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# The effect of immigration on natives' task specialization

The case of Germany

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# Table of contents

<b>Acknowledgements</b> .....	<b>2</b>
<b>Abstract</b> .....	<b>5</b>
<b>1 Introduction</b> .....	<b>6</b>
<b>2 Literature review</b> .....	<b>10</b>
<b>3 Data and descriptive statistics</b> .....	<b>11</b>
3.1 Task-intensity variables .....	12
<b>4 The effect of immigration on the relative task supply of natives</b> .....	<b>15</b>
4.1 Model specification .....	15
4.1.1 Native-born mobility .....	16
4.1.2 Endogeneity and measurement error .....	16
4.2 Results and discussion .....	16
<b>5 Extension: findings across gender groups</b> .....	<b>20</b>
<b>6 Sensitivity analysis: EWCS and PIAAC tasks variables</b> .....	<b>21</b>
<b>7 Conclusion</b> .....	<b>23</b>
<b>References</b> .....	<b>24</b>

## Abstract

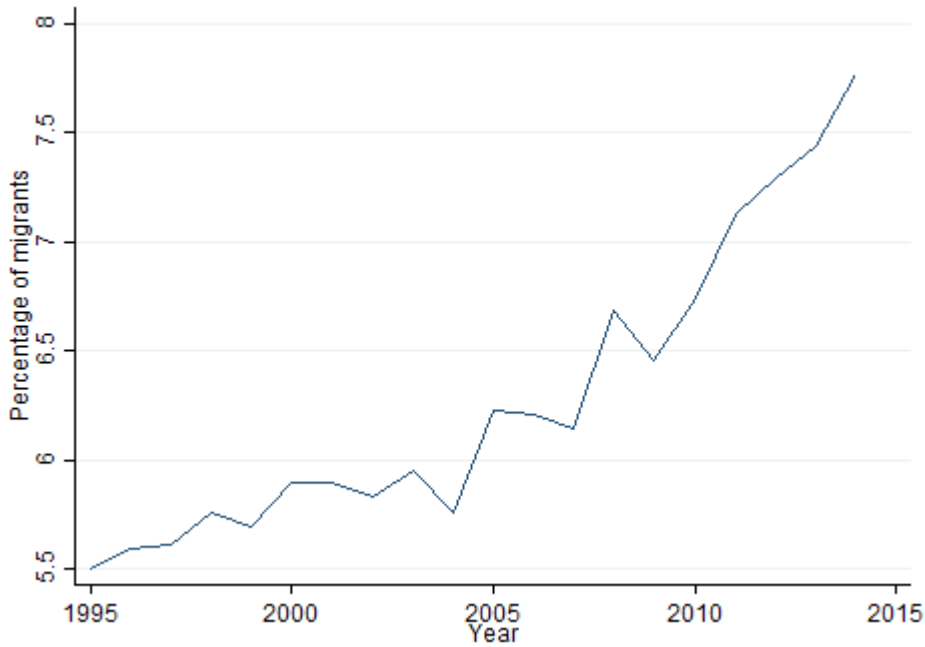
Using an approach developed by Peri and Sparber (2009), this paper explores the effect of an increase in the relative supply of migrants on the German natives' task reallocation. The hypothesis is that, as low skilled migrants enter the labour market into predominantly manual-intensive occupations, natives will self-relocate to occupations which make use of their comparative advantage, communication skills. We find that an increase in the share of migrant population is indeed negatively associated with the native population's relative supply of manual and communication tasks. Moreover, recent migrants seem to supply more manual skills relative to communication skills than long term migrants, while natives supply the least manual skills, or, conversely, the most communication skills. Last, but not least, as expected, the magnitude of the effect is significantly higher for women.

# 1 Introduction

The effect of immigration on the host country's economy is a question of great interest for researchers and policy makers alike. Previous research, which has focused on the effect of migration on the employment, unemployment rates or the wages of the native population, has found small to insignificant negative effects, and in certain cases, even positive effects of migration (Friedberg and Hunt 1995; Card and DiNardo 2000; Peri 2007). This paper attempts to take a more refined look by zooming in on the task specialization of natives in response to migration. We investigate whether natives, as a response to increased migration, tend to specialize in communication-intensive occupations, where they arguably have a comparative advantage. Moreover, we look specifically at the lower educated migrant group, as their contribution to the economy is usually more controversial and oftentimes thought to be negative. We follow the methodology developed by Peri and Sparber (2009), but focus instead on Germany, a country that has received increasingly high numbers of immigrants over the past few decades. Given that the wage structure in Germany is more rigid, that employment protection legislation is rather high and that unions still play a relatively large role in the wage-setting process, we expect immigration to have a more significant effect on natives' employment than in the US context (Pischke and Velling 1997). We find that an increase in the share of low-skilled migrants is indeed associated with an increase in the share of natives specializing in communication-intensive occupations, and our results are in line with studies conducted for the US and Spain.

Net immigration flows into Germany have increased substantially since 1995, with a sharp increase being observed from 2010 onwards (Figure 1). The more recent increases can be attributed to the significant numbers of refugees coming from conflict-affected countries such as Syria, Irak or Afghanistan. Significant increases can also be observed after the first enlargement round of the EU in 2004, and the second enlargement round in 2007, with a small decrease during the Great Recession, in 2009.

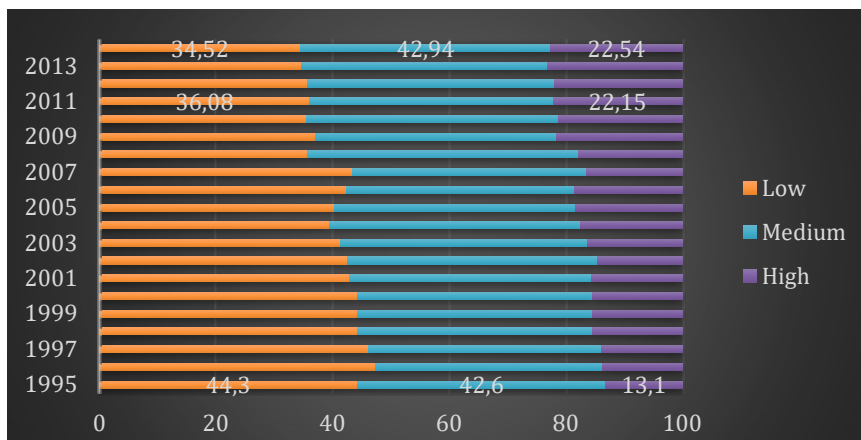
Figure 1 The evolution of the share of migrants in Germany's working age population



Notes: Percentage of foreign-born in working age population 16-65. Source: German Labour Force Survey (DE-LFS) and author's calculations.

In terms of skill composition of migrants in Germany (Figure 2), there seems to be a small shift from low-skilled to high skilled migrants. If in 1995, the share of highly skilled migrants was only 13 per cent while the share of low skilled migrants 44 per cent, by 2014, 23 per cent of the migrant population was now highly skilled, with 34 per cent being low skilled (almost a transfer of 10 per cent). The share of medium skilled migrants seems to have been more or less constant over the same time period.

Figure 2 Share of migrants by educational level, 1995-2014



Notes: Educational attainment based on three values: high, medium and low educated (skilled). The derived categorical variable for education takes value of 1 for low educated (ISCED 0-2; i.e. primary and lower secondary education), 2 for medium (ISCED 3-4; i.e. upper secondary and post-secondary nontertiary education) and 3 for high (ISCED 5-7; i.e. tertiary education). Source: German Labour Force Survey (DE-LFS) and author's calculations.

In light of the above observation, the findings from Figure 3, which compares the share of migrants by broad occupational group, between 1995 and 2011, become even more interesting. To start with, despite the fact that the share of low skilled migrants in the total migrant population decreases overall in the past two decades, the share of migrants in elementary occupations increases substantially from one period to the other. Moreover, compared to other occupational groups, migrants in Germany seem to be disproportionately found in lower skilled occupations, such as elementary and service and sale workers, pointing to a substantial skill mismatch.

Clerical occupations also register a significant increase in the share of hired migrants between the two time periods, as well as skilled agricultural and fishery workers, which more than doubled between 1995 and 2011. Highly skilled jobs such as professionals, associate professionals or managers increase only incrementally, despite a significant increase in the share of highly skilled migrants.

Figure 3 Share of migrants by occupation



Notes: ISCO-88 occupations at one-digit level. Source: German Labour Force Survey (DE-LFS) and author's calculations.



Figure 4 Share of recent migrants (&lt; 5 years) by occupation



Notes: ISCO-88 occupations at one-digit level. Recent migrants are defined as those with at most five years of residence in Germany.

Source: German Labour Force Survey (DE-LFS) and author's calculations.

The picture changes significantly, however, if we look only at recent migrants (i.e. migrants with less than five years in Germany) (Figure 4). Whereas in 1999, most recent migrants would be employed in elementary occupations by a high margin, in 2011, migrant employment was more or less divided between professional, trades and machine operations occupations (the baseline period changes to 1999 due to data availability). Interestingly, while the overall share of migrants in Figure 3 pointed to a decrease in trade occupations between 1995 and 2011, the share among recent migrants is significantly increased. Recent migrants, thus, seem to be relatively better matched with their level of education, since there seems to be more or less an equal distribution between types of occupations.

The rest of the paper is divided as follows. Section 2 provides an overview of the existing literature. Section 3 presents the data employed in the analysis and corresponding descriptive statistics. It also looks at the intensity of tasks by occupational group following the methodology employed by Peri and Sparber (2009). Section 4 presents the model and the results of our empirical analysis, while in Section 5 we conduct a sensitivity analysis looking at the gendered effects of migration on tasks. Section 6 provides an alternative analysis using PIAAC data, to test the robustness of our results, while in Section 7 we conclude the research and provide a discussion on new research avenues.

## 2 Literature review

There is a growing literature that investigates the effect of immigration on labour market outcomes in Germany, with somewhat mixed results. Winkelmann and Zimmermann (1993) and De New and Zimmermann (1994) find that immigration has negatively affected the unemployment rate and wages of the native population, with some industries being hit harder than others. What is more, De New and Zimmermann (1994) distinguish between white collar and blue collar jobs and find that the effect is negative only for blue collar. Looking at geographical substitution effects between immigrants and natives across local labour markets in Germany, Pischke and Velling (1997) find little effects for displacement due to immigration. They conclude that the small or no effects of immigration previously observed in Germany cannot be explained by a reallocation of natives to other geographical areas. More recently, Brücker et al. (2014) find that in the short term, wages are significantly affected in Germany, however, in the long term, under the empirically supported assumption that capital stocks adjust to shocks in labour supply, immigration does not affect wages. They also find that since the elasticity of substitution between migrants and the native population is relatively low, the impact of immigration on both wages and employment would be higher.

Ottaviano and Peri (2006, 2008) find that the effect of migration depends to a large extent on the degree of substitution between native and migrant workers, *ceteris paribus*. They argue that migrants and native workers with the same educational background differ in their skills, leading them to different task specialisations. This in turn means that migrants and natives compete for different jobs and occupations, therefore the effect of migration on the native labour market should be minimal, if at all.

Peri and Sparber (2009) complement and extend the analysis of Ottaviano and Peri (2006, 2008) by focusing on workers without a college education in US. Their principal contribution is the use of the “Task Biased Technological Change” framework (developed by Autor et al., 2007, TBTC) to argue that the way in which occupations are affected by the arrival of migrants depends to a large extent on the comparative advantage of the tasks they perform, rather than on their educational level. They predict a progressive substitution of migrants for native labour in physical tasks. On the one hand, less educated migrant workers have a comparative advantage in occupations demanding physical tasks, mainly because of limited language proficiency. On the other hand, less educated native workers will reallocate to complex tasks under the assumption that their relative comparative advantage is higher in “communication tasks” than in “physical tasks”. They empirically show that less educated recent migrants specialise in physical occupations, while less educated native workers respond to the influx of migrants by increasing their supply of complex tasks.

Amuedo-Dorantes and de la Rica (2011) build on the Peri and Sparber (2009) model by adding a gender dimension and looking at the case of Spain. The authors provide evidence that native men (women) reallocate to occupations with complex content in response to an increase in male (female) migration. To the best of our knowledge, theirs is the only study using this model to show the effect of migration on natives’ task allocation. The present paper builds on the existing literature and it enriches it by looking at the case of Germany, a country with a significantly different labour market dynamic than either Spain or the US.

### 3 Data and descriptive statistics

We base our analysis on data derived from the German Labour Force Survey (LFS) and explore the period between 2002 and 2014, for which information at the regional level is available. The German LFS is carried out as part of the annual micro-census, which is based on the 'micro-census law' (Eurostat 2007). The survey has been carried out since 1957 in the old West-Germany, and since 1991 in the new Bundesländer and East-Berlin. Quarterly data has been available from 2005 onwards, when the survey has been organised as a continuous survey covering all weeks of the year. The survey includes information on country of birth, on which we base our conceptualization of a migrant. Hence, we define migrants as those individuals who are foreign-born. We drop from our analysis long term foreign-born workers (i.e. those with five or more years in Germany), as they are more likely to have acquired German proficiency and other human capital skills of natives.<sup>1</sup> Additionally, since we are most interested in analyzing the effect that low skilled migrants have on low skilled natives task specialization, we restrict the data to only this educational group. We exploit information on the highest qualification achieved.<sup>2</sup> Moreover, since we look at the effect on task specialization, we confine our sample to only those natives and migrants which are either employed or self-employed, thus the working population. We use the NUTS1 regional disaggregation as available in the LFS, for a total of 16 regions.

Table 1 displays some descriptive statistics of low skilled migrants and natives. Both groups seem to share similar characteristics, in terms of the average age in the sample or the share of younger adults (less than or 42 years old). The most substantial difference appears with regards to the share of women in the low skilled bracket, which is more than half for the native population, while almost 44 per cent for immigrants.

Table 1 Characteristics of low skilled migrants and natives, low skilled only

Characteristics	Natives	Immigrants
Average age	37.1	39.8
Female (%)	51.3	43.5
Less than or equal to 42 years old (%)	61.9	62.9
Total number of observations	206,208	49,800

Notes: Workers (employed or self-employed) between 17 and 67.

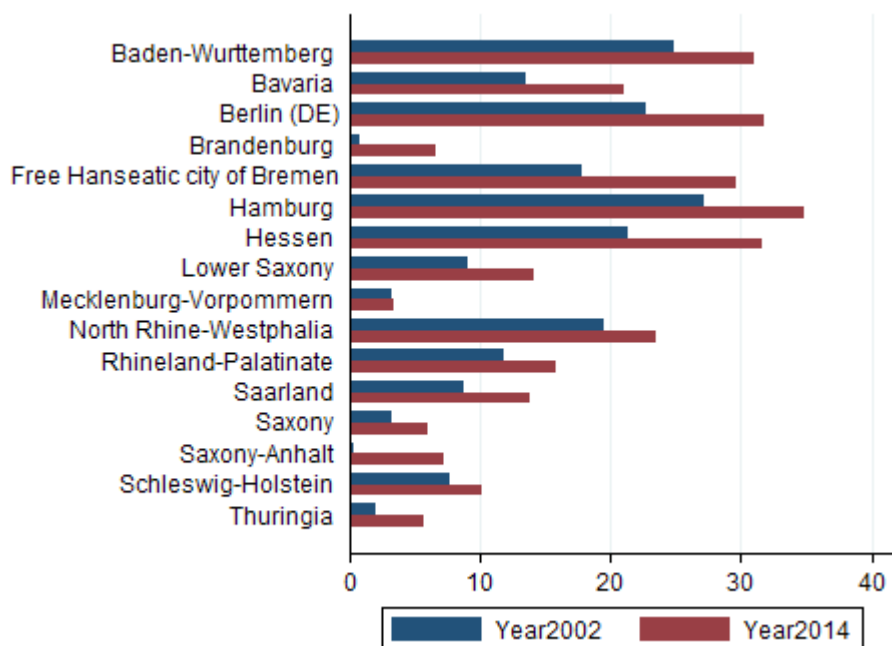
Source: German Labour Force Survey (DE-LFS) and author's calculations.

Figure 5 below looks at the change in the geographical distribution of less educated migrants across Germany's regions. Although all regions register increases in the share of less educated migrants over the analyzed period, the magnitude of the increase differs significantly. While regions such as Hamburg, Berlin, Hessen or Baden-Württemberg exhibit large shares for both time periods, regions such as Brandenburg or Saxony-Anhalt register differences between the two, with a significant upsurge from one period to the other.

<sup>1</sup> Our results are robust to the inclusion of all the migrants.

<sup>2</sup> We use the variable *hatlevel* to measure the highest level of education

Figure 5 Share of less educated migrants, by region



Source: German Labour Force Survey (DE-LFS) and author's calculations.

### 3.1 Task-intensity variables

In order to investigate the effects of migrants on natives' task specialisation, we need information on the activities performed by workers on the job. Unless otherwise noted, and like previous studies on migration and task-specialisation, we rely on the U.S Department of Labor's O\*NET abilities survey to derive data on job tasks requirements.<sup>3</sup> Hence, we work under the assumption that task composition is the same in the U.S and in Germany. This database makes our results easily comparable with other studies.

Applying the O\*NET survey to our data poses some challenges. Mainly, the O\*NET codify 812 occupations based on 2000 standard code (SOC) which we had to convert into ISCO-88, as we only have the occupation in ISCO. Therefore we convert occupational codes from SOC into ISCO using the crosswalk made available by the Center for Longitudinal Studies in the UK.<sup>4</sup> We aggregate the 812 occupations into 67 ISCO codes (3-digit level), and then into 25 ISCO codes (2-digit level).

We merge the O\*NET abilities data with the German Labour Force Survey by occupation using the ISCO codes. In order to show the importance of each particular ability in Germany, we properly weight each occupation's ability raw scores. To facilitate the interpretation of our results, we transform the ability scores into percentage. This is done by dividing each weighted ability score by the maximum score of the ability in question in other occupation. As such, each final ability score

<sup>3</sup> We use version 11.0 of the survey. It is available at: <http://www.onetcenter.org/>

<sup>4</sup> Available at: <http://www.cls.ioe.ac.uk/page.aspx?&sitesectionid=351&sitesectiontitle=O>

ranges between 0 and 1, and is indicative of the relative importance of that particular task in the occupation at hand – as opposed to its importance in other occupations.

In order to establish the task content of each job's measures, we use the same framework as Peri and Sparber (2009). Their classification is based on a two-dimensional typology: manual as opposed to communication. We define manual skills using the following abilities: [1] dexterity ("limb, hand, and finger dexterity", "body coordination and flexibility", and "strength"), [2] coordination ("multi-limb coordination, and gross body coordination) and [3] strength (static and dynamic). Interactive skills include measures of oral and written expression and comprehension.

Table 2 presents the manual and the interactive tasks values, together with their ratio, for each of the two-digit ISCO-88 occupations included in the analysis. This aggregation offers a clear interpretation of tasks content of the occupations. As one would expect, high-skilled occupations, "corporate managers" (ISCO 12), "Physical, mathematical and engineering science profession" (ISCO 21) and "Life science and health professionals" (ISCO 22) are those ones having the greatest level of interactive tasks and a smaller content of manual tasks. On the other side of the spectrum, low-skilled occupations like "Agricultural, fishery and related labourers" (ISCO 92), "Metal, machinery and related trades workers" (ISCO 72) among others have high levels of manual tasks and smaller content of interactive tasks. As a result, the values of C/M are lowest among craft and trade workers, and in operative and elementary occupations. Managers and professionals score instead among the highest.

We use the O\*Net database, a US survey to measure the task content of occupations. In section 5, we test the robustness of these results by using the task content of occupations from two other sources of survey data: the European Working Condition Survey (EWCS) and the Programme for the International Assessment of Adult Competencies (PIAAC). Unlike the O\*Net, the EWCS and PIAAC are workers' survey data. More information on the items selected is found in section 5.

Table 2 Task intensities by occupation

Occupations (ISCO-88 code)		M	C	M/C
12	Corporate managers	0.35	0.83	0.43
13	General managers	0.38	0.72	0.53
21	Physical, mathematical and engineering science profession	0.29	0.82	0.35
22	Life science and health professionals	0.55	0.81	0.67
23	Teaching professionals	0.36	0.73	0.49
24	Other professionals	0.21	0.77	0.28
31	Physical and engineering science associate professionals	0.53	0.73	0.73
32	Life science and health associate professionals	0.63	0.72	0.87
33	Teaching associate professionals	0.28	0.61	0.47
34	Other associate professionals	0.27	0.71	0.38
41	Office clerks	0.27	0.65	0.42
42	Customer services clerks	0.36	0.60	0.59
51	Personal and protective services workers	0.64	0.56	1.13
52	Models, salespersons and demonstrators	0.56	0.58	0.97
61	Market-oriented skilled agricultural and fishery workers	0.87	0.46	1.86
71	Extraction and building trades workers	0.86	0.45	1.93
72	Metal, machinery and related trades workers	0.90	0.50	1.78
73	Precision, handicraft, printing and related trades worker	0.69	0.44	1.54
74	Other craft and related trades workers	0.79	0.43	1.83
81	Stationary-plant and related operators	0.79	0.49	1.62
82	Machine operators and assemblers	0.89	0.45	1.97
83	Drivers and mobile-plant operators	0.84	0.49	1.70
91	Sales and services elementary occupations	0.59	0.47	1.25
92	Agricultural, fishery and related labourers	0.98	0.31	3.18
93	Labourers in mining, construction, manufacturing and transport	0.80	0.45	1.74

Notes: Workers between 17 and 67 with little educational attainment (hatlevel=1). The manual (M) and communication (C) indexes are derived averaging tasks measures and weighting with the DE-LFS.

Source: Authors computations using O\*NET database and DE-LFS 2002-2014 (German Labour Force Survey)

## 4 The effect of immigration on the relative task supply of natives

### 4.1 Model specification

Thus far, we have provided preliminary evidence of the greater relative supply of manual tasks by migrants compared to native throughout the descriptive statistics in Table 1 and 2, along with Figure 1 through 5. We now proceed to test whether less-skilled natives respond to increasing migration inflows by shifting onto job characterized by a lower manual to communication ratio.

To test the previous hypothesis we follow Peri and Spaber (2009). We collapse the data using data from 16 German regions from 2002 to 2014, and we estimate the next regression equation:

$$\ln\left(\frac{M_D}{C_D}\right)_{rt} = \alpha_r + \beta_t + \gamma(\text{share}_{\text{foreign}})_{rt} + \varepsilon_{rt} \quad (1)$$

Where  $\left(\frac{M_D}{C_D}\right)$  is the logarithmic average ratio of manual to communication supply at the regional (r)/year (t) level. We apply region fixed effects to control for regional unobserved characteristics that might also affect task reallocation, and time fixed effects  $\beta_t$  to control for time-varying parameters.

Equation (1) examines the impact of the supply shock on the provision of relative manual tasks by less educated natives in the economy. If natives specialize in occupations requiring fewer manual, as opposed to interactive, tasks as the share of foreign-born workers increases, the coefficient should be negative and statistically different from zero.

Following Peri and Sparber (2009), we can go further and estimate whether the negative effect is due to a decrease in the native supply of manual tasks or an increase in the natives supply of communication tasks. Therefore, we separately estimate equations (2) and (3):

$$\ln(M_D)_{rt} = \alpha_r + \beta_t + \gamma_m(\text{share}_{\text{foreign}})_{rt} + \varepsilon_{rt} \quad (2)$$

$$\ln(C_D)_{rt} = \alpha_r + \beta_t + \gamma_c(\text{share}_{\text{foreign}})_{rt} + \varepsilon_{rt} \quad (3)$$

When we measure the effect of migrants on native workers on local labour markets, the literature has defined two identification assumptions that must hold in order to estimate properly the previous equations. The first one concerns the inter mobility of native-born workers as a result of migrant-born workers flows. If there were internal migration of native-born workers, this would disperse the effect of migrant across the German economy and undermine the effect of it. The

second issue deals with the potential endogeneity of foreign-born workers. We need to ensure that the variation of the share of less-educated foreign-born workers is exogenous and is driven by supply shifts (not by any unobserved employment opportunity). In the next two sections, we discuss more in depth these two problems.

### 4.1.1 Native-born mobility

Evidence on native-born mobility responses to migrant's inflows is mixed in the US. On the one hand, Frey (1995) and Borjas (2003) find evidence of an adverse effect of immigration on native internal mobility. On the other hand, Wright et al. (1995), Card and Di Nardo (2000) and Card (2001) consider inter mobility of native-born workers an irrelevant issue.

With regards to Germany, the results are clearer. Pischke and Velling (1997) analysed the impact of increased immigration on employment outcomes of natives in Germany. Their analysis, which covers the period from 1985 to 1989, shows that there is little evidence for displacement effects due to immigration, and this is particularly true for unemployment rates. We can therefore argue that the assumption that labour markets are regional in scope is a reasonable one.

### 4.1.2 Endogeneity and measurement error

As previously stated, the endogeneity of foreign-born share could make our estimations inaccurate. The decision of whether to migrate and where to migrate are made simultaneously. Therefore, characteristics which might explain the allocation of the foreign-born share cross regions in Germany may also help explain the allocation of manual to communication tasks as migrants would migrate to areas which offer suitable or desirable employment opportunities. Many of these characteristics are unobservable, such as migrant abilities, risk aversion or labour demand conditions at regional level. This uncertainty makes it difficult to establish a causal relationship and tends to bias the estimations.

To address the potential endogeneity issue, we construct an instrumental variable for the share of low-educated foreign-born workers. We draw on Amuedo-Dorantes and De la Rica (2011) and use the share of low-educated long-term migrants – a group that was excluded from the analysis, as an instrument.

## 4.2 Results and discussion

The following section explores the relation between less-educated native workers and the corresponding less-educated migrants' task supply, across the 16 regions in Germany and across the 13 years under analysis. Namely, we investigate whether there has been a reallocation of native individuals to jobs characterized by a higher share of non-manual tasks, as a result of a rise in the share of migrants with similar skills.

Before moving on to the actual analysis, however, in a similar fashion to Peri and Sparber (2009) and Amuedo-Dorantes and de la Rica (2011), we control for a potential spurious relationship between the immigration shock and natives' provision of manual to non-manual tasks. To do so we first regress each individual task supply on a number of personal characteristics, namely



gender (female dummy), age (four age groups) and education level (low-education dummy). We then obtain the “cleaned” residuals by subtracting the predicted task supply from the individual's observed task supply, which we use in the final regression analysis. Table 3 below displays the coefficients of the personal characteristics variables used in the “cleaning” procedure. The coefficient for female and age seem to be positive for communication-intensive tasks and negative for manual tasks, whereas the effect of education (our dummy for low education), as expected is negative for communication and positive for manual tasks.

Table 3 Task supply “cleaned” of demographic effects

	Manual	Commu- nication
Female	-0.060***	0.027***
	(0.000)	(0.000)
Age	-0.002***	0.001***
	(0.000)	(0.000)
Low Education	0.059***	-0.077***
	(0.000)	(0.000)
Constant	0.256***	0.494***
	(0.000)	(0.000)
N	1,873,287	1,873,287

Notes: We use the “cleaned” residuals from the above regressions to compute the manual and communication task supply measures. Significance levels \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\*  $p < 0.01$ .

Source: German Labour Force Survey (DE-LFS), O\*NET, and author's calculations.

Turning to our regression analysis, Table 4 below presents an ordinary and a weighted least square regressions with and without the region of Berlin, where the migrant share in the working population is substantially higher, with standard errors clustered by region. Similarly to previous studies (Peri and Sparber, 2009; Amuedo and de la Rica, 2011), we find that in Germany too, an increase in the share of migrant population is negatively associated with the native population's relative supply of manual and communication tasks. The results seem to suggest that a one percent increase in the relative supply of migrants leads to a 1.4 percent decrease in the supply of manual versus communication tasks for the native population. Turning to the relative supply of manual and communication tasks for natives, column 1 suggests that a one percentage point increase in the supply of migrants decreases the supply of natives' manual tasks by 0.6 percent, while it increases the supply of native's communication tasks by 0.2 percent. The direction of these results seems to hold even when we control for the variation in the employed population across regions by using weighted least squares, although the magnitude of the effect does seem to decrease substantially.

Moving now to columns 3 and 4, where we exclude Berlin, which exhibits a relatively high share of migrants in the working population, the direction and magnitude of our effect seems to hold for both the ordinary and weighted least square equations. OLS and WLS estimates are almost identical to those measuring the tasks content of occupations with all the regions: all coefficients have the expected sign and are statistically significant, suggesting that our results are not driven by the exclusion of these outliers in the data.

As expected, the magnitude of the effects of immigration of natives' relative supply of tasks in Germany is substantially higher than in the case of the US, or the case of Spain.

Table 4 The effect of migration on the relative task supply of less-educated native workers, OLS and WLS

Explanatory variable: share of low educated migrant workers				
Dependent variable	OLS (1)	WLS (2)	OLS without Berlin (3)	WLS without Berlin (4)
Ln(M/C)	-1.406** (0.546)	-0.839*** (0.227)	-1.367** (0.548)	-0.789*** (0.220)
Ln(M)	-1.074** (0.415)	-0.645 *** (0.161)	-1.047** (0.413)	-0.610*** (0.158)
Ln(C)	0.332 ** (0.145)	0.194 ** (0.076)	0.320* (0.150)	0.178 ** (0.074)
Region and year fixed effects	Yes	Yes	Yes	Yes
Observations	208	208	195	195

Notes: Standard errors robust to serial correlation and hetereskedasticity are reported in parentheses. Specifications (3) and (4) do not include Berlin. Significance levels \* $p < 0.1$ ; \* \* $p < 0.05$ ; \*\*\*  $p < 0.01$

Source: German Labour Force Survey (DE-LFS), O\*NET, and author's calculations.

Table 5 reports the results of an instrumental variable (IV) regression against the results of our OLS regression. We re-estimate the equation instrumenting the share of low-educated foreign-born workers with information about the share of low-educated long-term migrants. Not only does the IV equation confirm the direction of our effect, but the magnitude of said effect becomes notably larger and the effect itself becomes significant at 99% confidence interval. That is, in this case, a one percent increase in the relative supply of immigrants seems to lead to a 2.3 percent decrease in the supply of manual versus communication-intensive tasks for the native population. Moreover, a one percent increase in the relative supply of migrants seems to reduce the supply of native's supply of manual-intensive tasks by 1.1 percent and to increase the natives' supply of communication-intensive tasks by 0.4 percent. Again the immigration effects in the case of Germany seem to be considerably larger than the ones found in the case of the UK and Spain, a consequence of the somewhat more rigid nature of the national labour market.

Table 5 The effect of migration on the relative task supply of less-educated native workers, OLS and IV

Dependent variable	OLS	IV
ln(M/C)	-1.406** (0.546)	-5.145*** (1.148)
ln(M)	-1.074** (0.415)	-2.036*** (0.475)
ln(C)	0.332 ** (0.145)	1.016*** (0.234)
Region and year fixed effects	Yes	Yes
First stage F-statistics (p-value)		37.4
Observations	208	199

Notes: Standard errors robust to serial correlation and hetereskedasticity are reported in parentheses Significance levels \* $p < 0.1$ ; \* \* $p < 0.05$ ; \*\*\*  $p < 0.01$

Source: German Labour Force Survey (DE-LFS), O\*NET, and author's calculations.

The analyses above have explored the effect of an increase in the relative supply of immigrants in general, however, it seems rather intuitive to expect different magnitudes of effects when distinguishing between recent and long-term migrants (recent migrants are defined as those living who have been living in the country for less than 5 years). The latter, by virtue of living in the destination country can in time learn the local language better and integrate more easily in terms of skills and knowledge in the labour market, becomes less complementary and more substitutes to the native population. <sup>5</sup>However, because of high collinearity between the two migrant groups, we cannot test empirically this effect; what we do instead, in a similar fashion to Amuedo-Dorantes and de la Rica (2011), we explore the average relative supply of manual to communication tasks for natives, recent and long-term migrants. As expected, recent migrants score higher than all other groups, while natives score the lowest. That is, recent migrants supply more manual relative to communication skills than long term migrants, while natives supply the least manual skills, or, conversely, the most communication skills.

Table 6 Average relative task supply for different groups of low educated workers

Variable	Natives	All migrants	Recent migrants	Long term migrants
M/C	0.857	0.919	0.934	0.917
	(0.41)	(0.37)	(0.37)	(0.36)
Observations	203,093	49,627	4,801	44,826

Notes: Recent migrants are those with at most 5 years of residence in Germany. Standard errors in parenthesis.

Source: German Labour Force Survey (DE-LFS), O\*NET, and author's calculations.

<sup>5</sup> The terms skill and education are interchangeable in our context.

## 5 Extension: findings across gender groups

We replicate the same models as above, this time using gender lenses. We assume there will be notable differences between female and male migrants' effect on native female and male's task reallocation, not in the least because women tend to concentrate in jobs which usually require less manual and more communication skills. Firstly, the effect of recent female migration is markedly larger than the effect of all female migrants, confirming the above hypothesis that in time, migrants assimilate into the host society. Moreover, there is, as expected, a significant difference between the effect of female and male migration, with a higher magnitude effect for the latter. The results is intuitive, because, as already mentioned, women migrants would tend to already go for occupations which require more communication and less manual skills.

Table 7 The effect of all migrants and recent migrants on the relative task supply of less-educated native workers from a gender perspective, OLS and IV

Dependent variables	OLS	OLS_recent	IV
ln(M/C)Female	-0.391 (0.463)	-3.105** (1.131)	-0.832** (0.361)
MFemale	-0.455 (0.366)	-2.150** (0.762)	-0.896*** (0.266)
CFemale	-0.065 (0.166)	0.954 (0.559)	-0.064 (0.125)
ln(M/C)Male	-2.193*** (0.681)	-6.567*** (1.367)	-3.450*** (0.951)
MMale	-0.918*** (0.290)	-2.643*** (0.592)	-1.481*** (0.133)
CMale	0.483*** (0.145)	1.546*** (0.264)	0.701*** (0.082)

Notes: Each cell contains estimates from separate regressions and  $\ln(m/c)$  is calculated for each specific demographic group of natives. Standard errors robust to serial correlation and hetereskedasticity are reported in parentheses. Significance levels \* $p<0.1$ ; \* \* $p<0.05$ ; \*\*\*  $p<0.01$ . Source: German Labour Force Survey (DE-LFS), O\*NET, and author's calculations.

## 6 Sensitivity analysis: EWCS and PIAAC tasks variables

As previously shown there exists evidence that German less educated workers have shifted their task supply and provided more communication relative to manual tasks. Until now, and following previous research, we have relied on O\*NET to measure the tasks. We now proceed to test whether the results are robust to the dataset. Therefore we perform the same analysis using two datasets: the European Working Condition Survey (EWCS) and the Programme for the International Assessment of Adult Competencies (PIAAC). One advantage is that we do not need to assume anymore the same task composition between the US and Germany, the EWCS and PIAAC collect information on the latter country.<sup>6</sup> However, there is not perfect correspondence between the three datasets and we carefully selected the items that resemble each other the most.<sup>7</sup>

Table 8 reports estimates OLS, WLS and IV using the EWCS. In here we remain responses on “skill in using hands or fingers” (e.g. repetitive hand or arm movements), “physical strength”(e.g carrying or moving heavy loads), and “physical stamina” (e.g. carrying or moving heavy loads), for the manual aspect, and on “dealing directly with people who are not employees at your workplace” and “Using internet / email for professional purposes” for the communication dimension. As can be seen, the results resemble the baseline model in size and significant of the variables. OLS estimates are almost identical to those using O\*NET. When we instrument the share of foreign-born workers, results are still positive, statistically significant, the magnitude is higher but the Ln(C) is not significant. The main differences appear when using the weighted least square regressions the magnitude is lower and not significant.

Turning to Table 9, all regressions are based on PIAAC after a suitable conversion of occupational codes<sup>8</sup>. In this case, we define manual skills using the following abilities: “how often does/did your job usually involve using skill or accuracy with your hands and fingers at your workplace?” and “how often does/did job usually involve working physically for a long period?”. Interactive skills are defined “how often does/did job usually involve making speeches or presentations in front of five people or more?” and “how often does/did job usually involve selling a product or a service?”. We note that all coefficients are almost identical as the previous case having the expected sign, confirming the findings presented in the previous Table. OLS estimates are almost the same and have the expected coefficient, but in this case Ln(C) is not significant. We therefore conclude that the results presented in the previous section are robust to the choice of the database, and using the EWCS or PIAAC does not significant alter our results.

<sup>6</sup> See Appendix A for more information of each dataset.

<sup>7</sup> See Appendix A for a complete mapping between task variables in the three dataset.

<sup>8</sup> ISCO-08 occupational codes in PIAAC were matched to the ISCO-88 classification using the crosswalk made by Harry Ganzeboom.

Table 8 The effect of migration on the relative task supply of less-educated native workers, OLS, WLS and IV using EWCS

Dependent variable	OLS	WLS	IV
Ln(M/C)	-1.089*	-0.135	-7.342**
	(0.549)	(0.376)	(2.604)
Ln(M)	-0.913**	-0.300***	-4.511***
	(0.365)	(0.105)	(0.949)
Ln(C)	0.176*	0.235	2.831
	(0.437)	(0.134)	(1.815)
Region and year fixed effects	Yes	Yes	Yes
First stage F-statistics (p-value)			32.4
Observations	208	199	199

Notes: Standard errors robust to serial correlation and hetereskedasticity are reported in parentheses. Significance legels \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ . Source: German Labour Force Survey (DE-LFS), EWCS, and author's calculations.

Table 9 The effect of migration on the relative task supply of less-educated native workers, OLS, WLS and IV using PIAAC

Dependent variable	OLS	WLS	IV
Ln(M/C)	-29.920**	-11.961	-7.106**
	(12.105)	(7.785)	(2.564)
Ln(M)	-22.645**	-14.084***	-4.331***
	(8.934)	(3.521)	(0.908)
Ln(C)	4.829	-1.490	2.776
	(6.821)	(5.399)	(1.828)
Region and year fixed effects	Yes	Yes	Yes
First stage F-statistics (p-value)			32.8
Observations	208	199	199

Notes: Standard errors robust to serial correlation and hetereskedasticity are reported in parentheses. Significance legels \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ . Source: German Labour Force Survey (DE-LFS), EWCS, and author's calculations.

## 7 Conclusion

One of the most heated debates surrounding immigration concerns the effect it has on the host country's labour market. Using an approach developed by Peri and Sparber (2009), this paper has explored the effect of an increase in the relative supply of migrants on the natives' task reallocation. The hypothesis is that, as low skilled migrants enter the labour market into predominantly manual-intensive occupations, natives will self-relocate to occupations which make use of their comparative advantage, communication skills. The paper focuses on Germany, a country with an increasingly high immigrant population, and a relatively rigid labour market, which would imply a more significant effect of task reallocation. Indeed, our results seem to confirm this theory. The effect of immigration on natives' task reallocation in Germany is substantially higher than the effect found in the US and Spain. Moreover, the effect is significantly larger for recent and for male migrants, pointing to an assimilation effect taking place over time.

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