427
	10-year Gap	0.011	0.009	0.043	0.042	0.089	0.014
Italy	Initial Gap	-0.379	-0.258	-0.383	-0.607	-0.554	-0.557
	Convergence Coeff	0.288	0.265	0.282	0.637	0.719	0.534
	10-year Gap	-0.091	0.006	-0.100	0.029	0.166	-0.024
Luxembourg	Initial Gap	-0.178	-0.019	-0.375	-0.175	-0.084	-0.289
	Convergence Coeff	0.323	0.147	0.603	0.303	0.302	0.309
	10-year Gap	0.144	0.128	0.228	0.128	0.218	0.020
Netherlands	Initial Gap	-0.672	-0.515	-0.751	-0.361	-0.153	-0.391
	Convergence Coeff	0.703	0.726	0.672	0.316	0.455	0.063
	10-year Gap	0.030	0.212	-0.078	-0.045	0.302	-0.328
Portugal	Initial Gap	-0.204	-0.070	-0.275	-0.438	-0.295	-0.550
	Convergence Coeff	0.433	0.366	0.422	0.593	0.417	0.695
	10-year Gap	0.229	0.296	0.146	0.155	0.122	0.145
Spain	Initial Gap	-0.247	-0.182	-0.259	-0.421	-0.327	-0.476
	Convergence Coeff	0.035	-0.021	0.030	0.406	0.481	0.431
	10-year Gap	-0.212	-0.202	-0.229	-0.015	0.154	-0.045
Sweden	Initial Gap	-0.399	-0.344	-0.465	-0.522	-0.432	-0.629
	Convergence Coeff	0.168	0.182	0.221	0.406	0.273	0.605
	10-year Gap	-0.231	-0.163	-0.243	-0.116	-0.159	-0.023
Switzerland	Initial Gap	-0.383	-0.271	-0.436	-0.204	-0.042	-0.403
	Convergence Coeff	0.736	0.885	0.420	0.209	0.044	0.407
	10-year Gap	0.352	0.614	-0.016	0.005	0.002	0.004
United Kingdom	Initial Gap	-0.334	-0.290	-0.383	-0.429	-0.247	-0.575
	Convergence Coeff	0.494	0.385	0.575	0.480	0.326	0.597
	10-year Gap	0.159	0.096	0.192	0.051	0.079	0.022
Mean	Initial Gap	-0.335	-0.219	-0.412	-0.315	-0.233	-0.398
	Convergence Coeff	0.326	0.263	0.359	0.320	0.318	0.351
	10-year Gap	-0.009	0.044	-0.053	0.005	0.085	-0.046
Median	Initial Gap	-0.348	-0.222	-0.395	-0.343	-0.220	-0.420
	Convergence Coeff	0.295	0.176	0.398	0.310	0.288	0.412
	10-year Gap	0.000	0.042	-0.032	-0.005	0.084	-0.028

To sum, we can see that how migrants in traditional and new destination countries assimilate differently in Period 1 and Period 2; migrants in traditional (new) destination countries experience larger initial disadvantages and faster labor-market assimilation in Period 1 (2). However, one common pattern across countries seems to be that female migrants have a larger initial gap in employment relative to similar natives, but they also show a larger convergence coefficient than male migrants. Still in most cases the employment probability of female immigrants does not converge fully in ten years to that of their native counterparts. Mean and median value of convergence coefficients for female are larger than those of male in both periods. However, these coefficients vary substantially across the countries as Figure 3 below shows.

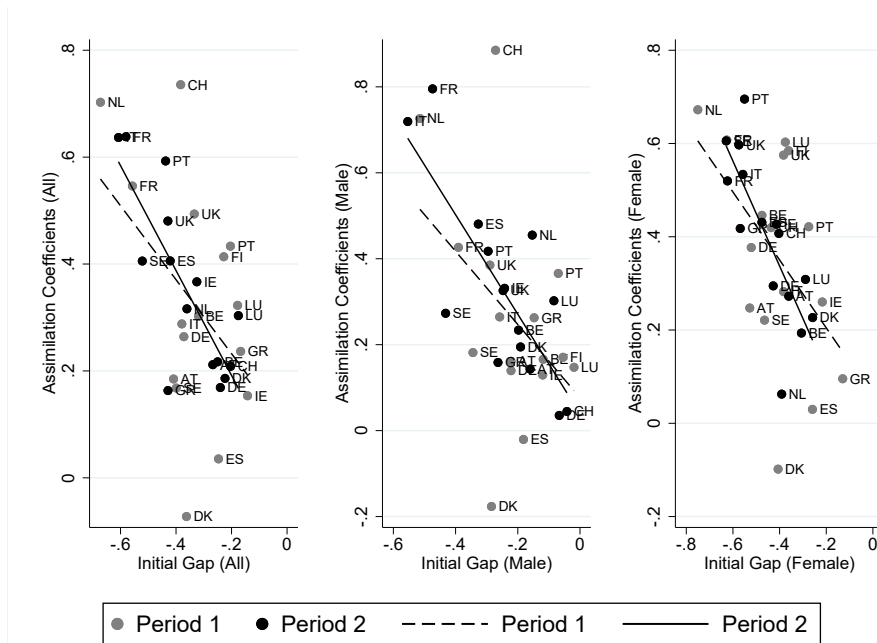
Figure 3: Distribution of the Estimates (Country-level)



### 3.3.2 Assimilation patterns and initial gaps

Looking at the estimates of initial gap and convergence coefficients for employment probability one regularity emerges. As shown in Figure 4 below, there is a very strong negative correlation between initial gap and convergence (assimilation) coefficient.<sup>9</sup> This tendency is common to both men and women, and to the overall population and also to both Period 1 and Period 2 of our analysis. This implies, interestingly, that the 10-year gap between immigrants and natives are more homogeneous across countries than the initial gaps or the convergence coefficients. It also implies that potential structural factors that increase the initial gap (likely related to the selection of immigrants) are also potentially helping their assimilation. We will look at whether there is evidence of a systematic association between some country-specific factors and initial gap or convergence in the next section.

Figure 4: Correlation between Assimilation Coefficients and Initial Gap



<sup>9</sup>Appendix Figure A2 shows the correlation with outlier (Finland, Period 2).

### 3.3.3 Heterogeneity across skills

The employment probability gap is a very important indicator of the labor market gap between natives and immigrants. However, this measure does not capture the potential difference in quality of jobs accessed by natives and immigrants. While usually looking at some measures of wages or earnings would be the natural approach, we do not have such a variable in our data. Hence to approximate the type of occupational/productivity differences between immigrants and natives, we consider the probability of having a high-skilled job. These jobs are defined as legislators, senior officials, managers or professionals based on one-digit ISCO-88 and ISCO-08.

$$\text{high-skilled} = \begin{cases} 1, & \text{if one is legislators, senior officials,} \\ & \text{managers (ISCO 1) and professionals (ISCO 2)} \\ 0, & \text{otherwise} \end{cases}$$

Using the identical regression equations (1) and (2) with the variable "high-skilled" defined above as dependent variable, Table 7 reports the three estimates: initial gap, convergence coefficient and 10-year gap, for each country and their mean and median value across them. As opposed to the previous estimates in section 3.3.1, estimates for the probability of having high-skilled job show a different picture of assimilation process. The mean and median value, reveal that there is no initial gap, on average, for male migrants. However female migrants show a significant gap. Similarly, we do not find evidence of convergence. In general, with this variable, possibly because it is coarsely defined, we do not find common patterns across countries but rather very large country-specific variation.

The coefficients show substantial variation across countries and less consistent pattern when compared with the previous results on employment probability. During Period 1, migrants in some countries do not show initial disadvantages. Initial gap for overall, male, and female migrants is largest in Finland (-0.304, -0.326, and -0.326) while Sweden (0.215), Switzerland (0.235) and France (0.250) have the largest initial advantage for overall, male and female migrants, respectively. Convergence coefficient for overall, male, female migrants is often negative, denoting immigrants losing ground relative to similar natives in access to high skilled occupations as they stay in the country. The lowest and negative coefficient is in Sweden (-0.676, -0.721 and -0.586), implying that immigrants become progressively less likely to do high skilled jobs. Our 10-year gap estimates reveal that immigrants outperform natives in their probability of working in high skilled jobs after 10 years only in few countries: Belgium, Denmark, Ireland, Luxembourg and Netherlands.

In Period 2 of our analysis, Greece (-0.152, -0.267) boast the largest initial gap for total and the male sub-population and female migrants in France (-0.205) experience the largest initial disadvantage. Migrants in Switzerland (0.162 for all, 0.163 for female) and France (0.177 for male) experience initial advantage. Convergence coefficient for overall, male, female migrants is highest in Italy (0.137), Greece (0.444), Austria (0.232), respectively, while the Netherlands (-0.213) for overall migrant, France (-0.464) for male migrants and Greece (-0.398) for female migrants experience the largest divergence between immigrants and natives. In terms of 10-year gap, migrants in Austria, Belgium, Finland, Italy and Luxembourg experience full catching-up.

However, the 10-year gap is larger for female migrants than male migrants in many countries – all except for Austria and UK for both Period 1 and 2, which is puzzling as female migrants are likely to be more educated and to experience more rapid employment catching-up. This contradictory finding are consistent with the existence of 'de-skilling' or 'brain-waste' among female migrant workers; for example, high-skilled female workers take up low-skilled job while the natives stay in high-skilled jobs. Therefore, this situation highlights that even when migrant women are actually employed, the quality of their employment tends to be lower, which can be attributable to problems in the recognition of foreign degrees, as well as factors such as country of origin attitudes regarding women's employment, language barriers, and immigrants' limited access to public sector jobs. (Rubin et al. (2008))

This finding reinforces the importance of taking into account 'de-skilling' or 'brain-waste' especially for migrant women, whose education level may not be a good predictor of their occupation. In addition to the simple dummy capturing the probability of having a high skilled occupation, we measure occupational change over time for migrants, using the ISEI score to take into account factors beyond the standard quantitative measures of labor market outcomes (such as participation and employment rates). This is a measure of socio-economic status based on the occupational definitions as in ISCO-08.<sup>10</sup> The ISEI score assigns to each occupation a score that increases in the "skill content" and hence average wage paid in that occupation. Changes in the score for a group only reflect changes in occupation over time. They do not reflect the potential change in skill/content or wage within an occupation over time and are identical for Period 1 and Period 2.<sup>11</sup>

<sup>10</sup>The ISEI score was constructed on a database of 198,500 men and women with valid education, occupation and (personal) incomes derived from the combined 2002-2007 waves of the International Social Survey Programme (Ganzeboom et al. (1992)).

<sup>11</sup>ISCO08 3-digit codes (available after 2010) and ISCO88 3-digit codes (available before 2011) are converted into ISEI-08 score.

Table 7: Estimates of Probability of Having High-skilled Occupation

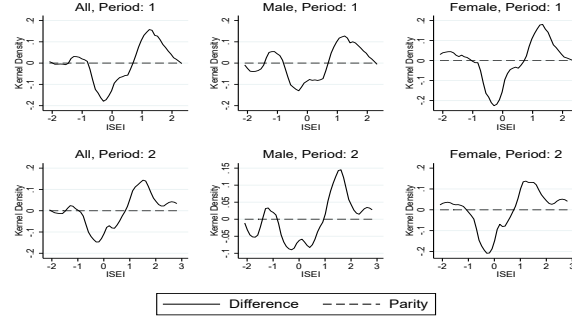
Country	Estimates	All, Period 1	Male, Period 1	Female, Period 1	All, Period 2	Male, Period 2	Female, Period 2
Austria	Initial Gap	0.022	0.124	-0.128	-0.048	-0.004	-0.104
	Convergence Coeff	-0.092	-0.355	0.272	0.099	-0.022	0.232
	10-year Gap	-0.069	-0.231	0.144	0.052	-0.026	0.129
Belgium	Initial Gap	0.123	0.078	0.152	-0.002	0.014	-0.028
	Convergence Coeff	-0.111	-0.039	-0.136	0.056	0.114	-0.038
	10-year Gap	0.013	0.039	0.016	0.055	0.128	-0.066
Denmark	Initial Gap	0.045	-0.048	0.190	-0.075	0.009	-0.187
	Convergence Coeff	0.023	0.385	-0.377	-0.049	-0.076	0.013
	10-year Gap	0.069	0.337	-0.187	-0.124	-0.067	-0.174
Finland	Initial Gap	-0.304	-0.326	-0.327	-0.412	-0.179	-0.635
	Convergence Coeff	0.290	0.323	0.210	0.680	0.355	0.941
	10-year Gap	-0.014	-0.003	-0.117	0.268	0.234	0.306
France	Initial Gap	0.207	0.134	0.251	0.014	0.177	-0.205
	Convergence Coeff	-0.388	-0.293	-0.437	-0.126	-0.464	0.225
	10-year Gap	-0.182	-0.159	-0.186	-0.112	-0.287	0.02
Germany	Initial Gap	0.103	0.118	0.036	0.034	0.043	-0.007
	Convergence Coeff	-0.147	-0.145	-0.097	-0.163	-0.147	-0.166
	10-year Gap	-0.044	-0.028	-0.061	-0.129	-0.103	-0.173
Greece	Initial Gap	-0.171	-0.115	-0.242	-0.152	-0.267	0.103
	Convergence Coeff	0.08	0.049	0.107	0.052	0.444	-0.398
	10-year Gap	-0.091	-0.066	-0.136	-0.1	0.177	-0.295
Ireland	Initial Gap	-0.146	-0.137	-0.172	-0.009	0.052	-0.100
	Convergence Coeff	0.232	0.185	0.335	-0.121	-0.116	-0.109
	10-year Gap	0.086	0.048	0.163	-0.130	-0.064	-0.209
Italy	Initial Gap	-0.037	0.008	-0.091	-0.124	-0.114	-0.159
	Convergence Coeff	-0.139	-0.159	-0.112	0.137	0.155	0.147
	10-year Gap	-0.176	-0.150	-0.203	0.013	0.042	-0.011
Luxembourg	Initial Gap	0.002	0.020	-0.061	0.044	0.029	0.046
	Convergence Coeff	0.009	0.099	-0.098	-0.020	-0.026	0.015
	10-year Gap	0.011	0.119	-0.158	0.024	0.003	0.061
Netherlands	Initial Gap	0.031	0.141	-0.121	0.078	0.140	0.020
	Convergence Coeff	0.122	-0.067	0.378	-0.213	-0.296	-0.230
	10-year Gap	0.152	0.074	0.257	-0.135	-0.156	-0.21
Portugal	Initial Gap	-0.122	-0.025	-0.232	-0.038	-0.023	-0.059
	Convergence Coeff	-0.047	-0.310	0.243	-0.140	-0.072	-0.167
	10-year Gap	-0.169	-0.335	0.01	-0.179	-0.095	-0.226
Spain	Initial Gap	-0.059	-0.043	-0.074	-0.051	-0.103	-0.029
	Convergence Coeff	-0.061	-0.056	-0.063	0.022	0.210	-0.072
	10-year Gap	-0.119	-0.099	-0.137	-0.029	0.106	-0.102
Sweden	Initial Gap	0.215	0.189	0.228	-0.119	-0.084	-0.187
	Convergence Coeff	-0.677	-0.721	-0.586	-0.075	-0.005	-0.075
	10-year Gap	-0.462	-0.533	-0.358	-0.194	-0.089	-0.262
Switzerland	Initial Gap	0.165	0.235	0.062	0.162	0.156	0.163
	Convergence Coeff	-0.321	-0.395	-0.267	-0.201	-0.169	-0.241
	10-year Gap	-0.156	-0.16	-0.205	-0.039	-0.013	-0.078
United Kingdom	Initial Gap	-0.010	-0.001	-0.041	0.069	0.146	-0.070
	Convergence Coeff	-0.158	-0.195	-0.092	-0.210	-0.390	0.058
	10-year Gap	-0.168	-0.197	-0.133	-0.141	-0.244	-0.012
Mean	Initial Gap	0.004	0.022	-0.036	-0.039	-0.001	-0.090
	Convergence Coeff	-0.087	-0.106	-0.045	-0.017	-0.028	0.008
	10-year Gap	-0.083	-0.084	-0.081	-0.056	-0.028	-0.081
Median	Initial Gap	0.012	0.014	-0.067	-0.024	0.011	-0.064
	Convergence Coeff	-0.076	-0.106	-0.095	-0.062	-0.049	-0.055
	10-year Gap	-0.080	-0.083	-0.134	-0.106	-0.045	-0.090

The selected figures report the difference in the distribution of immigrants and natives by period and gender along the standardized ISEI score: if immigrants and natives had an identical distribution of occupational status, then the graph would show a straight line at 0 (Frattini and Vigezzi (2019), Frattini and Campa (2020)). However, the line above (below) 0 indicates where the occupational status of migrants is more (less) concentrated than natives. The figures show largely a U-shape pattern, suggesting that across European countries, migrants are less represented in the middle part of the distribution and over-represented at the extreme. However, there exist core differences across countries in terms of the specific distribution. For example, there is positive selection in Switzerland (Figure 5a) where migrants tend to be more concentrated at the top. On the other hand, there is negative selection in Spain and the UK (Figure 5b and 5c) where migrants have more elementary occupations

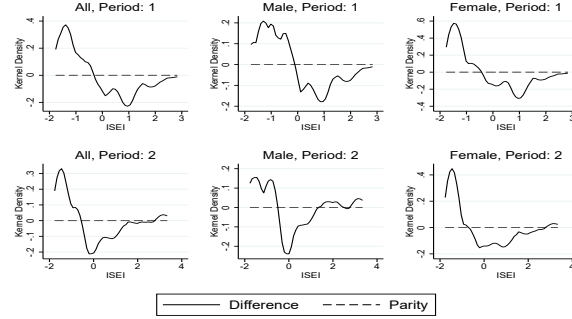


than the natives do, and this indicates another systematic disadvantage faced by migrants in the European labor market.<sup>12</sup>

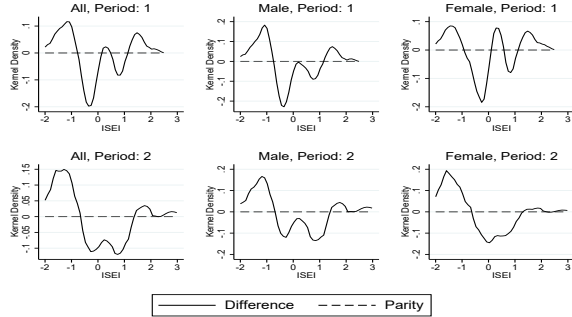
Figure 5: Relative Distribution of Immigrants along the Skill (ISEI) Score



(a) Switzerland



(b) Spain



(c) United Kingdom

The regression specification (1) and (2) for each gender and period uses the 3-digit ISEI score (standardized in each country with the mean of 0 and standard deviation of 1) as dependent variable. The summary statistics of regression results on ISEI score without the outlier can be found in the Table 8 below. The results show that female migrants have a larger initial disadvantage in terms of occupational score during both periods of our analysis. And the initial gap for each gender is greater in Period 2 which could reflect the effect of the decreasing quality of newly arriving migrants. However, we cannot find a decisive pattern of assimilation in results. There is only some evidence of convergence of immigrants to natives' score for female migrants. Average values for the 10-year gap estimates for each gender and period show that, on average, immigrants did not reach parity with natives in terms of occupational score. And the gap is more persistent for female migrants in both periods.

The different occupational score distribution between natives and immigrants may determine important differences and complementarities between these two groups. Occupational segregation and concentration that we documented in the previous section can explain two seemingly contradictory findings – rapid catching-up of female migrants in employment rates (Table 6) and de-skilling of female migrants (Table 7 and 8). Female migrants may have achieved employment but in occupations for which they are overqualified.

<sup>12</sup>The figures related to the other countries are available from the Authors upon request.

Table 8: Mean and Median of Estimates from the Regressions with Standardized ISEI Score

	All, Period 1	Male, Period 1	Female, Period 1	All, Period 2	Male, Period 2	Female, Period 2
<b>Mean</b>						
Initial Gap	-0.175	-0.067	-0.373	-0.247	-0.185	-0.408
Convergence Coeff.	-0.298	-0.340	-0.211	-0.170	-0.115	-0.084
10-year Gap	-0.472	-0.407	-0.584	-0.417	-0.300	-0.492
<b>Median</b>						
Initial Gap	-0.075	-0.024	-0.281	-0.184	-0.024	-0.383
Convergence Coeff.	-0.273	-0.337	-0.179	-0.211	-0.257	-0.138
10-year Gap	-0.401	-0.418	-0.521	-0.398	-0.368	-0.471

Note: Finland (Period 2) is excluded.

The results show that female migrants have a larger initial disadvantage in terms of occupational score during both periods of our analysis. And the initial gap for each gender is greater in Period 2 which could reflect the effect of the Great Recession. However, we cannot find a decisive pattern of assimilation in results except for the fact that the difference is greater in Period 1. There is only some evidence of convergence of immigrants to natives' score for female migrants during Period 2 but such a finding seems to depend on some outliers. In particular the data on initial gap for Finland and Italy and the estimates of the convergence coefficient in France and Sweden seem to drive the results. Average values for the 10-year gap estimates (without outliers) for each gender and period show that immigrants did not reach parity with natives in terms of occupational score. And the gap is more persistent for female migrants in Period 1.

### 3.3.4 Youth employment

Up until now we have included in our sample the population aged between 25 and 75. However, it is worth exploring the assimilation process for the young population, who arrived in the destination country younger than 15. Young migrants are more likely to receive some training and education in the host country and to acquire specific skills and culture more quickly. The dynamics of employment of young migrants can provide us with a picture of a faster assimilation process. We construct 32 new samples for each country and period which include individuals aged between 15 and 24 and migrants who first entered the host country when younger than 15. Two regression specifications on these samples are used to estimate the initial gap and convergence coefficient for each country and period. The results are presented in Table 9. We find a smaller initial gap compared to previous findings for both period (-0.071 for Period 1 and -0.190 for Period 2), so that the 10-year gap in employment for younger migrants who migrated very young is now positive (0.049 for Period 1 and 0.096 for Period 2). The initial employment gap is largest in Sweden (-1.109) and in Germany (-1.127), respectively for Period 1 and Period 2. It is smallest in Denmark (0.869) for Period 1 and in Luxembourg (1.109) in Period 2. Sweden has the fastest assimilation speed (0.957) for Period 1 and assimilation is fastest in Greece (2.034) for Period 2 whereas France and Luxembourg experience some degree of divergence (-0.573 and -0.166) in each period.

Our 10-year gap estimates show that in Period 1 young migrants have successfully gone through the assimilation process in 7 countries (i.e., Denmark, Finland, Greece, Ireland, Luxembourg, Portugal and Spain) whereas there is no convergence for the remaining 9 countries in our sample (i.e., Austria, Belgium, France, Germany, Italy, Netherlands, Sweden, Switzerland and the United Kingdom). On the other hand, in Period 2 in 9 out of 16 countries young migrants do not exhibit employment disadvantage by the end of the decade examined. Among the countries where there is not full convergence by the end of Period 2 we find the same 5 countries where convergence was incomplete by the end of Period 1 (i.e., Austria, Germany, Sweden, Switzerland, and the United Kingdom) in addition to Luxembourg and Ireland.

Table 9: Estimates of Probability of Being Employed: Youth Population

Country	Estimates	Youth, Period 1	Youth, Period 2
Austria	Initial Gap	-0.253	-0.826
	Convergence Coeff	-0.030	0.703
	10-year Gap	-0.283	-0.123
Belgium	Initial Gap	-0.085	0.017
	Convergence Coeff	-0.294	0.706
	10-year Gap	-0.378	0.723
Denmark	Initial Gap	0.869	-0.675
	Convergence Coeff	0.343	0.713
	10-year Gap	1.213	0.038
Finland	Initial Gap	0.206	-0.066
	Convergence Coeff	0.281	0.271
	10-year Gap	0.487	0.205
France	Initial Gap	0.298	-1.069
	Convergence Coeff	-0.573	1.411
	10-year Gap	-0.275	0.342
Germany	Initial Gap	-0.323	-0.630
	Convergence Coeff	0.102	0.559
	10-year Gap	-0.221	-0.070
Greece	Initial Gap	0.141	-1.127
	Convergence Coeff	0.331	2.034
	10-year Gap	0.471	0.907
Ireland	Initial Gap	0.165	0.957
	Convergence Coeff	-0.117	-1.606
	10-year Gap	0.048	-0.649
Italy	Initial Gap	0.482	0.083
	Convergence Coeff	-0.532	0.112
	10-year Gap	-0.049	0.195
Luxembourg	Initial Gap	-0.150	1.109
	Convergence Coeff	0.494	-1.659
	10-year Gap	0.344	-0.550
Netherlands	Initial Gap	-0.229	-0.053
	Convergence Coeff	-0.229	0.531
	10-year Gap	-0.458	0.478
Portugal	Initial Gap	-0.787	0.329
	Convergence Coeff	0.941	-0.195
	10-year Gap	0.153	0.134
Spain	Initial Gap	0.046	-0.153
	Convergence Coeff	0.317	0.602
	10-year Gap	0.363	0.449
Sweden	Initial Gap	-1.110	0.150
	Convergence Coeff	0.958	-0.262
	10-year Gap	-0.152	-0.111
Switzerland	Initial Gap	-0.781	-0.765
	Convergence Coeff	0.403	0.558
	10-year Gap	-0.378	-0.207
United Kingdom	Initial Gap	0.380	-0.326
	Convergence Coeff	-0.477	0.096
	10-year Gap	-0.097	-0.230
Mean	Initial Gap	-0.071	-0.190
	Convergence Coeff	0.120	0.286
	10-year Gap	0.049	0.096
Median	Initial Gap	-0.019	-0.110
	Convergence Coeff	0.191	0.544
	10-year Gap	-0.073	0.086

## 4 Analysis of labor market institutions

### 4.1 Correlation of gaps between men and women

The results reported so far show large variation in the assimilation pattern across countries. The variety of estimates in the convergence coefficients and 10-year gaps calls for an analysis to identify possible correlates with those outcomes across countries. Before examining such factors, we look at the correlation of immigrant-native employment gaps between men and women across countries using estimates of the probability of being employed presented in Table 6. Figure 6 below shows that there is a strong positive correlation between the initial gap for men and women across countries and for the assimilation coefficient. The correlation appears stronger in Period 1.<sup>13</sup> The 10-year gap seems less correlated between men and women across countries, especially in Period 2. Table 10 reports the coefficients from regressions of initial gap, assimilation coefficient and 10-year gap for female on those for male with and without period-fixed effects, across countries respectively, predicting the variation in the estimates for female migrants using those for male migrants.<sup>14</sup>

We can see that there is high correlation between the initial gap estimate for male migrants and the one for female migrants, 0.555 (without period-fixed effect) and 0.538 (with period effect) which are statistically significant. As the initial gap estimates for male migrants and female migrants are all negative values between -1 and 0, the estimated coefficient suggests that there is a greater initial gap for female migrants and that an initial gap decrease in male migrants is associated with a smaller initial gap decrease in female migrants. Assume that there is a country with 0.1 percentage point less initial disadvantage (i.e., 0.1 percentage point higher in initial gap estimate) for male. This country is expected to experience only 0.055 percentage point less initial disadvantage (i.e., 0.055 percentage point higher in initial gap estimate) for female. Assimilation coefficient estimates for male are also statistically significantly associated with the estimate for female: 0.423 (without period-fixed effect) and 0.428 (with period-fixed effect), where the absolute value of both estimates is below 1. Similarly, one country with 0.1 higher assimilation coefficient for male migrants has on average 0.0423 higher assimilation coefficient for female migrants. However, the coefficients become less (without period-fixed effect) or not (with period-fixed effect) statistically significant and the magnitude of the coefficient (0.292 and 0.345, with and without period-fixed effect) as well as R-square decreases by one third for 10-year gap estimates. Hence, the 10-year gap for male migrants is not strongly associated with that for female migrants, suggesting that different factors may be affecting country-level variation in overall assimilation of male migrants and female migrants. The large variation across countries and the limited correlation between men's and women's ten-year gap suggests that these indices of assimilation may depend significantly on gender-specific and country-specific factors.

Table 10: Estimates from Regressions of Coefficients for Female on Coefficients for Male

	Initial Gap (Female)		Assimilation Coeff. (Female)		10-year gap (Female)	
	(1)	(2)	(1)	(2)	(1)	(2)
Initial Gap (Male)	0.555** (0.157)	0.538*** (0.158)				
Assimilation Coeff. (Male)			0.424*** (0.087)	0.428*** (0.080)		
10-year gap (Male)					0.293 (0.178)	0.346* (0.179)
Constant	-0.325*** (0.053)	-0.330*** (0.048)	0.272*** (0.053)	0.271*** (0.052)	-0.082** (0.029)	-0.085*** (0.027)
Observations	31	31	31	31	31	31
R-squared	0.417	0.447	0.363	0.364	0.136	0.168
Period-fixed effects		Yes		Yes		Yes

Note: Standard errors in parentheses. \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

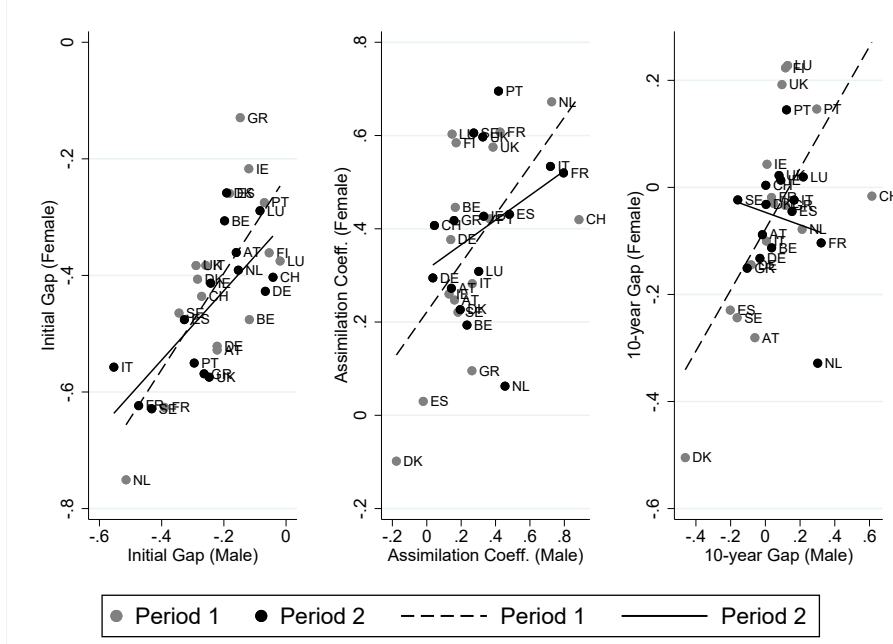
<sup>13</sup>Appendix Figure A2 shows the correlation with outliers (Finland, Period 2).

<sup>14</sup>Appendix Table A1 shows the result with full sample. Excluding an outlier from the regression analysis does not lead to a change in the estimated coefficients. The regression equation is below:

$$y^f = \beta_0 + \beta_1 x^m + \varepsilon \quad (3)$$

where  $y^f$  and  $x^m$  are coefficient (initial gap, convergence coefficient, and 10-year gap) for female and male, respectively. Population of beginning year of the period (i.e., 1999 and 2009) for each country is used as weights and errors are clustered at country level.

Figure 6: Correlation between Men's and Women's Estimates



## 4.2 Explanatory Factors

In this section we use country-level data from various sources to identify macroeconomic, institutional and cultural characteristics that can be correlated with economic assimilation of immigrants across countries. We examine factors that are general in nature and could affect assimilation of all immigrants. Then we focus on gender-specific factors that may be more specific to the assimilation of immigrant women. The first set of general factors include macroeconomic and demographic variables, aggregate economic indicators and institutional characteristics<sup>15</sup>. Each variable is averaged over each of the two periods (1999-2008 and 2009-2018) for each country. We then calculate the cross-country correlation between these variables and the estimated assimilation coefficients of immigrants. For example, if economic growth is important for the economic success of immigrants relative to natives then GDP growth should have a positive correlation with the assimilation coefficient, while recession indicators, output gap and unemployment are likely to have a negative correlation. The total number of immigrants may also be positively correlated with assimilation if networks support helps or negatively if overcrowding hurt assimilation. To study the role of institutions, we also include seven OECD indicators in our analysis - three from OECD employment protection indicators (protection of permanent workers against individual dismissal, specific requirements for collective dismissal, and regulation on temporary forms of employment) and four from OECD product market regulation indicator (barriers to entrepreneurship, barriers to trade and investment, product market regulation, and state control). These indicators measure different forms of protection of insiders relative to outsiders, which could imply reduced opportunities for integration of immigrants. The second set of country-level variables that we consider include indicators of women empowerment and their economic/social rights and attitudes towards women. Specifically they are the proportion of seats held by women in national parliaments(%), female to male tertiary enrollment ratio, female to male employment ratio and indicators from Cingranelli and Richards (2010) (CIRI) Human Rights Data-set (Women's political rights, Women's economic rights and Women's social rights). As done for the macroeconomic indicators, we calculate the average value of each variable for two periods using available yearly data. These indicators are expected to have a positive association with the convergence coefficient of women. The attitude variables measure attitudes toward women. We use two questionnaires (C001: Men should have more right to a job than women, D057: Being a housewife just as fulfilling) from the European Values Study (EVS). We re-code them to a binary variable and calculate country average for both period. If general attitudes towards women affect the economic convergence of female immigrants then these indicators should be negatively associated with the coefficients. To analyze whether those factors are associated with economic convergence of all immigrants or of female immigrants specifically, once we control for their initial gap, we run the following panel regression using country-level variables for each of the two periods:

$$y_{i,t}^a = \beta_0 + \beta_1 \text{inigap}_{i,t}^a + \beta_a X_{i,t} + \varepsilon_{i,t} \quad (4)$$

$$y_{i,t}^f = \beta_0 + \beta_1 \text{inigap}_{i,t}^f + \beta_f X_{i,t} + \varepsilon_{i,t} \quad (5)$$

<sup>15</sup>The description of the datasets and variables used in the analysis is available in the Appendix.

The dependent variables  $y_{i,t}^a$  and  $y_{i,t}^f$  are either the convergence coefficient for all immigrants or female immigrants, respectively in country  $i$  and period  $t$ .  $inigap_{i,t}^a$ ,  $inigap_{i,t}^f$  are the corresponding initial gaps for all immigrants and female immigrants. The coefficients  $\beta_a$  and  $\beta_f$  capture the partial correlation of the all-migrants convergence coefficients or the female-migrants convergence coefficients with specific macroeconomics, institutional or attitude variables that we include, in turn, as explanatory variable  $X_{i,t}$ .

We also estimate an augmented specification that focuses on the “difference” in convergence of female immigrants relative to convergence of male immigrants, as follows:

$$y_{i,t}^f = \beta_0 + \beta_1 inigap_{i,t}^f + \beta_2 assim_{i,t}^m + \beta_3 X_{i,t}^f + \varepsilon_{i,t} \quad (6)$$

The variable  $assim_{i,t}^m$  is the estimate of the convergence coefficient for male in the same country and period. The term  $X_{i,t}$  includes macroeconomic and institutional variables,  $X_{i,t}^f$  instead focuses on gender indicator. Population at the beginning of the year of the period (i.e., 1999 and 2009) for each country is used as weights and errors are clustered at country level to capture correlation within country.

Table 11: Country-level Macroeconomic, Institutional, and Cultural Explanatory Factors

	Expected Sign	Estimated coefficients		
		<i>Number of Observations</i>	<i>All</i>	<i>Female</i>
<b>1. General Factors</b>				
· Average GDP growth	(+)	31	-0.463	-1.358
· Log Migration Stock	(+)	31	0.003	-0.001
· Recession	(-)	31	-0.009	0.013
· Output gap	(-)	31	0.001	-0.001
· Unemployment rate	(-)	31	-0.005	-0.001
<i>OECD employment protection indicators</i>				
· Protection of permanent workers against individual and collective dismissal	(-)	31	-0.073	-0.102*
· Protection of permanent workers against individual dismissal	(-)	31	-0.042	-0.064
· Specific requirements for collective dismissal	(-)	31	-0.084**	-0.104**
· Regulation on temporary forms of employment	(-)	31	-0.032	-0.034
<i>OECD Product Market Regulation Statistics</i>				
· Barriers to entrepreneurship	(-)	31	-0.075**	-0.051
· Barriers to trade and investment	(-)	31	-0.103	-0.094
· Product market regulation	(-)	31	-0.096	-0.075
· State control	(-)	31	-0.048	-0.038
<b>2. Women Specific Factors</b>				
· Proportion of seats held by women in national parliaments	(+)	31		-0.005*
· Female to male tertiary enrollment ratio	(+)	29		0.151
· Female to male employment ratio	(+)	31		1.505
· Women’s political rights	(+)	31		-0.138*
· Women’s economic rights	(+)	31		-0.041
· Women’s social rights	(+)	16		0.143
· Men should not have more right to a job than women	(+)	30		-0.224
· Being a housewife not just as fulfilling	(+)	28		-0.763*
· Women should not be prepared to cut down on paid work	(+)	27		-0.262

Note: \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

Table 11 reports the estimated coefficients  $\beta_a$ , for all migrants’ convergence and  $\beta_f$  for female migrants’ convergence from the regressions above (results with country-fixed effects are available in Appendix Table A2). Given the small number of observations in each regression we include one factor at a time in estimating its partial correlation. The macroeconomic variables except for the output gap and the institutional variables have the expected correlation with the convergence coefficient for the overall immigrant population but they are not statistically significant (except for specific requirements for collective dismissal and the barrier to entrepreneurship which seem to affect significantly convergence of all immigrants). The convergence coefficient for female migrants, on the other hand, does not show significant correlation with aggregate macro, institutional or gender specific indicators except for two OECD employment protection indicators. Possibly attitudes indicators are positively

and equally associated with employment opportunities of native female workers and female migrant workers so that they will not affect the relative performance captured by our coefficient, hence no effect would be detected.

While the regression do not show significant correlations, the small number of observations and the very aggregate nature of these regression may conceal some significant relationship.

### 4.3 Further analysis

#### 4.3.1 Analysis at regional level

Because of the small number of observations – 32 observations for two periods at most, the cross-country results are not very significant. In this section we conduct a similar analysis at the local level. We first consider sub-national regions in European countries as the places of destination for immigrants. We then estimate the “initial gap,” the “convergence coefficient” and the “10-year gap” specific to immigrants in each of these local areas. As units we use the Nomenclature of Territorial Units for Statistics or NUTS, a geocode standard used for referencing the subdivisions of countries in Europe. The standard, adopted in 2003, is developed and regulated by the European Union. The more aggregate NUTS1 level, refers to broad-area regions while the NUTS2 level includes basic regions for the application of regional policies. We consider these two levels, depending on the national availability, to analyze the association between socio-economic conditions and the economic convergence of immigrant employment.

Specifically in our *EU-LFS* dataset, the regional variable is either at NUTS1 (Austria, Germany and UK) level or NUTS2 level (for the remaining countries, except for the Netherlands where the variable is not available). So our analysis at NUTS1 will include all countries but the Netherlands. The analysis at NUTS2 will include all countries but Austria, Germany, UK and Ireland. The number of regions in our sample for the NUTS1 and NUTS2 levels are shown in Table 12.

Table 12: The Number of Regions by Country

Country	Level of the smallest NUTS available from the raw data set	No. of regions available from the raw dataset	No. of NUTS1 included in the analysis	No. of NUTS2 included in the analysis
Austria	1	3	3	-
Belgium	2	11	3	11
Switzerland	2	7	1	7
Germany	1	16	16*	-
Denmark	2	5	1	5
Spain	2	19	7	19
Finland	2	5	1	5
France	2	26	14	26
Greece	2	13	4	13
Ireland	2	2	1	2
Italy	2	20	5	21
Luxembourg	1 and 2	1	1	1
Netherlands	-	1	-	-
Portugal	2	7	3	7
Sweden	2	8	3	8
United Kingdom	1	12	12	-
Total		156	75	124

*Note:* Region variable to construct NUTS1 variable in Germany is available from 2001.

*Source:* Eurostat (2018)

The main analysis presented uses NUTS1 level regions which allows a more precise estimate of the convergence coefficient at the regional level (as more migrants are included and they are likely to stay within the area) and includes a larger sample.<sup>16</sup> When considering regional factors we include, besides aggregate macro-variables from (Eurostat), variables capturing local attitudes from the European Social Survey.<sup>17</sup> Let us notice that there is significant regional variation in Europe in attitudes and institutional settings and hence this analysis can add significant information. Table 13 below shows that, for the selected variables in Period 1, within country variation across regions is as high as 50% or more of the cross-country (between) variation.

We run the regressions to estimate “convergence coefficient” and “initial gap” on 75 (regions) for 2 (period) samples. In this regard, we could identify some outliers which are related to the fact that in some regions the

<sup>16</sup>Results from the analysis at NUTS2 level are available from the Authors upon request.

<sup>17</sup>The description of the datasets and variables used in the analysis is available in the Appendix.

Table 13: Between and Within Variation of Selected Variables

	Overall	Between	Within
Average GDP growth	0.026	0.010	0.017
Number of recessions	1.133	2.155	0.945
Long-term unemployment	0.039	0.027	0.015
Law against ethnic discrimination	0.713	0.059	0.030
Not better if everyone shares customs	0.441	0.075	0.043
Immigrants create new jobs	0.471	0.067	0.045
Immigrants make country's crime problems better	0.344	0.058	0.026
Government more generous for refugee applications	0.492	0.097	0.062
Not important to speak country's official language	0.303	0.101	0.038
Men should not have more right to a job than women	0.134	0.146	0.058

total number of immigrants is extremely small and hence the estimates are noisy. In order to address this issue, we exclude five regions with very small population as those estimates are extremely imprecise. Specifically, these regions are Åland from Finland, Corse and overseas departments and regions of France, and Azores and Madeira from Portugal. Our analytical sample includes 70 regions in 15 countries over Period 1 and Period 2.

Figure 7: Distribution of the Estimates (Region-level)

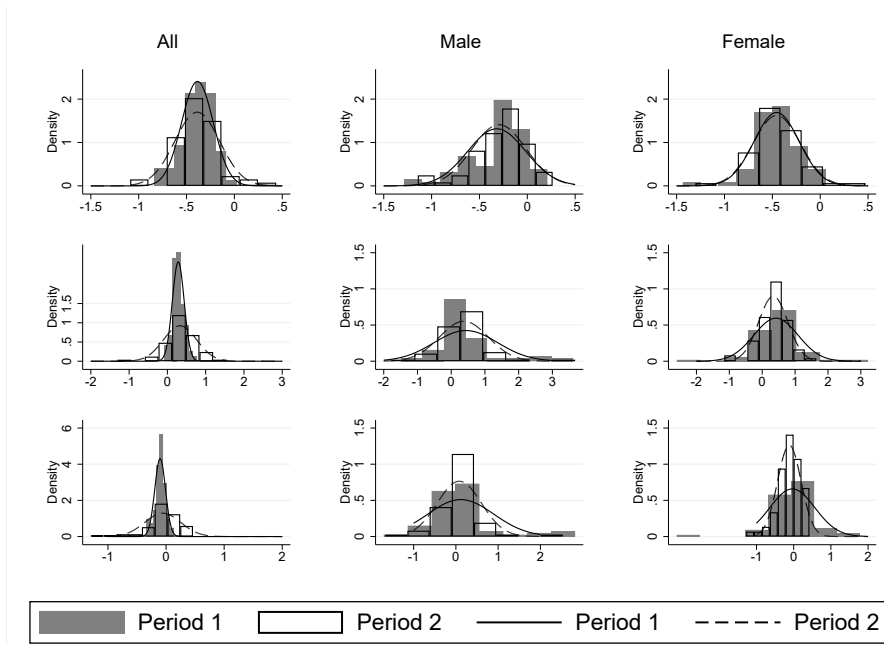


Figure 7 above shows the distribution of three estimates, initial gap, assimilation coefficient and 10-year gap for our analytical sample.<sup>18</sup> Average values for initial gap (-0.456 for female and -0.319 for male in Period 1; -0.454 for female and -0.295 for male in Period 2) confirm the initial disadvantage faced by female migrants; the average probability of being employed for female migrants is more than 10% points lower than that for male migrants. We cannot see any strong temporal patterns for initial gap here for all migrants and the two subgroups. There seems to be more variation in the assimilation coefficients for all migrants in Period 2 than in Period 1, suggesting that the increasing flow of migrants and adverse economic situations have played a key role. The average value of assimilation coefficients at regional level for male migrants (0.439 in Period 1; 0.377 in Period 2) is slightly higher than the female counterparts (0.423 in Period 1; 0.340 in Period 2) for both periods. However, the estimates for male migrants present greater variation in both periods. Finally, we can see that while male migrants in many regions managed to catch up with their native counterparts after 10 years (0.119 in Period 1 and 0.082 in Period 2), female migrants have not overcome the initial disadvantage after, and this happens in both periods (-0.033 in Period 1 and -0.113 in Period 2).

The macroeconomic variables included in the regional analysis, constructed using data from Eurostat are the

<sup>18</sup>Region-specific results are available from the Authors upon request.



following: average GDP growth rate, average unemployment rates for all population, average youth unemployment rate (youth unemployment defined by one aged between 15 and 24), average long-term unemployment rate, average unemployment rate for high-skilled population (whose educational attainment is tertiary or above), number of recessions (defined by consecutive negative growth of the growth rate), and number of recessions by period (defined by the negative growth lower than 3.4%), for our regression analysis. These 7 macroeconomic variables are averaged over each period (Period 1 for 1999-2008; Period 2 for 2009-2018) for each region.

The attitude variables are obtained, instead, from the European Social Survey (ESS). This covers all 16 countries and spans the whole time period in our sample. These variables are available either at NUTS1 or 2 level. Variables on sentiments towards migrants and women are based on the questionnaires on social attitudes towards migrants, attitudes towards cultural values, attitudes towards labor-market and economy, attitudes towards crime, attitude of government towards refugees and attitude towards women's empowerment.<sup>19</sup>

These variables which are ordinal with a four or five-point scale with values or with 0-10 scale are all re-scaled to 0-1 scale and averaged at NUTS1 level using survey weights for each country and for each of the two periods for the following analysis. A different method is also used to code the attitudes variables in binary response, the results are robust.<sup>20</sup>

As there are several variables capturing the positive attitude of people towards immigrants in several different areas, and they are highly correlated, we opt for reducing dimensionality through principal component analysis. This allows us to include in the regression fewer variables (components) while maintaining most of the cross-regional variation in pro-immigrants attitudes. We selected 4 components whose eigenvalue is greater than 1 and run regressions using them as explanatory variables for the coefficient on employment convergence of immigrants across regions. Each of these components has explanatory power in the cross-region variation in our estimates; all 4 components are positively associated with the dependent variable, which reveals that pro-migration sentiments at regional level is associated positively with migrant's economic assimilation.<sup>21</sup>

In the regional regressions the population at the beginning of the relevant period (i.e., in 1999 and 2009) for each region is used as weight and errors are clustered at the country level to allow for spatial correlation.

Table 14 reports results from the regressions with country fixed effects. We show the coefficient estimates for all immigrants and those estimated on convergence of female immigrants. Many estimated coefficients – especially of the attitude variables, have the expected sign and several are significant.

We expect that immigrants' labor market outcomes are likely to be more cyclical than those of natives and adverse economic conditions such as negative economic growth, recessions and high unemployment rates to be associated with a lower degree of migrants' labor-market assimilation as documented in previous studies (e.g., Aydemir (2003), Orrenius and Zavodny (2010)).

In spite of this, we do not find statistically significant association between macroeconomic variables and the labor-market assimilation of immigrants. We suspect that this is because the macroeconomic variables are averaged over 10 years and short- and medium-term fluctuations over this period are offset by being averaged as shown by the large variation between Period 1 and Period 2 (Table 13). As attitude variables are in general more persistent and are not likely to fluctuate during the period as shown in relatively small within variations of Table 13, the results using these variables are more statistically significant. We measure the degree of openness to migrants by examining people's attitudes toward migrants' role in job creation, crime and we expect the societal level of generosity towards migrants would facilitate migrants' labor market assimilation. As expected, the more "immigration friendly" attitudes – openness towards migrants, disagreement towards ethnic discrimination, support towards multiculturalism - the greater the estimated coefficient related to immigrants' assimilation.

In region where people are more open to work with a migrant boss, have a migrant relative and law against ethnic discrimination is stronger, on average, migrants' labor-market assimilation is faster. For example, a region with 0.1 unit higher in 0-1 scaled variable (i.e., 10% point increase in the average value agreeing to each statement) reflecting social attitudes towards migrants – openness to relative's marriage to migrant, migrant boss, anti-discrimination law, is associated with 0.072, 0.106 and 0.141 percentage point higher convergence coefficient of all migrants, respectively. The coefficients of the variables related to attitude towards cultural values (0.653), job/economy (0.806) and government (0.452) have the expected sign and are statistically significant.

While many attitude variables have statistically significant coefficients on convergence of all migrants, we do not find many significant coefficients on employment convergence of female immigrants; only two coefficients are statistically significant, and only one with the expected sign. A region with 0.1 unit higher in 0-1 scaled variable reflecting how much people agree with the laws against ethnic discrimination is statistically significantly associated with 0.119 lower convergence coefficient for female migrants, implying that one's attitude toward ethnic discrimination does not translate into attitude towards gender discrimination. On the other hand, host country's official language does not play an important role in explaining female migrants' convergence in labor market. From previous literature we can see that gender stereotypes in the country affect the degree of female migrants' labor market participation (Blau et al. (2011), Blau (2015)), The estimated coefficients related to the variables on attitudes are not significant. These results suggest two considerations. First, local attitudes matter in the

<sup>19</sup>More detailed information is available in the Appendix.

<sup>20</sup>Appendix Table A4 shows that sign and magnitude do not change significantly even when the dependent variable is binary.

<sup>21</sup>Appendix Table A3 shows the result of regressions using 4 principal components from 23 variables.

Table 14: Regional-level Macroeconomic, Institutional, and Cultural Explanatory Factors

	Expected Sign	Estimated coefficients		
		<i>Number of Observations</i>	<i>All</i>	<i>Female</i>
<b>I. General Factors</b>				
<b>1. Macroeconomic variables</b>				
<i>Economic growth</i>				
· Average GDP growth	(+)	128	1.088	-0.933
· Number of recessions, Consecutive negative growth	(-)	128	-0.009	-0.032
· Number of recessions, GDP growth lower than -3.4 percent	(-)	128	-0.032*	-0.025
<i>Employment</i>				
· Unemployment rate, All	(-)	140	-0.001	-0.006
· Unemployment rate, Youth	(-)	140	0.001	-0.003
· Unemployment rate, Long-term	(-)	140	-0.604	-1.083
· Unemployment rate, High-skilled	(-)	140	-0.342	-0.775
<b>2. Attitude variables</b>				
<i>Social attitudes towards migrants</i>				
· Do not mind if close relative married to migrant	(+)	111	0.717***	-0.010
· Do not mind if your boss is migrant	(+)	111	1.061***	0.829
· Law against ethnic discrimination in workplace good	(+)	117	1.413***	-1.106
<i>Attitudes towards cultural values</i>				
· Not better for a country if everyone shares customs	(+)	117	0.653***	0.772
<i>Attitudes towards job/economy</i>				
· Immigrants create new jobs	(+)	117	0.806***	0.414
<i>Attitudes towards crime</i>				
· Immigrants make country's crime problems better	(+)	117	0.293	-0.392
<i>Attitudes of government towards refugees</i>				
· Government more generous for refugee applications	(+)	122	0.452***	0.103
<i>Qualification for immigration</i>				
· Not important to speak country's official language	(+)	117	0.605	1.692***
<b>II. Women Specific Factors</b>				
· Women should not be prepared to cut down on paid work	(+)	113		0.366
· Men should not have more right to a job than women	(+)	121		0.026

Note: \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

assimilation of immigrants, so that more than at the national-level, the specific attitude in the local labor markets may be a better measure of the hurdles or support that immigrants will face. Second, factors that affect the general population or women may not necessarily affect immigrant women in the same way.

#### 4.3.2 Analysis on the characteristics of migrants

We now analyze how the composition of migrants is correlated to the initial disadvantage and pattern of assimilation across countries. We are going to start with the country-level analysis by examining to what extent the different characteristics of migrants and characteristics of labor market situation of migrants can explain part of such variation. By relying on the country of birth variable available from the *EU-LFS*, we constructed a binary variable to determine whether an individual is originally from a developing country or not.<sup>22</sup>

Previous studies focusing on European countries show that migrants from developing countries experience an initial employment disadvantage and that the assimilation pattern of immigrants varies by country of origin. An explanatory factor documented in the existing literature is that human capital accumulated in different countries of origin is rewarded differently in the labor market of the host country (Zorlu and Hartog (2012); Amuedo-Dorantes and de la Rica (2007); Basilio et al. (2017)).

Therefore, we will be able to examine how the share of migrants from developing countries in a given host

<sup>22</sup>We follow the standard IMF classification to define the 'developing country' status. Consequently, the 'developing countries' category includes the following countries: 3 new EU member states (Bulgaria, Croatia and Romania), Non-EU/EFTA countries in Europe, Countries in North Africa, Other African countries, Near Middle Eastern countries, East Asian countries, South and Southeast Asian countries and Latin American countries. As countries are already aggregated by region, a few advanced economies (i.e., Japan and South Korea in East Asia, Singapore in Southeast Asia) are identified as developing. However, the share of migrants from these countries of origin is negligible. Robustness checks have been carried out by excluding these regions.

country is associated with the assimilation coefficient of that receiving country. Additionally, we also employ the *EU-LFS* ad hoc modules (2008 and 2014) on “labor market situation of migrants and their immediate descendants” to examine the role of additional characteristics of migrants, such as reason for migration, host country language proficiency and characteristics of labor market situations of migrants. Previous studies show that humanitarian migrants often have different employment patterns and labor market outcomes in the host country than economic migrants (Brell et al. (2020)) and that the host country language and labor market policy play an important role in migrant’s labor market assimilation (Aleksynska and Algan (2010)).

These selected explanatory variables are recoded as binary variables, and then averaged by country and period.<sup>23</sup> We expect an increase in the share of economic migrants, overqualified migrants and migrants who are fluent in host country language in one country to be associated with a faster assimilation whereas the increase in the share of humanitarian migrants and migrants facing stricter labor market situations or language requirement for job to be associated with a slower assimilation. Table 15 presents the country-level regression results from the same specification described in equations (4) and (5) where the dependent variable is- in separate specifications- the assimilation coefficient for all migrants and female migrants.

We find that most migrants’ characteristics are not statistically significant. The only statistically significant variable in explaining the variation is one’s proficiency in the host country language. A 0.1 (in 0-1 scale) percentage point increase in the share of migrants proficient in the host country language is associated with a 0.058 percentage point increase in the convergence coefficient for all migrants and a 0.048 percentage point increase in the convergence coefficient for female migrants.

Table 15: Characteristics of Migrants

		Estimated coefficients		
	Expected Sign	<i>Number of Observations</i>	<i>All</i>	<i>Female</i>
1. Characteristics of migrants				
Origin from developing countries	(-)	31	-0.122	-0.129
Economic migration	(+)	26	-0.109	-0.063
Humanitarian migration	(-)	26	-0.746	-0.662
Participation in host country language course	(+/-)	26	-0.181	-0.184
Over-qualification for job	(+)	12	0.274	0.259
Proficiency in host country language	(+)	12	0.582*	0.481**
2. Characteristics of labor market situation of migrants				
Limitation of duration of current residence	(-)	13	0.310	0.132
Restriction of legal access to labor market	(-)	13	0.077	0.142
Need to improve host country language	(-)	14	0.056	-0.599

Note: \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

We then move from the country-level to the individual-level analysis to examine the role of migrants’ characteristics, namely one’s country of origin, in explaining the initial gaps and patterns of assimilation. As previously mentioned, the reason for changes in initial gaps and patterns of convergence can be attributed to changes in the composition migrants. To take this into account, in the main specification of the individual-level regressions on the probability of being employed (and probability of having a high skilled occupation), in equations (1) and (2), we include the country of origin fixed effects.<sup>24,25</sup> Table 16 presents mean and median values of each estimates. Country-specific results are available from the Authors upon request.

In Panel A, the mean and median values of the estimated results of probability of being employed with country of origin fixed effects for each subsample are presented. We can observe that the overall picture does not change significantly from the results without country of origin fixed effects (in Table 6). The results show similar stylized facts, female migrants have a greater initial gap in both periods (-0.413 in Period 1 and -0.388 in Period 2) than male migrants (-0.251 in Period 1 and -0.258 in Period 2) and female migrants do not overcome the initial disadvantage after 10 years (9 out of 16 countries in Period 1 and 6 out of 16 countries in Period 2 have negative a value for the 10-year gap estimates) while male migrants do (6 out of 16 countries in Period 1 and 5 out of 16 countries have negative values for the 10-year gap estimates). However, as opposed to the previous results in which female migrants assimilate faster than male migrants in both periods, our new results show that this is

<sup>23</sup>Some variables are only available for a single period. Please refer to the appendix for the detailed information.

<sup>24</sup>To construct the country of origin fixed effects, we use the country of origin variable available in the *EU-LFS*. This variable includes the following categories: Native of own, EU15, NMS 13, Outside EU 28, Other Africa, MENA, Asia, Latin America, and North America and Oceania.

<sup>25</sup>Germany (Period 1) is not included in our analysis as the country of origin variable is not available for this period.

Table 16: Estimates of Probability of Being Employed with Country of Origin Fixed Effects

		All 1	Male 1	Female 1	All 2	Male 2	Female 2
Panel A: Probability of being employed							
Mean	Initial Gap	-0.355	-0.251	-0.413	-0.327	-0.258	-0.388
	Convergence Coefficient	0.330	0.362	0.298	0.376	0.354	0.399
	10-year Gap	-0.024	0.111	-0.115	0.049	0.097	-0.011
Median	Initial Gap	-0.388	-0.270	-0.367	-0.331	-0.216	-0.378
	Convergence Coefficient	0.258	0.339	0.314	0.364	0.296	0.404
	10-year Gap	0.003	0.177	-0.105	0.032	0.070	0.021
Panel B: Probability of having high-skilled occupation							
Mean	Initial Gap	0.135	0.119	0.127	0.122	0.119	0.105
	Convergence Coefficient	-0.030	-0.055	0.011	-0.034	-0.028	-0.033
	10-year Gap	0.105	0.064	0.138	0.087	0.091	0.072
Median	Initial Gap	0.161	0.123	0.123	0.159	0.124	0.054
	Convergence Coefficient	-0.091	-0.068	-0.029	-0.044	-0.066	0.003
	10-year Gap	0.107	0.027	0.090	0.089	0.089	0.047

true in Period 2 whereas in Period 1 the average country level assimilation coefficient for male (0.362) is higher than that for female (0.298).

Moreover, once country of origin fixed effects are included, the mean of the estimates of the 10-year gap for all and female (Period 1) and male (Period 2) is larger. Looking at the country-specific results, we can observe that in countries such as Portugal, Greece and Italy, country of origin fixed effects are statistically significant and the magnitude of the effects is large enough to explain the different degree of assimilation of immigrant groups.

In Panel B, the new estimates of the probability of having a high-skilled occupation show substantial differences for the initial gap estimates from the previous analysis without country of origin fixed effects (in Table 7). Migrants in most countries have initial advantage in being employed in a high-skilled occupation. Therefore, for the entire population we have above 0 average (0.135) and median (0.161) values for the initial gap. Convergence coefficients and 10-year gap are larger for female migrants than male migrants in most countries in both periods. Most countries now have a smaller average initial gap. The average convergence coefficient and 10-year gap are smaller in most cases.

Taking into account the country of origin fixed effects would allow us to explain further the differences in assimilation across countries as it matters more for countries in which the country of origin mix has changed more drastically over the 20 years examined. Consistent with Borjas (2015) who concludes that the change in composition of migrants partially affects the estimated rates of assimilation, we find that for the overall population including country of origin fixed effects does not lead to a significant change in our estimates. On the other hand, we find that including country of origin fixed effects leads to significantly different results for the convergence of high skilled occupations. This is also in line with the recent work by Peri and Rutledge (2020) who argue that combining all immigrants in one group and studying their average progress towards economic assimilation to natives would overlook the role of a composition effect in explaining the changing gap and wage assimilation of immigrants relative to natives. The Authors focus on a specific and homogeneous group, the Mexican and Central Americans in the U.S. and compare this group with the other two largest groups of immigrants in the U.S., Chinese and Indians to show that the aggregate impression of deterioration in the assimilation of immigrants over time is in fact a result of the changing composition of immigrants.

We carry out the country-level regressions with the macroeconomic, institutional and cultural factors based on equations (4), (5) and (6) by including the estimates of the convergence coefficients (carried out by including country of origin fixed effects). The results are statistically significant for a larger number of explanatory factors (Table 17). And the sign of most coefficients is as expected. When we look at the regression results related to all migrants, average GDP growth among the macroeconomic factors and some institutional variables such as protection of permanent workers against individual and collective dismissal, specific requirements for collective dismissal, barriers to entrepreneurship, barriers to trade and investment, product market regulation and state control have negative and statistically significant coefficients. These variables can partially explain the cross-country variation in the convergence coefficients. As found in earlier studies, the stock of existing migrants has a positive impact on the pattern of assimilation. Our results suggest that a country with 1% higher migration stock is expected to have 0.0009 larger convergence coefficient. It is statistically significant, but the magnitude is very small. As expected, the estimates are negatively associated with the rigidity of labor market regulations. For example, a country with one point higher (on a scale of six points) “Barriers to trade and investment” indicator is associated with -0.506 lower convergence coefficient for all migrants and -0.674 lower convergence coefficient for

female migrants. Other variables - Product market regulation, and State control, can be similarly interpreted. It is also worth noting that these negative associations are much stronger between institutional variables and convergence coefficient for female migrants, suggesting that variations in assimilation of female migrants are more susceptible to cross-country differences in labor market regulations. Among the women specific factors, only the female to male employment ratio is statistically significant and with the expected sign. This result suggests that in those countries with a greater female labor force participation the convergence in employment probability is faster for immigrant women. On the other hand, the other women specific factors are not statistically significant which suggest that factors that affect women in general do not necessarily affect the employment patterns of immigrant women.

We also replicated the regional level analysis (presented in Table 14) using the estimates which include the country of origin fixed effects. We observe that the macroeconomic variables become statistically significant and some attitude variables remain statistically significant. As noted in the country-level regressions, also at the regional-level, the majority of women specific factors are not significantly associated with immigrant women's employment convergence. These results are available from the Authors upon request.

Table 17: Country-level Macroeconomic, Institutional, and Cultural Explanatory Factors

	Expected Sign	Estimated coefficients		
		<i>Number of Observations</i>	<i>All</i>	<i>Female</i>
<b>1. General Factors</b>				
· Average GDP growth	(+)	30	-5.210**	-4.888**
· Log Migration Stock	(+)	30	0.090**	0.093**
· Recession	(-)	30	-0.010	0.016
· Output gap	(-)	30	-0.011	-0.013
· Unemployment rate	(-)	30	-0.002	-0.002
<i>OECD employment protection indicators</i>				
· Protection of permanent workers against individual and collective dismissal	(-)	30	-0.099*	-0.183***
· Protection of permanent workers against individual dismissal	(-)	30	-0.050	-0.124**
· Specific requirements for collective dismissal	(-)	30	-0.093**	-0.124***
· Regulation on temporary forms of employment	(-)	30	-0.068	-0.062
<i>OECD Product Market Regulation Statistics</i>				
· Barriers to entrepreneurship	(-)	30	-0.170*	-0.127
· Barriers to trade and investment	(-)	30	-0.506**	-0.674**
· Product market regulation	(-)	30	-0.331***	-0.294**
· State control	(-)	30	-0.242***	-0.193***
<b>2. Women Specific Factors</b>				
· Proportion of seats held by women in national parliaments	(+)	30		-0.002
· Female to male tertiary enrollment ratio	(+)	29		-0.052
· Female to male employment ratio	(+)	30		3.274***
· Women's political rights	(+)	30		-0.030
· Women's economic rights	(+)	30		0.038
· Women's social rights	(+)	15		0.066
· Men should not have more right to a job than women	(+)	29		0.417
· Being a housewife not just as fulfilling	(+)	27		-0.869
· Women should not be prepared to cut down on paid work	(+)	26		0.335

Note: \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

## 5 Conclusion

This study provides new evidence on differences in the convergence of migrants to natives in the labor market, by gender. By using a rich dataset on 16 European countries over two decades, spanning the period 1999-2018 and hence covering before and after the Great Recession, we estimate the speed of convergence after arrival of immigrants to similar natives, in terms of employment probability. We find evidence of an initial employment gap of migrants at the time of arrival in terms of labor market outcomes but we also find evidence of economic convergence as immigrants spend years in the host country. In most of the countries examined, female immigrants start with a larger initial employment gap but subsequently converge more rapidly than male migrants to employment outcomes of similar natives. However, on average female migrants do not converge completely after 10 years, whereas male migrants are more likely to have employment probability equal to or larger than similar natives after 10 years. There is significant heterogeneity in the assimilation patterns by gender and across countries and also some differences between the two time periods considered. We use cross-country variation in the estimated employment convergence patterns and analyze to what extent different macroeconomic, institutional and cultural factors are associated with this variation. We carry out this analysis for the overall immigrant population and for female immigrants specifically. We do not identify macroeconomic and aggregate factors strongly associated with convergence of immigrants. Then we look at assimilation patterns at the regional level, as local features can be important for immigrants' assimilation. In this context we do find significant correlation of positive attitudes towards immigrants with their employment convergence at the local level. We also find positive but less significant correlation of employment assimilation of women and attitudes towards immigrants. We also analyze the change in composition of migrants and how this is related to the patterns of assimilation observed. We find some significant effects and use these new estimates to replicate the country and regional level analyses with the macroeconomic, institutional and cultural factors.

Overall, the empirical evidence of this paper has shown significant differences in employment convergence of immigrants, between men and women. While exploring some preliminary evidence on the possible country (and regional)-level sources of these gaps, it has not identified very strong correlates. One set of factors that appears more relevant than others are attitudes toward immigrants at the regional level. Regions where the population has more favourable views of immigrants and their contribution are also those where immigrants have faster employment convergence to natives. On the other hand, we identified a more limited number of factors that affect the assimilation of female immigrants, who may suffer from a double disadvantage in the labor market, as immigrants and as women. More research is needed to identify the underlying mechanisms that affect migrants' labor market integration and the policies that can play a role in closing these gaps.

# Appendix

## Notes on the dataset

In this section we provide the description of the variables, and their underlying sources, which are used as explanatory variables in the cross-country analysis in Section 4.2., NUTS1 level analysis in Section 4.3.1 and the additional analysis in Section 4.3.2.

### Country-level variables

The country-level analysis includes macroeconomic indicators, labor market institutions and survey-based measures of attitudes towards women. Macroeconomic variables are from various sources and include growth of average GDP per capita, total number of immigrants, the number of recessions, output gap and unemployment rate. The variables related to the institutional settings include OECD employment protection indicators which measure the procedures and costs involved in dismissing individuals or groups of workers and the procedures involved in hiring workers on fixed-term or temporary work agency contracts, and OECD product market regulation statistics which measure the extent to which policy settings promote or inhibit competition in areas of product market where competition is viable. Women-specific variables are retrieved from numerous sources including the CIRI data set which rates the level of government respect for a variety of internationally recognized human rights, and the European Values Study (EVS) which is a large-scale, cross-national, and longitudinal survey research program on attitudes, values and preferences of citizens in European countries. The table below summarizes the core information related to the data used in the analysis.

Variable name	Classification	Period	Country	Construction	Source
Average GDP growth	Macroeconomic	1: 1999-2008* 2: 2009-2018	All	Average of annual growth rate over 10 years**	Eurostat
Total number of immigrants	Demographic	1: 2000 2: 2010	All	Migrant stock in the first year of each period	UNDP
Number of recessions (defined by consecutive negative growth)	Macroeconomic	1: 1999-2008* 2: 2009-2018	All	Average of the number of recessions over 10 years**	Eurostat
Output gap	Macroeconomic	1: 1999-2008* 2: 2009-2018	All	Average of the output gap over 10 years**	OECD
Unemployment rate	Macroeconomic	1: 1999-2008* 2: 2009-2018	All	Average of annual unemployment rate over 10 years**	ILO
Protection of permanent workers against (individual) dismissal Specific requirements for collective dismissal Regulation on temporary forms of employment	Institutional	1: 1999-2008 2: 2009-2018	All	Average of annual values over 10 years	OECD Employment Protection Indicators
Product market regulation Barriers to trade and investment Barriers to entrepreneurship State control	Institutional	1: 1998, 2003 2: 2008, 2013	All	Average of two time points for each period	OECD Product Market Regulation Statistics
Proportion of seats held by women in national parliaments	Institutional	1: 1999-2008* 2: 2009-2018	All	Average proportion over 10 years**	IPU
Female to male tertiary enrollment ratio	Women-specific	1: 1999-2008* 2: 2009-2018	All	Ratio of average male and female tertiary educated rates over 10 years**	UNESCO
Female to male employment ratio	Women-specific	1: 1999-2008* 2: 2009-2018	All	Ratio of average male and female employment rates over 10 years**	ILO
Women's political rights Women's economic rights Women's social rights	Women-specific	1: 1999-2008 2: 2009-2011 1: 1999-2008 2: 2009-2011 1: 1999-2008 2: NA	All	Average value over 10 years	CIRI Human Rights Indicator
Attitude against job priority to men over women  Attitude against fulfillment just as a housewife	Women-specific	1: 1999-2001 (wave 3) 2: 2008-2010 (wave 4)	All except Switzerland (P1)  All except Austria, Switzerland, Ireland (P1)	Binary response to the statement, "Men should have more right to a job than women," is inverted and averaged by country Categorical response to the statement, "Being a housewife just as fulfilling," is inversely recoded to 0-1 scale numeric variable (Strongly Agree = 1, Agree = 0.66, Disagree = 0.33, Strongly Disagree = 0) and averaged by country	European Value Study (EVS)
Attitude against women's cut down on paid work	Women-specific	1: 2004 (wave 2) 2008 (wave 4) 2: 2010 (wave 5)	All except France (P1), Luxembourg, Austria, Italy (P2)	Categorical response to the statement, "Women should cut down on paid work for sake of family," is inversely recoded to 0-1 scale numeric variable (Strongly Agree = 1, Agree = 0.66, Disagree = 0.33, Strongly Disagree = 0) and averaged by country	European Social Survey (ESS)

Note: \*Switzerland 2001-2008, \*\*Switzerland for 8 years

## Regional level variables

This part of the analysis relies on within country information, aggregated at the regional level. One of the advantages is that it increases the comparability, makes the analysis more refined and also highlights the disparities and/or similarities within European countries themselves. Macroeconomic indicators in European countries at NUTS1 level are derived from Eurostat. Population data is also retrieved to be used as weight throughout the analysis. Concerning the attitude variables, the European Social Survey (ESS), which is a cross-national survey that has been conducted across Europe since 2001 (Total 8 rounds are available), is used. Every two years, face-to-face interviews are conducted with newly selected, cross-sectional samples. The survey measures the attitudes, beliefs and social preferences of diverse populations in more than thirty European countries. Among the extensive set of questionnaires, we examined the questionnaires related to sentiments towards migrants and attitudes towards women, specifically focusing on the perceived role of women in society. Each questionnaire is available at least once in each period examined (i.e., 1999-2008 and 2009-2018). The table below summarizes the core information related to the data used in the analysis.

Variable name	Classification	Period	Regions	Construction	Source
Average GDP growth	Macroeconomic	1: 2000-2008 2: 2009-2017	All regions except for regions from CH, FR (P1), LU (P2)	Annual values are averaged over each period	Eurostat
Number of recessions (Consecutive negative growth)					
Number of recessions (GDP growth lower than -3.4 percent)					
Unemployment rate (All/Youth/Long-term/High-skilled)					
Different race/ethnicity of relative's partner	Social attitudes towards migrants	1: 2002 (wave 1) 2: 2014 (wave 7)	All regions except for regions from AT (All), FR (P1), GR, LU, IT (P2)	0-10 scale response to the questions, "How much would you mind if people from another country who are of a different race married to a close relative or yours/is your boss," is inversely rescaled to 0-1 scale and averaged	European Social Survey (ESS)
Different race/ethnicity of boss				0-10 scale response to the questions, "How good is it for a country to have a law against racial or ethnic discrimination in the workplace", "How much would you agree that it is better for a country if almost everyone shares the same customs and traditions", "Would you say that people who come to live here generally help to create new jobs", "Are host country's crime problems made better by people coming to live here from other countries?" is inversely rescaled to 0-1 and averaged by country	
Law against ethnic discrimination in workplace				0-10 scale response to the questions, "How good is it for a country to have a law against racial or ethnic discrimination in the workplace", "How much would you agree that it is better for a country if almost everyone shares the same customs and traditions", "Would you say that people who come to live here generally help to create new jobs", "Are host country's crime problems made better by people coming to live here from other countries?" is inversely rescaled to 0-1 and averaged by country	
Shared customs and traditions				0-10 scale response to the questions, "How good is it for a country to have a law against racial or ethnic discrimination in the workplace", "How much would you agree that it is better for a country if almost everyone shares the same customs and traditions", "Would you say that people who come to live here generally help to create new jobs", "Are host country's crime problems made better by people coming to live here from other countries?" is inversely rescaled to 0-1 and averaged by country	
Job creation by migrants	Attitudes towards job/economy		All regions except for regions from FR (P1), GR, LU, IT (P2)	Categorical response to the statement, "Governments should be generous when judging applications for refugee status," is inversely recoded to 0-1 scale numeric variable (Strongly Agree = 1, Agree = 0.66, Disagree = 0.33, Strongly Disagree = 0) and then averaged by country	
Crime problems by migrants	Attitudes towards crime		All regions except for regions from FR (P1), LU, GR (P2)	0-10 scale response to the question, "how important should it be for migrants to be able to speak host country's official language," is inversely rescaled to 0-1 by dividing the value by 10 and then averaged by country.	
Generosity on judging applications for refugee status	Attitudes of government towards refugee	1: 2002 (wave 1) 2: 2014 (wave 7), 2016 (wave 8)	All regions except for regions from FR (P1), LU, GR (P2)	Categorical response to the statement, "Being a housewife just as fulfilling," is inversely recoded to 0-1 scale numeric variable (Strongly Agree = 1, Agree = 0.66, Disagree = 0.33, Strongly Disagree = 0) and then averaged by country	
Non-necessity to speak country's official language	Qualification for immigration	1: 2002 (wave 1) 2: 2014 (wave 7)	All regions except for regions from FR (P1), GR, LU, IT (P2)		
Women's cut down on paid work for sake of family	Women-specific factors	1: 2004 (wave 2), 2008 (wave 4) 2: 2010 (wave 5)	All regions except for regions from FR (P1), AT, LU, IT (P2)		
Job priority to men over women		1: 2004 (wave 2), 2008 (wave 4) 2: 2010 (wave 5), 2016 (wave 8)	All regions except for regions from FR, IT (P1), LU (P2)		



## Country- and regional level variables

The aim of the ad-hoc modules of the European Union Labor Force Survey is to provide information on specific topics concerning the labor market to supplement the core *EU-LFS* survey. In 2008 and 2014, the ad-hoc module focuses on the labor market situation of migrants. In section 4.3.2 we examine the role of changes in the composition of migrants in affecting their economic assimilation by using these two additional ad-hoc module datasets. We can identify individuals' country of origin by using the *countryb* variable available in *EU-LFS*. This variable is provided in up to 15 country groups for reference years from 2004 onward (i.e., National, EU15, NMS10 (10 new member states of 2004), NMS3 (3 new member states of 2007 and 2013), EFTA, Other Europe, North America, Australia Oceania, North Africa, Near Middle East, East Asia, South East Asia, Central America, South America). Before 2004, this variable is provided in only 3 categories (i.e., Native, EU15, Non 15). In addition to this variable, we extract variables on characteristics of migrants, labor market policy regarding migrants and intermediate outcomes after migration are used in the analysis. They are aggregated (averaged) at national and regional levels for the analysis. The regional-level analysis is based on the countries for which the regional (NUTS1) variable, which is necessary for aggregation, is available (i.e., Austria, Belgium, Switzerland, Germany (Period 2), France, Greece, Spain, Portugal, Sweden, Luxembourg and Ireland). The table below summarizes the core information related to the data used in the analysis.

Variable name	Classification	Period	Country	Construction	Source		
Origin from developing country	Characteristics of migrants	1: 2004-2008 2: 2009-2018	All except DE (P1)	Categorical variable is recoded as binary variable and is then averaged by country (or region)	<i>EU-LFS</i> Ad hoc module 2008, 2014		
Economic migration		1: 2008 2: 2014	All except DK, FI (P1), DE, IE, NL (P2)				
Humanitarian migration							
Participation in host country language course			Binary variable is averaged by country				
Proficiency in host country language		1: NA 2: 2014				All except DK, DE, IE, NL	
Over-qualification for the current job							
Limitation of duration of current residence	Characteristics of labor market situation of migrants	1: 2008 2: NA	All except CH, DK, FI	Categorical variable is recoded as binary variable and is then averaged by country (or region)			
Restriction of legal access to labor market		1: 2008 2: NA	All except FI, DK				
Need to improve host country language							

## Tables and figures

Figure A1.1 Occupational Distribution by Gender and Period

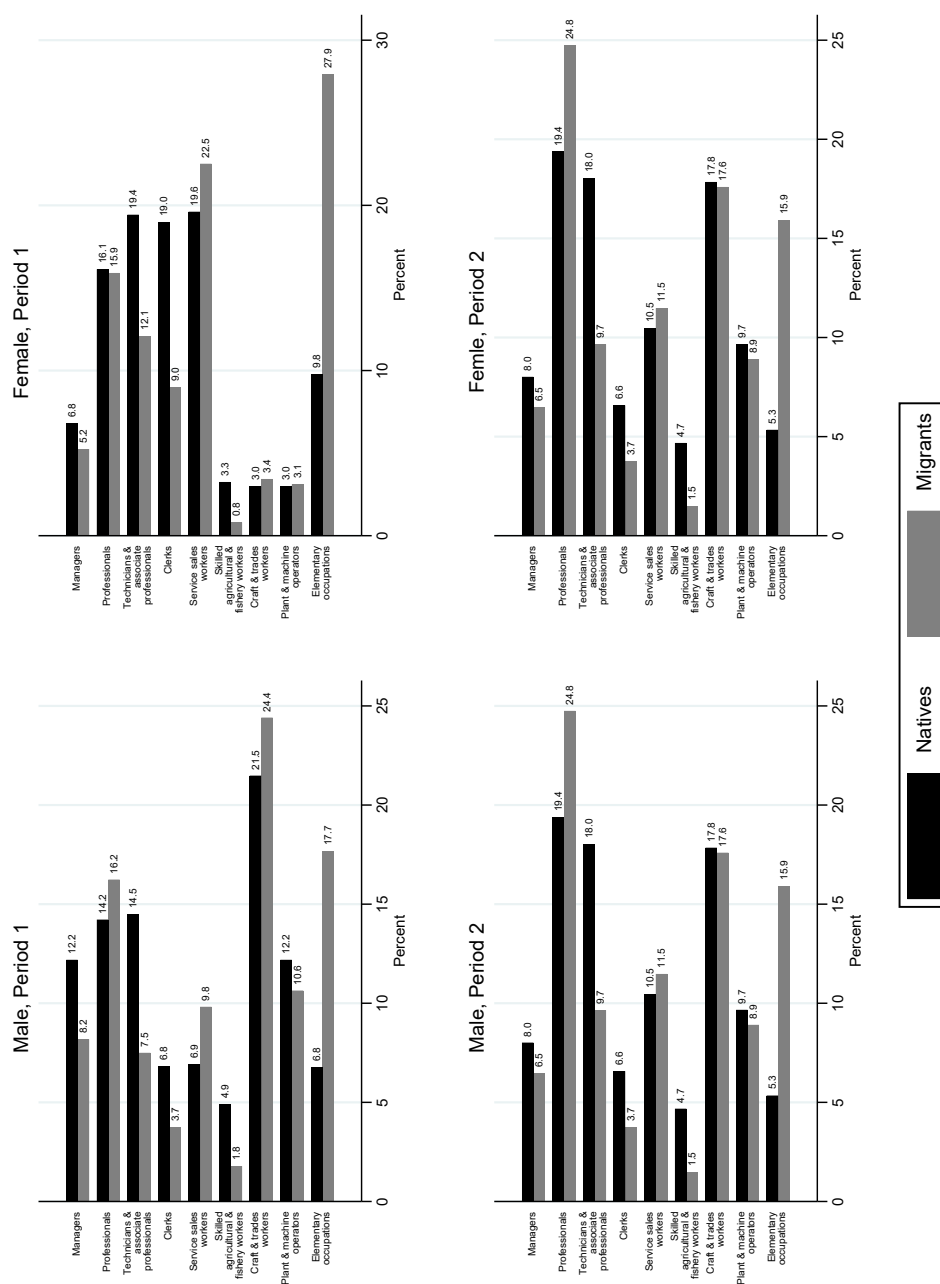


Figure A1.2 Sectoral Distribution by Gender and Period

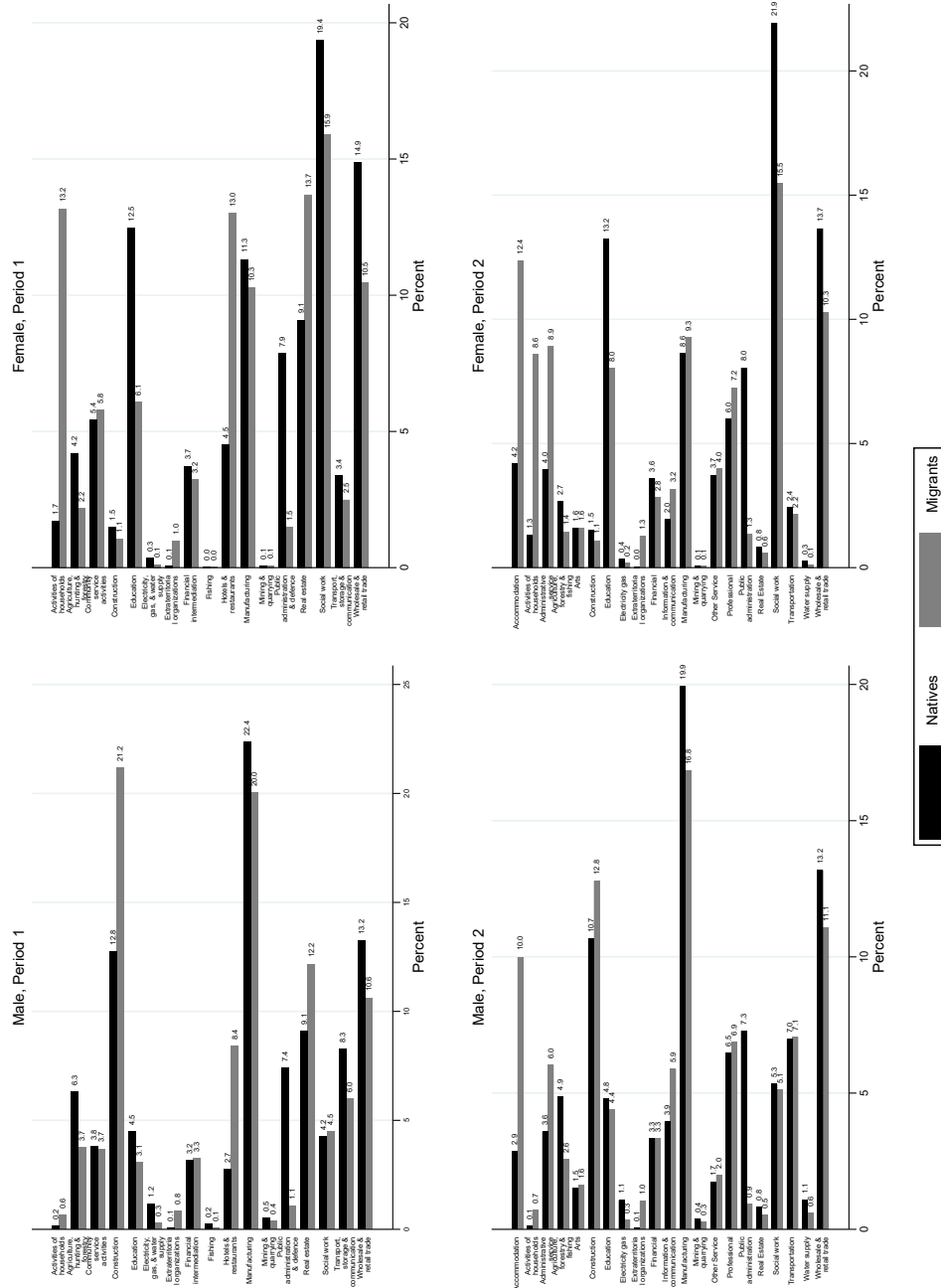


Figure A2. Correlation between Assimilation Coefficients and Initial Gap, with Outlier

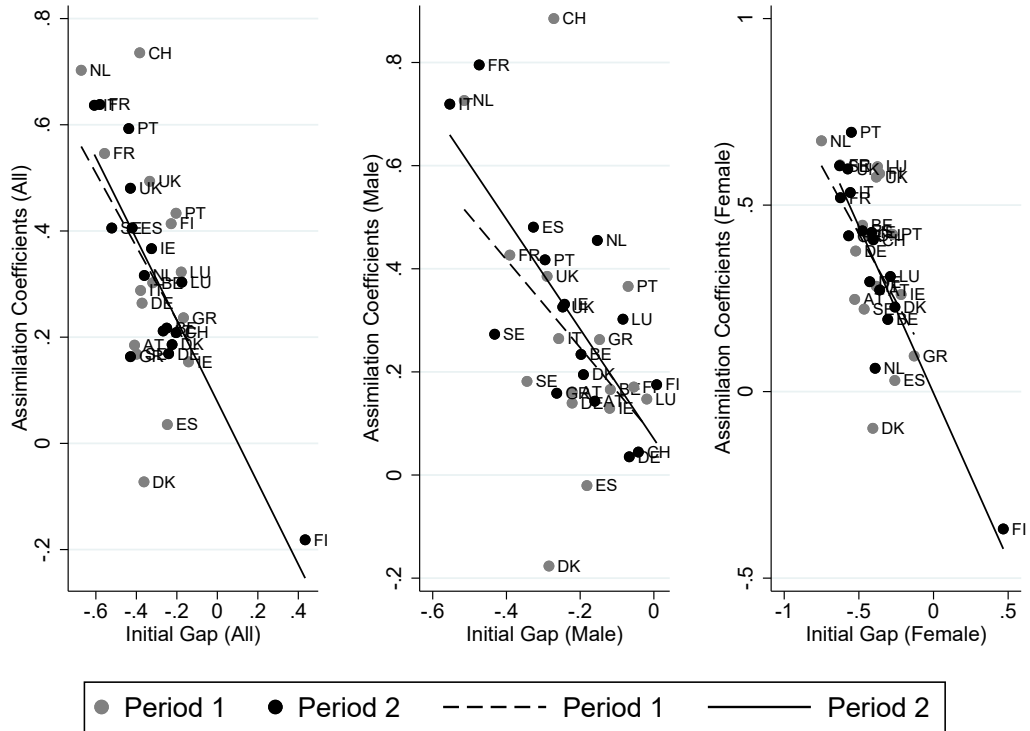


Figure A3. Correlation between Men's and Women's Estimates, with Outlier

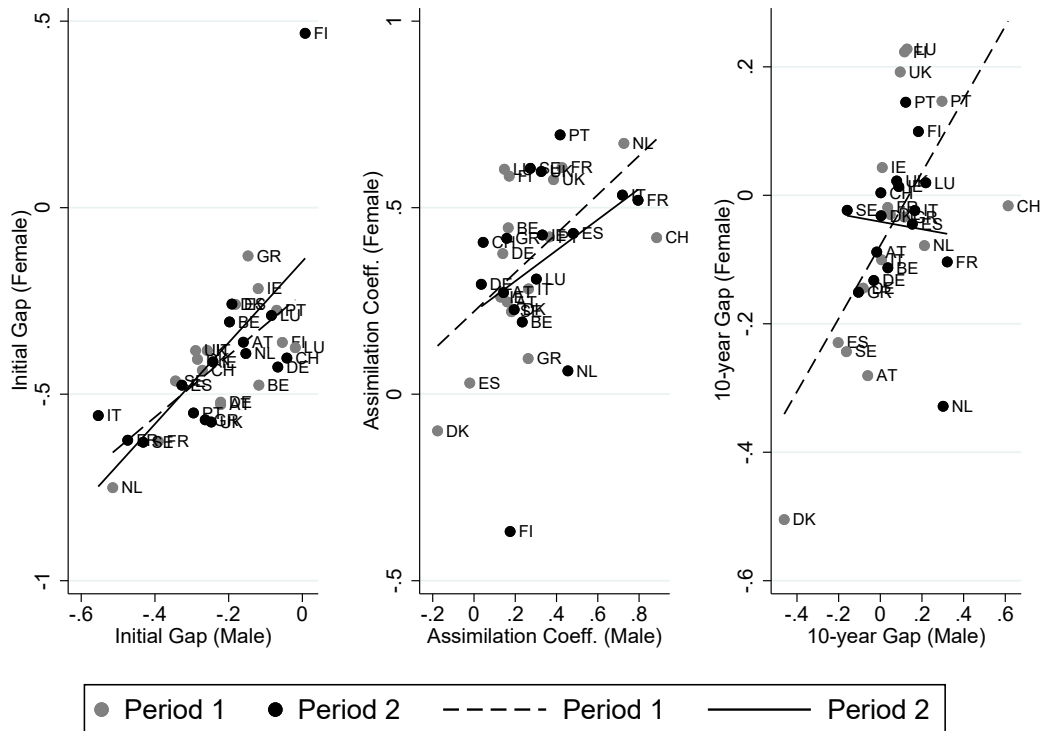


Table A1. Regression Results, with Outlier

	Initial Gap (Female)		Assimilation Coeff. (Female)		10-year Gap (Female)	
	(1)	(2)	(1)	(2)	(1)	(2)
Initial Gap (Male)	0.629*** (0.189)	0.619*** (0.192)				
Assimilation Coeff. (Male)			0.436*** (0.087)	0.447*** (0.085)		
10-year Gap (Male)					0.297 (0.179)	0.349* (0.180)
Constant	-0.299*** (0.065)	-0.301*** (0.064)	0.263*** (0.053)	0.259*** (0.054)	-0.081** (0.029)	-0.084*** (0.027)
Observations	32	32	32	32	32	32
R-squared	0.390	0.401	0.341	0.343	0.140	0.169
Period-fixed effects		Yes		Yes		Yes

Note: Standard errors in parentheses. \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

Table A2. Explanatory Factors in Variation of the Estimates

	Expected Sign	Estimated coefficients		
		<i>Number of Observations</i>	<i>All</i>	<i>Female</i>
1. General Factors				
· Average GDP per capita growth	(+)	30	-0.013	-1.546
· Log Migration Stock	(+)	30	0.120**	0.076
· Recession	(-)	30	-0.042	-0.036
· Output gap	(-)	30	-0.007	-0.004
· Unemployment rate	(-)	30	0.006	0.009
<i>OECD employment protection indicators</i>				
· Protection of permanent workers against individual and collective dismissals	(-)	30	-0.054	-0.087
· Protection of permanent workers against (individual) dismissal	(-)	30	0.027	0.003
· Specific requirements for collective dismissal	(-)	30	-0.206	-0.210
· Regulation on temporary forms of employment	(-)	30	-0.059	-0.112
<i>OECD Product Market Regulation Statistics</i>				
· Barriers to entrepreneurship	(-)	30	-0.048	-0.005
· Barriers to trade and investment	(-)	30	0.005	0.025
· Product market regulation	(-)	30	-0.067	-0.013
· State control	(-)	30	-0.072*	-0.024
2. Women specific factors				
· Proportion of seats held by women in national parliaments	(+)	30		-0.010*
· Female to male tertiary enrollment ratio	(+)	26		-0.302
· Female to male employment ratio	(+)	30		0.648
· Women's political rights	(+)	30		0.078
· Women's economic rights	(+)	30		-0.056
· Women's social rights	(+)	16		0.069
· Men should not have more right to a job than women	(+)	28		-0.600
· Being a housewife just as not fulfilling	(+)	24		1.234
· Women should not be prepared to cut down on paid work for sake of family	(+)	24		-0.285

Note: \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

Table A3. Regression Results

	(1) Basic	(2) Multivariate	(3) Fixed effects	(4) Multiple fixed effects
Initial.Gap (All)	-1.124*** (0.083)	-1.193*** (0.106)	-1.398*** (0.171)	-1.399*** (0.163)
Component score 1		0.003 (0.006)	0.020*** (0.005)	0.021** (0.007)
Component score 2		0.018 (0.011)	-0.003 (0.035)	-0.005 (0.033)
Component score 3		0.022* (0.012)	0.027 (0.030)	0.033 (0.036)
Component score 4		-0.012 (0.018)	0.015 (0.031)	0.016 (0.030)
Constant	-0.104*** (0.036)	-0.126*** (0.043)	-0.196*** (0.066)	-0.196*** (0.063)
Observations	140	111	111	109
R squared	0.570	0.613	0.654	0.653
Country fixed effect			Yes	Yes
Period fixed effect				Yes

Note: Standard errors in parentheses. \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

Table A4. Regional-level Cultural Explanatory Factors in Binary Responses

	Expected Sign	Estimated coefficients		
		<i>Number of Observations</i>	<i>All</i>	<i>Female</i>
<b>I. General Factors</b>				
<i>Social attitudes towards migrants</i>				
· Do not mind if close relative married to migrant	(+)	111	0.525***	0.178
· Do not mind if your boss is migrant	(+)	111	0.755**	0.769
· Law against ethnic discrimination in workplace good	(+)	117	0.969***	-0.617
<i>Attitudes towards cultural values</i>				
· Not better for a country if everyone shares customs	(+)	117	0.374**	0.425*
<i>Attitudes towards job/economy</i>				
· Immigrants create new jobs	(+)	117	0.268***	0.004
<i>Attitudes towards crime</i>				
· Immigrants make country's crime problems better	(+)	117	-0.192	-1.234*
<i>Attitudes of government towards refugees</i>				
· Government more generous for refugee applications	(+)	122	0.255***	-0.036
<i>Qualification for immigration</i>				
· Not important to speak country's official language	(+)	117	0.566*	1.044**
<b>II. Women Specific Factors</b>				
· Women should not be prepared to cut down on paid work	(+)	113		-0.009
· Men should not have more right to a job than women	(+)	121		-0.002

Note: Standard errors in parentheses. \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

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