'Crowded out'? Immigration Surge and Residents' Employment Outcomes in Norway[1]

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ABSTRACT

This study uses Norwegian public register data in a spatial correlation approach, and analyzes associations between regional variations in immigration and employment outcomes 2004–2015 in a cohort of adult residents (N = 1.3 million). A higher share of immigrants in the regional population and an immigrant population dominated by low-educated were associated with slightly negative work income trends and less employment opportunities for residents, in particular for low-educated natives and earlier immigrants. A steep increase in the immigrant share of the regional population was, on the other hand, associated with better employment outcomes for all analyzed resident categories. Overall, regional immigration differences were only modestly related to the outcomes. Findings indicate that the institutional context has limited the role of market mechanisms in the labor market, and a booming regional economy will tend to neutralize potentially negative effects of immigration on residents' employment.

KEYWORDS

Job competition / employment rates / labor migration / refugees / EU enlargement

Introduction

A debated issue is how immigration impacts on labor markets, and in particular whether low-skilled natives in advanced capitalist economies face lowered wages and are 'crowded out' of employment by immigrants from less developed countries (Altonji & Card 1991; Basten & Siegenthaler 2019; Foged & Peri 2016). Substantial migration to North America and Western Europe in recent decades (OECD 2012) has raised awareness about this question. Concern exists that immigration could lead to social dumping, reduced incomes and higher unemployment in vulnerable parts of the native population, if employers exploit immigrants' eagerness for work by hiring them to 'bad' jobs with low pay (Kiss 2017). The prevalence of such practices varies considerably between countries, however, and studies from Western Europe and North America have found both positive, negative, and negligible associations between immigration and natives' wages and employment (Dustmann et al. 2016; Kerr & Kerr 2011; OECD 2016, pp. 110–116).

The present study pursues this topic in the Norwegian setting. Using public register data, we examine work income and employment 2004–2015 in a cohort of adult residents. The cohort includes both natives and pre-2004 immigrants who were residents

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throughout the study period. During the analyzed years, the immigrant share of the working-age population more than doubled: one in five aged 22–59 was foreign-born in 2015, as against 8.6% in 2004. Immigration varied considerably between the 46 labor market regions, however, both as to the percentage of immigrants in the regional populations, the composition of the immigrants, and how fast the immigrant population had grown. By examining associations between these differences in regional immigration and employment outcomes in the cohort of residents, this study aims at shedding further light on these themes.

Below, we first outline theories and mechanisms about how immigration could impact on wages and employment among residents in the receiving country. Next, we describe the Norwegian context and present study design, hypotheses, data and findings. Finally, results are summarized and interpreted, and we compare our findings with other Nordic studies.

Theories and mechanisms

The immediate effect of immigration is a larger workforce. According to standard economic theory, assuming a competitive labor market where the price of labor reflects relationships of supply and demand, immigration will lead to downward pressure on average wages (Borjas 2013; Edo 2019). Economic theory predicts that wage developments among residents, whether natives or earlier immigrants, will tend to be restrained when new immigrants enter a particular labor market. Effect sizes will depend on the magnitude of the immigrant share of the workforce, and on how fast the immigrant population grows. Lowered employment may follow if immigrants take jobs that residents would have had if immigration had not occurred.

However, such effects depend on substitutability, that is, to what extent immigrants can replace native workers (Constant 2014; Peri 2016). Developed economies have a complex industrial structure and a heterogeneous workforce. Immigration will primarily intensify job competition in those segments of the labor market where the immigrants are relevant substitutes. Residents with qualifications that shield them from being replaced by typical immigrants may on the other hand benefit: '… immigration tends to worsen the wages of competing workers (who have skills similar to those of the migrants), and improve those of complementary workers (who have skills that complement those of immigrants, meaning that their productivity rises from working with them)' (Edo 2019, p. 925).

Thus, immigration will tend to have distributional effects (Dustmann et al. 2013; Ottaviano & Peri 2012). If dominated by low-skilled immigrants, negative effects will primarily occur among low-educated natives and earlier immigrants whose skills are similar to those of the new immigrants. Highly qualified residents may gain from the inflow of immigrants since demand for their special qualifications may increase.

These predictions are based on the assumption that capital stock and the number of jobs are relatively fixed, but this assumption may be unrealistic (Edo 2019). In a flourishing economy, job opportunities may expand faster than immigration-induced expansion of the workforce. Employers could also invest in order to exploit an increased supply of cheap labor (Ottaviano & Peri 2012; Peri 2016). In addition, a growing immigrant population will increase demand for housing, consumer goods and services and thereby stimulate the economy (Constant 2014). Effects of immigration may therefore vary over time. An initial

tendency to wage decline may be short-term and reversed in the long run if subsequent increased demand for labor leads to higher wages. Economic theory suggests that in a longer time perspective, capital adjustments may imply that 'the capital-labor ratio and the average wage remain the same as prior to the immigrant influx' (Edo 2019, p. 925).

Furthermore, the prediction that immigration is followed by average wage decline and change in the wage distribution assumes that market mechanisms operate relatively unrestrained. Reduced wages presuppose that wages are downwardly flexible, but this could be curbed by trade union power, collective bargaining, and legal stipulations about minimum wages. Employment protection laws may hinder employers from firing residents and replace them with lower-paid immigrants. Welfare benefits may restrict employers' access to low-paid labor since alternative income sources exist. Thus, the institutional context and 'labor market rigidities' may protect wage levels. A potential downside, however, is that employers hold back investments since access to cheap labor has been restricted (Edo 2019, p. 924).

Residents' responses to immigration may also influence outcomes. Mobility makes it possible to circumvent negative effects. If employment opportunities in one's residential area become negatively affected by an influx of immigrants, one may move to another area with better prospects (Lewis & Peri 2014; Ortega & Verdugo 2016). This may also alleviate job competition in the initial area. Re-education and finding a new industrial branch may function in similar ways (Basten & Siegenthaler 2019; Foged & Peri 2016).

A complexity is moreover that just as immigration can influence labor markets, labor market developments can influence immigration. Booming economies and expanding industries will tend to increase demand for labor and trigger an inflow of immigrants. Higher demand for labor may at the same time contribute to rising wages and increased employment. A positive association between immigration and favorable wage and job opportunities for residents could arise because thriving economic conditions will both attract immigrants and lead to rising wages and higher employment levels.

Accordingly, associations between immigration and residents' wages and employment, and employment outcomes for low-educated natives in particular, are likely to depend on the constellation of a set of circumstances. Particularly relevant factors are the size of and rate of immigration; the composition of the immigrants; labor market institutions; opportunities for occupational and geographical mobility; and national and international economic conditions. The time frame is also relevant: associations may change over time due to how workers and employers adjust, and because new policies may be implemented.

Thus, '[g]iven all the potential channels through which immigration can affect wages and employment, economic theory alone cannot determine the net effects of immigration on labor markets. Empirical investigation is needed to measure these effects' (Edo 2019, p. 927). The purpose of the present study is to contribute with such an empirical investigation.

The Norwegian context

Norway is a sparsely populated Nordic country (5.2 million in 2015) with a large public sector and an export-oriented market economy based on profitable North Sea oil extraction, but also on fish farming, fisheries, mining, manufacturing and tourism. Its economy

grew considerably during the period addressed by this study. Average *real* wages were about 25% higher in 2015 than in 2004 (Nilsen 2020, p. 7). The international financial crisis which started in 2008 had limited impact on the Norwegian economy (OECD 2014). Unemployment rates were below 4% in almost every year from 2004 to 2015 (OECD 2020). The upward trend in the economy is indicated by employment statistics: the number of employed, age 15–74, with at least 20 working hours per week were estimated to about 1.840 million in 2004, increasing to almost 2.200 million in 2015 (SSB 2020a).

Substantial immigration took place during this period. Statistics Norway defines immigrants as registered residents born abroad by parents with no Norwegian ancestry (SSB 2020b). Using this definition, 6.8% of the total population were immigrants in 2000, increasing to 7.9% in 2004 and 14.2% in 2015 (OECD 2012, p. 336; 2019, p. 341).

The growth in the working-age population, particularly relevant for this study, was even larger. Table 1 shows that the number of immigrants age 22–59 rose from 207,000 in 2004 to 537,000 in 2015. Among all residents in these age categories, 8.6% were immigrants in 2004, increasing to 10.5% in 2007, 13.9% in 2010, 18.5% in 2013, and 20.1% in 2015.

The potential impact on labor markets would depend not only on the size and growth of the immigrant population, but also on its composition. Table 1, Panel A, displays world region origin, reason for immigration, and registered education in 2004 and 2015 among working-age immigrants – for comparison, Panel B shows the corresponding number of natives and their educational levels in 2004 and 2015.

In 2004, almost 40% of the immigrants were from Asian countries (including Turkey), while nearly one third were from Nordic or Western countries. During the study period, all categories displayed in Table 1 grew in number, but their relative size changed. An important background for this was the extension of the European Union (EU). More than 10 Central and East European countries became members of EU in 2004 and subsequent years. This triggered waves of labor migration to Western parts of Europe, including Norway which, although not an EU member, is part of the European Economic Area (EEA) and included in the EU/EEA labor market. Table 1 shows that the number of immigrant residents in Norway, age 22–59, from Other Europe (which includes the new EU member countries) grew from 34,000 in 2004 to almost 200,000 in 2015 (Table 1). Other Europe immigrants made up 36.6% of the entire immigrant population in these age categories in 2015. About half of them were from Poland or from Lithuania. During the same period, the share of immigrants who were from Nordic and Western countries declined from 30.9% in 2004 to 20.5% in 2015.

Distributions of reasons for immigration changed in a parallel manner.[1] Since the 1970s, refugees had arrived from Chile, Vietnam, Iran and (especially during the 1990s) from the former Yugoslavia and from East Africa. After the Millennium, refugee immigration continued to be considerable, in particular from Somalia, Eritrea, Iraq and Afghanistan. Nonetheless, the refugee proportion of the immigrant population decreased, since labor immigration was large. In 2004, only 12,000 of the non-Nordic immigrant residents (age 22–59) were recorded as labor immigrants, increasing to 175,000 in 2015.

Table 1 indicates furthermore that educational distributions among immigrants (Panel A) and natives (Panel B) were fairly similar in 2004. In 2015, however, average educational level had increased among natives, but apparently not among the immigrants – note, however, that in this year, educational information was missing for about one fourth of the immigrants.

Table 1 Immigrants and natives residing in Norway, age 22–59, 2004 and 2015

	2004			2015		
	Number	**%**	**Employ. rate[a]**	**Number**	**%**	**Employ. Rate**
Panel A: Immigrants[b]						
Men	102,116	49.4	61.0	285,353	53.2	66.9
Women	104,565	50.6	48.1	251,400	46.8	52.8
All immigrants	206,680	100.0	54.4	536,751	100.0	60.3
Geographical origin						
Nordic & West[c]	63,818	30.9	69.1	109,850	20.5	74.6
Other Europe	33,507	16.2	55.8	196,266	36.6	66.7
Africa	22,394	10.8	38.4	62,412	11.6	38.2
Turkey, Mid. East, Pakist.	38,885	18.8	39.8	66,242	12.3	43.5
Other Asia	39,056	18.9	52.9	84,893	15.8	56.7
Other	9019	4.4	54.9	17,100	3.2	57.6
Total %	206,680	100.0		536,751	100.0	
Reason for immigration; non-Nordic immigrants, since 1990						
Labor immigrants	11,843	9.1	72.8	175,161	38.0	73.5
Refugee/asyl.seekers	37,797	29.0	43.7	88,905	19.3	42.3
Family reunification[d]	49,610	38.0	43.8	141,436	30.7	49.9
Other	31,286	24.0	60.3	55,943	12.1	63.9
Total with reason info.	130,536	100.1		461,445	100.1	
Education[e]						
High education	61,095	29.6	68.8	160,111	29.8	70.4
Medium education	42,550	20.6	61.4	101,553	18.9	69.3
Low education	67,443	32.6	47.1	124,314	23.2	47.2
Missing information	35,596	17.2	35.4	150,782	28.1	54.2
Total	206,680	100.0		536,751	100.0	
Panel B: Natives						
Men	1,112,500	50.9	80.5	1,086,838	50.9	80.4
Women	1,072,852	49.1	70.8	1,047,666	49.1	74.6
All natives	2,185,348	100.0	75.7	2,134,507	100.0	77.5
Education						
High education	680,332	31.1	83.4	852,907	40.0	84.5
Medium education	702,751	322,2	80.2	765,959	35.9	81.6
Low education	794,418	36.4	65.3	506,972	23.8	59.9
Missing information	7847	0.4	–	8671	0.4	–
	2,185,348	100.0				

Source: *Microdata.no,* cf. section on Data, variables and methods. Totals may deviate slightly from the sum of subcategories due to 'noise-inflicting' devices implemented for data protection reason (NSD/SSB 2019, p. 110). [a]Employment rate = yearly work income at least 2 Basic Amounts (see text for definition). [b]Immigrants = foreign-born with parents without Norwegian ancestry; short-term immigrants (seasonal workers, posted workers etc.) not included. [c]West = EU countries per 2000 plus Iceland, Switzerland, Malta, USA, Canada, Australia, New Zealand. [d]Residential permits granted to family members of refugees and labor immigrants; immigrant partners of natives. [e]See text for definitions.

Apart from overall economic conditions and the size, composition and growth in the immigrant population, also the institutional context would influence residents' employment opportunities. The Norwegian labor market is regulated in many ways, for instance by the 1978 Working Environment Act, which stipulates working hours, holidays, sickness benefits, and protection against arbitrary and unjustified dismissals (NHO 2020). Another example is the General Application Act (GAA 1993), which intends to 'ensure foreign employees terms of wages and employment which are equivalent to those of Norwegian employees' and thereby to counter social dumping.

In spite of such legislation, unlawful immigrant employment is no rarity in some branches (Eldring & Ørjasæter 2018), but government agencies and trade unions monitor work life and try to combat rule breaking. Approximately 55% of all workers are union members (Dølvik & Steen 2018, p. 58; Nilsen 2020). Unionization is lower among immigrants, but as almost 80% of all workers are estimated to be covered by collective agreements, also many immigrants will have wages determined by nation-wide agreements and the collective bargaining which takes place in each workplace.

Social benefits will also influence labor market conditions. Permanent residents, regardless of citizenship, are in principle eligible for support from income protection schemes – unemployment benefits, work assessment allowance, social assistance, etc. (NOSOSCO 2015). Access is strictly regulated, but such benefits will provide alternatives to inferior low-paid jobs and contribute to uphold wage levels. Labor market policies also include the activities of local Employment Offices, which assist job-seeking and re-education in case of unemployment. Special programs exist for immigrants (Hernes et al. 2019) which, if successful, could actually intensify native-immigrant job competition.

The potential of immigration to influence residents' employment may also depend on the actual level of immigrants' work participation. Table 1 indicates that employment levels (i.e., percentage having at least 2 Basic Amounts in yearly work income; see section on Data for definition) are much lower among immigrants than among natives: 21 percentage points lower in 2004, 17 percentage points lower in 2015. Employment was relatively high among Nordic and West immigrants, but relatively low among immigrants from Africa and the Middle East. Labor immigrants had comparatively high employment rates.

Immigrants' difficulties in gaining employment could be due to disadvantages such as inadequate education, language problems, and unfamiliarity with Norwegian work life. However, discrimination does also play a role (Birkelund et al. 2017), as well as the structure of the job market: the Norwegian labor market is characterized by a 'low frequency of elementary jobs that require only low skills' (Calmfors & Gassen 2019, p. 12). An additional factor is that employers' interest in hiring immigrants may depend on the opportunity to pay low wages, which will be restricted by Norwegian labor market institutions and the compressed wage distribution (Nilsen 2020, p. 8).

Nonetheless, research suggests that employers may prefer immigrants over natives in some branches, such as fish processing industries and hotels (Friberg & Midtbøen 2019). From Table 1 it can be estimated that the number of *employed* immigrants, age 22–59, increased from 110,000 in 2004 to 320,000 in 2015. The register data available for this study have also some information on industrial branches. Immigrants' employment in 2015 was especially evident in cleaning (68.1% of all employed), accommodation and restaurants, cafés etc. (48.4%), construction (20.4%), and transport and postal services (19.3%).

Study design and hypotheses

In this study, we combine a *cohort* approach with a *spatial correlation* approach.

The cohort approach consists in following a fixed sample of adult residents who were registered as living in Norway both at the start of 2004 and at the end of 2015. The study cohort includes both natives and earlier (pre-2004) immigrants, and can be assumed to have had practically uninterrupted residency in Norway during the study period.

We examine how employment outcomes developed from the first three years of the study period (2004–2006) to the last three years (2013–2015). Thus, our focus is not on short-term effects of immigration, but on developments over an extended period during which the residents in all regions experienced considerable growth in the immigration population. Both wages and employment opportunities could be affected, and we analyze three outcomes: *work income change* among continuously employed; *risk of leaving employment* (i.e., having no or marginal employment in 2013–2015 among employed 2004–2006); and *chance of entering employment* if having no or only marginal employment at the start of the period.

The essence of the spatial correlation approach (Edo 2019; Okkerse 2008) is to explore the possible role of immigration by analyzing how area differences in immigration are related to residents' employment outcomes. In our approach, we defined areas in terms of Statistic Norway's division of the country into 46 labor market regions (Bhuller 2009).[2]

Immigration is a composite phenomenon, however. We focus on regional variations in three aspects: overall immigration level (i.e., average proportion of immigrants in the regional population during the study period); the composition of immigrants in the region; and how steeply the immigrant population increased.

Based on the above sections, we propose four hypotheses.

First (H1); we expect that developments of work income and employment in the analyzed cohort of residents will be worse the higher the average percentage of immigrants in the regional working-age population. This is in line with standard economic theory which predicts that a large supply of immigrants who strives for employment will lead to downward pressure on wages as well as intensified job competition, with a potential for generating difficulties for the residents both in keeping and in attaining employment.

Second (H2); we expect that such negative effects will mostly occur among low-educated natives and pre-2004 immigrants. This is due to substitutability: immigrants will primarily challenge residents in those parts of the labor market where the immigrants are relevant substitutes. During the study period the immigrant population came to be more characterized by immigrants from Other Europe and non-European countries. Many of them did not have the work experience or education which would qualify them for high-ranking occupations. This suggests that their employment opportunities would most often be in manual, less skilled, and lower paid jobs – thus, in the job market where low-educated natives and earlier immigrants typically are employed.

Third (H3); we expect, however, that the negative effects of a high immigrant presence will be modest in size, since institutions such as labor laws and collective bargaining are likely to restrain the role of market mechanisms in the labor market. Employers' scope for dismissals and wage reductions is limited if rules are followed. Moreover, residents' occupational and geographical mobility may contribute to limit negative effects.

Fourth (H4); a rapid increase of immigrants in the regions – a labor supply 'shock' – could be negative for the residents, since it could outpace job opportunities, lead to intensified job competition, and occur too fast for adjustments to take place. We expect, however, that an opposite association is quite likely in view of the economic conditions in Norway during the study period. A fast growth in the regional immigrant population could coincide with better employment outcomes for the residents, because a booming local economy could both raise wage levels and employment opportunities, and at the same time attract immigrants.

Data, variables and methods

Data and the study cohort

We used public register data administered by Statistics Norway and obtained at the data portal *https://microdata.no/en/*. Individual-level information for several decades on income, country of birth, place of living, education, etc., for *all* residents recorded in the population registry is available at this data portal. Researchers at approved research institutions can obtain permits to use data for research purposes. Data security is taken care of by inbuilt devices which only allow for seeing output from analyses, with no possibility of inspecting individual information (NSD/SSB 2019, pp. 106–113). A drawback is however that analyses must be performed with the statistical tools available *inside* the data portal, and potentially relevant techniques (e.g., multilevel modelling) were not available for this study.

The study cohort consists of all residents on 1 January 2004 and born 1956–1976 (i.e., age 28–48 in 2004), who were also registered as residents at the end of 2015 (when aged 39–59). Those who had emigrated by the end of 2015 (2.0% of those registered in 2004) or died (1.8%) were excluded from the analyses. The age categories were selected in order to focus on main phases of work life; before age 28, many will still be in education or in unstable early careers; after age 60 health-related exits from employment increase.

In the study cohort, those born abroad by parents without Norwegian family origin (SSB 2020b) were defined as (pre-2004) immigrants. All others, including Norwegian-born descendants of two immigrant parents (only 3% of the study cohort), were classified as natives. Educational information by January 1, 2004, coded by the ISCED standard (Barrabés & Østli 2015), was used for classifying natives into *low* (ISCED levels 0–3), *medium* (ISCED levels 4 and 5), or *high education* (ISCED levels 6, 7, and 8). Since only 8.7% of the study cohort were immigrants, and their educational information was partly lacking, no further division of the immigrants in the study cohort was employed.

Employment outcomes

Variables indicating employment outcomes were constructed by means of information on pre-tax *work income*, that is, the annual sum of wages, salaries, and reported work income for self-employed (and sickness and parental leave payment, considered as work-related income in Norway). Rents, dividends, pensions, and other social benefits do not count as work income.

To ensure comparability across the study period, work income, given in Norwegian Kroner, was calculated into Base Amounts (BA). The size of the BA is determined each year by government agencies for social security purposes (NAV 2019). The nominal BA value increased by 53% from 2004 to 2015, while the consumer price index rose by 24 %. Thus, one BA represents more buying power in 2015 than in 2004, since it is adjusted each year in line with changes in overall income levels. Nevertheless, in the Norwegian context, the BA can be viewed as a *socially equivalent income unit* over time, which makes it very useful in longitudinal income analyses.

The study cohort was classified according to average work income, measured in BA, during three-year periods (i.e., 2004–2006, 2007–2009, 2010–2012, and 2013–2015). Three-year average was used in order to neutralize short-term fluctuations. Those who earned more than 2 BA on average per year were classified as *employed* during the three-year period; those who earned more than 2 BA in all four three-year periods were classified as *continuously employed*. Two BA correspond roughly to half the yearly work income of a full-time, but relatively low-paid, worker (SSB 2019a). Note that by this definition, more than trivial earnings are required for being classified as employed. Similarly, those classified as not employed were not necessarily without any work income, but could have small earnings.

Three employment outcome variables were constructed. Among continuously employed we calculated percent *Work income change* from 2004–2006 to 2013–2015. For those who were employed in 2004–2006, we constructed the dichotomy *Exit* (not employed 2013–2015 = 1, employed = 0). Among those who were not employed 2004–2006, we constructed a similar dichotomy termed *Entrance*, that is, employed 2013–2015.

Table 2 describes the study cohort. Among the natives, a marked educational gradient in all three employment indicators can be seen – average *Work income change*, for instance, was plus 19.8% for high-educated natives, but much lower (11.1%) for low-educated natives.

Among pre-2004 immigrant residents in the study cohort, labor market difficulties are indicated by the high percentage who left employment (the *Exit* variable). Nonetheless, both *Work income change* and *Entrance* values were relatively favorable. Part of the reason for this is that short residential time for some of the immigrants (12% of them had arrived in 2002 or 2003) led to low employment in 2004. With increasing years of residency, chances of entering employment will typically improve.

Region-level variables

Three variables – *Level*, *Composition*, and *Growth* – were used to measure immigration differences between the 46 labor market regions.

Table 2 The study cohort, born 1956–1976, registered residents both in 2004 and 2015

	Total cohort	Natives, three educational levels			Pre-2004 immigrants
		high	medium	low	
Number of individuals	1,341,801	409,437	427,822	387,927	116,613
Women (%)	49.6	55.3	41.4	51.9	51.5
Mean age 2004	38.0	37.2	37.4	39.4	37.7
Married 2004 %	49.5	52.1	47.3	43.5	67.6
Employed 2004–2006%[a]	81.7	92.3	86.9	70.5	63.3
Employed 2013–2015%	81.6	92.7	87.2	68.2	66.3
Continuously employed %[b]	74.9	88.5	80.8	60.6	53.0
Mean work income 2004–2006[c]	4.94	6.33	5.13	3.68	3.57
Mean work income 2013–2015	5.41	7.23	5.57	3.72	4.01
Employment outcomes					
Work income change %[d]	15.9	19.6	14.7	11.1	18.9
Exit %[e]	8.4	4.1	7.0	14.0	16.4
Entrance %[f]	36.6	55.0	48.8	25.6	36.3

[a]Employed = average work income > 2 BA during three-year period. [b]Continuously employed = average work income > 2BA both in 2004–2006, 2007–2009, 2010–2012, and 2013–2015. [c]Mean work income measured in BA. [d]*Work income change* estimated among continuously employed. [e]*Exit* = not employed 2013–2015 among employed 2004–2006. [f]*Entrance* = employed 2013–2015 among not employed 2004–2006.

Table 3 Regional variables, 46 Norwegian labor market regions

	Values for 46 regions			
	Mean	Minimum	Maximum	St.deviat.
Level: average % immigrants 2004/2015 in regional population, age 22–59	10.0	6.1	22.6	2.98
Composition: average % 2004/15 low-educated immigrants among all regional immigrants	36.3	29.4	44.4	3.21
Growth: percentage point increase 2004–2015 in immigrant share of population	10.0	6.2	14.6	2.07

Level was calculated as the average percentage of immigrants in the regional population, age 22–59, across the 2004–2015 years.

As to *Composition*: in view of the 'crowded-out' thesis, characteristics which indicate substitutability for low-educated natives in the labor market will be particularly relevant. Accordingly, the *Composition* variable measures the average proportion of low-educated immigrants in the regional immigrant population 2004–2015.

Third, as to how much immigration increased during the study period, the variable *Growth* measures the percentage point increase from 2004 to 2015 in the share of immigrants in the region's working-age population (age 22–59).

Table 3 shows that on average for the 46 regions, 10.0% of the working-age population (age 22–59) were immigrants during the study period; 36.3% of these immigrants had low education (calculated among those with educational information); and the

share of immigrants in the regional populations increased on average by 10.0 percentage points. Variations between the regions were considerable, as indicated by minimum and maximum values, and the standard deviations. Unfortunately, short-term immigrants and posted workers (SSB 2019b) who also may impact on regional labor market conditions, are not included in Table 3 figures, since information about their regional location is largely missing. However, it is not unlikely that their regional distribution parallels that of the long-term immigrants.

Analyses

Associations between employment outcomes and regional variations in immigration were analyzed by multivariate regression models: ordinary least square (OLS) for *Work income change*, linear probability models (LPM) for *Exit* and *Entrance*. Models were estimated for the total study cohort, the three native categories, and the (pre-2004) immigrants.

In the analyses, the *Level*, *Composition*, and *Growth* variables were entered together, simultaneously, since residents were confronted with regional labor markets where all three immigration aspects co-existed. The reported coefficients for each immigration indicator are therefore adjusted for the other immigration aspects. Results from models with regional variables entered one at a time are shown in an appendix table. To ease interpretation, the immigration variables were centered on the mean and calculated into 5 percentage point units. Analyses were controlled for gender (men = 0, women = 1), age and age squared (centered), and 2004 marital status (married = 0, not married = 1). The constant coefficients will indicate estimated outcomes for married men, born 1966, in regions with average values for *Level*, *Composition*, and *Growth*.

The analyzed samples are very large, and quite small coefficients will pass standard significance levels. The analyses are made in samples which cover practically the entire target population. Therefore, estimations of statistical significance have limited value, but we chose to print coefficients with p-values < 0.001 (i.e., t-values above 3.090) in **bold**.

Results

Regression results are displayed in Table 4. Findings appear to be consistent with the first hypothesis (H1): the *Level* variable (adjusted for *Composition* and *Growth*) was negatively associated with *Work income change*, both in the total study cohort and in the four resident categories. Thus, a higher percentage of immigrants in the regional population during the study period went together with tendencies to less favorable changes in work income for the continuously employed.

Also, *Level* coefficients for *Entrance* (having entered employment in 2013–2015 if outside employment in 2004–2006) were negative, suggesting less chances of transitions from non-employment into employment the higher share of immigrants in the regional population. In a corresponding manner, *Level* coefficients for *Exit* were positive (exception: the insignificant coefficient for pre-2004 immigrants), indicating a higher risk of leaving employment in regions with a larger immigrant proportion in the population.

Table 4 Multivariate regression models; employment outcomes regressed simultaneously on *level, composition, and growth*, adjusted for individual traits[a]

	Total cohort	Natives, three educational levels			Pre-2004 immigrants
		high	medium	low	
Outcome: *Work income change*					
Coefficients, OLS models					
– *Level* of immigration[b]	**–1.59**	**–1.07**	**–3.07**	**–2.74**	**–2.69**
– *Composition* of the immigrants[c]	**–1.47**	**–1.72**	**–0.63**	**–1.11**	**–3.32**
– *Growth* in immigration[d]	**4.80**	**5.02**	**6.51**	**4.23**	**4.98**
– Constant	15.6	19.4	14.7	12.0	17.9
N	984,559	357,249	339,017	229,018	59,275
Outcome: *Exit*					
Coefficients, linear prob. Models					
– *Level* of immigration	**0.34**	**0.30**	**0.66**	**0.85**	–0.45
– *Composition* of the immigrants	**1.27**	0.20	**0.59**	**1.48**	**3.48**
– *Growth* in immigration	**–1.09**	**–0.56**	**–1.56**	**–2.36**	–0.08
– Constant	5.06	1.65	3.3	8.2	16.2
N	1,096,562	377,713	371,574	273,444	73,831
Outcome: *Entrance*					
Coefficients, linear prob. Models					
– *Level* of immigration	**–2.02**	–0.28	**–3.05**	**–2.01**	**–4.78**
– *Composition* of the immigrants	**–1.91**	–1.31	0.19	**–0.92**	**–2.66**
– *Growth* in immigration	**5.02**	2.71	**6.32**	**4.62**	**6.21**
– Constant	41.1	58.1	52.1	33.3	41.3
N	245,238	31,724	56,254	114,483	42,777

[a]Adjusted for gender, age, age squared, and marital status 2004; see Appendix Table A for full set of coefficients. Continuous variables have been centered on mean values. [b]*Level* = mean immigrant share 2004–2015 of regional population age 22–59; five percentage points units. [c]*Composition* = average percentage 2004–2015 with low education, among all immigrants in the region aged 22–59 with educational information; five percentage points units. [d]*Growth* = increase 2004–2015 in immigrant share of regional population, five percentage points units. **Bold** coefficient = p-values < 0.001.

The second hypothesis (H2) that negative effects will primarily occur for low-educated natives and pre-2004 immigrant residents was at least partly supported. Clearly larger negative *Level* coefficients emerged among low-educated natives (all three outcomes) and pre-2004 immigrants (two of the outcomes), than among high-educated natives. Nonetheless, also some negative effects occurred for high educated natives, and considerable negative effects appeared for natives with medium education. Thus, a higher *Level* had negative effects for *all* the four analyzed resident categories, but less negative among high educated natives than among natives with lower educational levels, and among pre-2004 immigrants.

As regards the *Composition* variable, the results agree with the expectation that the more the regional immigrants had low education, the more would negative employment outcomes occur for low-educated natives. This was even more noticeable among pre-2004 immigrants in the study cohort. Among them, the negative associations between employment outcomes and a high share of low-educated immigrants among the region's immigrants were particularly marked. However, also work income change among

high-educated natives was negatively associated with a high presence of low-educated immigrants in the region.

The third hypothesis (H3) proposed that effects of regional variations in immigration will be small. How to define 'small' is debatable, but a possible approach is to compare the effect coefficients with the *constant* coefficients. The latter indicate outcomes given mean values on the regional immigration variables. As *Level*, *Composition* and *Growth* were measured with 5 percentage points units, one unit covers a substantial portion of the regional variations (cf., the standard deviations reported in Table 3). For instance, more than two thirds of the 46 regions had *Level* values within a 5 percentage point range.[3]

Thus: among low-educated natives, the estimated effect of 5 percentage points higher *Level* was 2.0 percentage points decline in *Entrance*. This can be compared with the constant coefficient (33.3) which signifies the overall probability of *Entrance*: in general, about one third of those outside employment in 2004–2006 had entered employment in 2013–2015.

Using this reasoning, many of the *Level* and *Composition* effects appear as small, but some seem more noteworthy, for instance the effect of *Level* on *Work income change* among low-educated natives (–2.74) which does not seem trivial, compared to the constant (12.0).

Lastly, the *Growth* effects, adjusted for *Level* and *Composition*, throw light on the fourth hypothesis (H4). A distinct pattern can be seen: the more the immigrant share of the working-age regional population increased 2004–2015, the better employment outcomes for the residents. This appeared for each examined resident category, and for all three employment outcomes (exception: *Exit* for pre-2004 immigrants). Thus, a sharp increase in the immigrant share of the regional population during the study period corresponded to more favorable *Work income change*, reduced risk of *Exit*, and better chances of *Entrance*.

Alternative models

To check robustness, alternative models were estimated. Findings for *Work income change* are reported in Appendix Table B.

By and large, results from these alternative models agreed with the findings reported in Table 4. Note, however, that the positive effects of *Growth* become less distinct (even insignificantly negative for low-educated natives and pre-2004 immigrants) when the *Level* variable is excluded from the models. This reflects the particular association between *Level* and *Growth*. They correlate (Pearson's $r = +0.73$; see Appendix Table C), but while *Level* is negatively associated with employment outcomes, the opposite is the case for *Growth*. When only one of them is included as predictor, the coefficients for the selected variable are lowered since they also contain opposite effects from the other variable. The same can be noted when comparing the model including only *Level*, or only *Growth*, with the model including both.

Appendix Table B shows furthermore that the results were not unduly influenced by the two largest Norwegian cities Oslo and Bergen. Similar findings as in Table 4 also emerged after excluding the Oslo and Bergen regions.

Besides, *Composition* variable effects depend on how it is measured. Table 4 showed that a higher proportion of low-educated immigrants in the regional immigrant

population was associated with negative employment outcomes. Appendix Table B shows on the other hand that a high proportion of labor migrants had positive associations with residents' employment outcomes, while these outcomes seemed practically unrelated to the proportions of refugees and the proportion of non-European/non-Western immigrants in the immigrant population.

Using other time frames for *Level* and *Growth* (for instance, average 2010–2015 instead of 2004–2015) gave the same pattern of findings as reported in Table 4.

Discussion

Summary and interpretations

Findings indicate that an enduring large percentage of immigrants in the regional population tended to be associated with less favorable employment outcomes for the residents, both for work income change, risk of leaving employment, and chances of gaining employment. This is in line with theoretical predictions (Borjas 2013; Edo 2019) that a high share of immigrants in a labor market can trigger processes which depress wages and limit residents' employment.

Such negative associations were observed in all analyzed resident categories, but distributional effects did nevertheless appear. Negative tendencies were more marked for natives with low or medium education, and for pre-2004 immigrant residents, than for high-educated natives. This is likely to reflect differences in substitutability (Bratsberg et al. 2014; Peri 2016). Although immigrants are found in all sectors and industrial branches in Norway, they will in particular enter the labor market segments which typically employ low-educated natives and earlier immigrants. Therefore, in so far as negative effects of immigration occur, they will more often be experienced by low-educated natives and earlier immigrants. The same is suggested by the results for the *Composition* variable: the higher proportion of low-educated in the regional immigrant population, the more unfavorable outcomes for low-educated natives and in particular for pre-2004 immigrant residents.

In this way, findings concurred with the 'crowded-out' thesis that immigration from low- and middle-income countries to advanced economies tends to be negative for low-educated natives and especially for earlier immigrant residents. However, the assumed mechanisms – more intense job competition and more widespread hiring practices which replace low-educated natives with immigrants – cannot be directly demonstrated in our data, but earlier Norwegian research has suggested such processes (Friberg & Midtbøen 2019).

Some, although smaller, negative effects of a high share of (low-educated) immigrants in the regional population occurred also for high-educated natives. Empirical support for the theory-based prediction that highly qualified natives will gain from immigration since their qualifications are complementary to the immigrants, did not emerge in our analyses.

That regional economic conditions play a role is plausible in view of the results for the third analyzed aspect of immigration: *Growth* in the immigrant share of the regional population. In all analyzed resident categories, employment outcomes were more favorable when the share of immigrants was growing steeply during the study period. A rapid

enlargement of the local immigrant population did not appear as disadvantageous for residents' employment, but was on the contrary associated with better outcomes, also for those who might be most vulnerable, that is, low-educated natives and pre-2004 immigrants.

A plausible reason is that in regions with flourishing economies, demand for labor will rise, with positive effects on residents' wages and job opportunities. The employed workforce will increase, and mobile immigrants will also move into such regions. In more stagnant areas, residents' wages and employment will have less favorable developments, and immigration inflow will be more modest. In line with this, Appendix Table C shows a significant positive region-level correlation (Pearson's $r = 0.63$) between percentage change in the total number of employed in the region (reflecting economic expansion or stagnation) and growth in the share of immigrants in the regional population. Interestingly, the correlation matrix also indicates that employment rates among low-educated natives changed more favorably from 2004 to 2015 in regions with a large *Growth* in the immigrant population.[4]

Thus, in this study, immigration appeared to be linked to residents' employment outcomes in opposing ways. In itself, a higher proportion of immigrants in the regional population could trigger more job competition and downward pressure on wages, in particular for low-educated natives and earlier immigrants. On the other hand, a rapid growth in the immigrant population could signify an expanding local economy which tended to bring about improved work incomes and employment opportunities for all categories of residents – also low-educated natives. By including both these immigration aspects, simultaneously, in the analyses, the underlying tendencies linked to each of them surface in the results.

However, we also hypothesized that the associations between regional immigration and residents' employment outcomes would be quite small, due to the 'labor market rigidities' (cf., Edo 2019, p. 924) in Norway in terms of labor laws, collective bargaining, etc. The results are compatible with this. Mostly, immigration effects represented no more than relatively small variations around the general level of employment outcomes.

A contributing factor to the small observed immigration effects could be residents' geographical and/or occupational mobility (Foged & Peri 2016; Ortega & Verdugo 2016). We probed into this, using information about changes from 2004 to 2015 in residential region and/or industrial branch.[5] Residents who were mobile in this sense had consistently better employment outcomes than those who were immobile (table not shown, available from the authors). This suggests that the overall positive changes in work income in the study cohort were associated with mobility. However, the propensity to move or to change to another industrial branch was practically unrelated to the immigration characteristics in the 2004 residential region. Thus, mobility seemed primarily due to 'pull factors' (such as prospects of improved employment outcomes) and not to immigration-generated 'push factors' (i.e., poor employment prospects because of immigration in one's initial region).[6]

Nordic comparisons

The topic addressed by this study has been analyzed in many advanced economies (Kerr & Kerr 2011; OECD 2016, pp. 110–116), but comparisons with other Nordic studies will be particularly relevant. The Nordic countries – in spite of some differences, for

instance as to immigration policies and labor market regulations – share many structural and policy features (Dølvik & Steen 2018). Our study focused on relationships between regional immigration differences in Norway and employment outcomes 2004–2015 in a cohort of adult residents. An interesting question is whether similar, or compatible, results have emerged in Nordic studies using other approaches, for other time periods.

In several Nordic studies,[7] the starting point has been theory-based assumptions that 'an inflow of immigrant labor into a certain skill group will reduce the relative wage of native workers' (Bratsberg et al. 2014, p. 357). A Norwegian study, using 1998–2005 data, found support for this in terms of a negative association between wage growth and the proportion of immigrants in different occupations in the construction sector (Bratsberg & Raaum 2012). Similarly, the influx of young Swedes to the Norwegian labor market during 2005–2008 seemed to correspond to lowered employment among low-skilled young natives (Bratsberg & Raaum 2013). When analyzing male wage earners in Norway, split into 32 skill groups, the authors found less wage growth in skill groups with many immigrants, in particular if the immigrants had Nordic origins. The proposed explanation was that 'native and Nordic citizens [are] close substitutes, while natives and immigrants from developing countries are imperfect substitutes' (Bratsberg et al. 2014, p. 356).

Corresponding results have emerged in a Danish study with data for 1993–2004. It found negative wage effects in firms employing many low-skilled immigrants (Malchow-Moller et al. 2012). A Swedish study points in similar directions. After the EU extension in 2004, labor immigrants to Sweden from Baltic countries typically entered areas close to the harbors of Baltic Sea ferry lines. Low-skilled natives who lived in these areas experienced relatively negative wage developments (Aslund & Engdahl 2019).

Thus, other Nordic investigations, just as our study, have revealed patterns which are basically consistent with the 'crowded-out' thesis. The Nordic setting has hardly subdued the market mechanisms, which make unfavorable employment outcomes for low-educated natives and earlier immigrants a possible consequence of high immigration.

Nonetheless, it is striking that these studies also demonstrate that such negative effects seem usually quite small and of little significance for overall levels of wages and employment. The Norwegian study in the construction sector estimated that 'a 10% increase in immigration predicted to reduce wages by 0.6%' (Bratsberg & Raaum 2012, p. 1177). The Swedish study found 'an adverse impact on earnings of present workers in the order of 1 percent' for those who lived in areas with many Baltic immigrants (Aslund & Engdahl 2019, p. 706). Together with our results, this indicates that in the Nordic countries, labor laws, strong trade unions and other labor market institutions tend to counter considerably the potentially negative effects of immigration on residents' wages and employment.

It is also noteworthy that some Nordic studies have discovered practically no effects of immigration on residents' employment outcomes. A study using pre-Millennium Norwegian data found that different levels of immigration in the county populations had few associations with natives' wages (Zorlu & Hartog 2002). A recent study using Swedish data from 2011 did not find any evidence that an increased immigrant share in the neighborhood population had negative implications for native residents' earnings (Bohlmark & Willen 2020, p. 340). The arrival of many refugees to Sweden during 1999–2007 seemed unrelated to natives' employment, although some increased unemployment among earlier

immigrants occurred (Ruist 2013). A Danish study which followed young low-skilled natives during 1995–2008 did not find any negative effects of larger refugee immigration into the study cohort's original residential areas (Foged & Peri 2016). Mobility seemed to contribute strongly to this, as low-tenured natives tended to shift towards better paid non-manual occupations. Thus, as in our study, residents' employment seems to be marginally affected by refugee immigration.

Conclusion

This study has examined relationships between immigration and residents' employment outcomes in Norway, with special attention to the 'crowded-out' thesis that large immigration from low- and middle-income countries will lead to lowered wages and deteriorated job opportunities for low-educated natives and earlier immigrants. We analyzed changes in work income and employment in a cohort of adults during a 12-year period. A spatial correlation approach was applied. Analyses were made of associations between residents' employment outcomes and three types of regional differences in immigration: the level of immigration (the share of immigrants in the population), the composition of the regional immigrant population, and how much the immigrant share of the population had grown during the study period.

Less work income growth and somewhat reduced chances of employment emerged among residents in regions with a high proportion of immigrants in its population, especially among low-educated natives and earlier immigrant residents. The same occurred if the regional immigrant population was dominated by low-educated immigrants. However, such negative effects were small, compared to typical work income growth and employment level during the analyzed period. All in all, residents' employment outcomes were only modestly affected by regional variations in the composition of and proportion of immigrants in the population.

A rapid growth in the immigrant share of the regional population was on the other hand associated with better employment outcomes for all analyzed resident categories. A likely interpretation is that booming regional economies lead to rising demand for labor, with beneficial impact on residents' employment outcomes, low-educated natives included. At the same time, immigrants will tend to move into such areas because of their thriving economies. Mutual associations between regional economic growth, improved employment outcomes for residents, and large immigrant inflows, will therefore arise. In this way, the 'crowded-out' thesis appears to be of little relevance in regions with expanding economies.

Our results agree, by and large, with findings in other Nordic studies. Immigration can be associated with negative tendencies in residents' employment outcomes, at least in relative terms, in those labor market segments where the immigrants are relevant substitutes – hence, 'crowded-out' tendencies occur. However, both in Denmark, Norway, and Sweden, such effects appeared as small, relative to overall wage changes and employment levels. This indicates that in the Nordic settings, the labor market mechanisms highlighted by economic theory are importantly restrained by institutions such as labor laws, trade union power, and collective bargaining. Residents' employment outcomes are primarily influenced by general economic conditions, and only modestly affected by differences in immigration.

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Notes

[1] Reason for immigration was not registered before 1990. Due to open borders between Nordic countries since the 1950s, reason for immigration is not registered for immigrants from Sweden, Denmark, Finland and Iceland.
[2] The original classification into 46 labor market regions has been slightly modified. The very large Oslo (the capital) region, originally with almost one third of the entire Norwegian population, has been divided into three. The three regions in the Northern county of Finnmark, with quite small populations, have been collapsed into one labor market region.
[3] On the *Level* variable, six of the 46 regions had values below 7.3% and seven had values above 12.3%.
[4] Among all low-educated natives age 22–59 (nation-wide cross-sectional data), employment levels (i.e., earning at least 2 BA) were about 5 percentage points lower in 2015 than in 2004, but decline in employment levels among low-educated natives were generally *smaller* in regions with a high growth in the immigrant share of the regional population.
[5] Using register information per 1 November 2004 and 2015 for continuously employed individuals in the study cohort, work places were classified into (1) health/social care, (2) construction, (3) trade, (4) transport and communication, (5) public administration, (6) manufacturing, (7) accommodation, restaurants, etc., (8) business services, (9) education, (10) agriculture, forestry, fisheries, and (11) other.
[6] A possible criticism against the present study is that we have only adjusted for gender without exploring gender differences. However, test analyses (available from the authors) show many gender similarities in the associations between regional immigration indicators and residents' employment outcomes, suggesting that gender-specific analyses would point towards the same main conclusions.
[7] We have selected the Danish, Norwegian, and Swedish contributions which seemed most relevant.

Appendix

Table A Selected regression models (cf. Table 4), full set of coefficients

	Natives		Pre-2004
	High educated	**Low educated**	**Immigrants**
Outcome: Work income change			
Level of immigration	**–1.07**	**–2.74**	**–2.69**
Composition of immigration	**–1.72**	**–1.11**	**–3.32**
Growth in immigration	**5.02**	**4.23**	**4.98**
Age (centered)	**–1.48**	**–1.18**	**–1.41**
Age squared	**0.01**	**–0.01**	0.01
Women, ref. men	–0.02	**6.28**	**5.31**
Not married, ref married	**–4.47**	**–2.34**	**–1.71**
Constant	19.4	12.0	17.9
Adjusted Rsquare	0.051	0.041	0.037
N	357,249	229.018	59,275
Outcome: Entrance			
Level of immigration	–0.28	**–2.01**	**–4.78**
Composition of immigration	2.71	**4.62**	**6.21**
Growth in immigration	–1.31	**–0.92**	**–2.55**
Age (centered)	**–2.48**	**–1.37**	**–1.81**
Age squared	0.01	**–0.03**	**–0.03**
Women, ref. men	1.64	**5.06**	0.24
Not married, ref married	**–13.84**	**–12.89**	**–4.75**
Constant	58.1	33.3	41.3
Adjusted Rsquare	0.097	0.056	0.059
N	31,724	114,483	42,777

Table B Multiple regression, outcome Work income change, models with different combinations of regional variables *Level*, *Composition* and *Growth*

Regional immigration variables included in the models	Total cohort	Natives, educational level			Pre-2004 immigrants
		High	Medium	Low	
Only *Level* as regional predictor	**–0.26**	**0.19**	**–1.05**	**–1.42**	**–1.68**
Only *Composition* (% low educ)	**–2.16**	**–2.40**	**1.59**	**–1.68**	**–4.50**
Only *Growth* as regional predictor	**1.93**	**2.93**	**1.25**	–0.32	–0.98
Only *Level* and *Growth*					
Level	**–1.85**	**–1.42**	**–3.17**	**–2.91**	**–3.27**
Growth	**5.56**	**6.00**	**6.83**	**4.76**	**6.65**
Oslo and Bergen regions excluded					
Level	**–3.10**	–0.51	**–4.59**	**–4.86**	**–3.72**
Composition (% low educ.)	**–1.28**	**–1.56**	**–0.56**	**–0.93**	**–3.29**
Growth	**6.11**	**4.47**	**7.90**	**6.17**	**5.90**
Alternative composition measure 1					
Level	–0.07	0.00	**–1.78**	**–0.98**	–1.38
Composition (% share labor migrants)	**1.76**	**1.45**	**1.33**	**1.85**	**2.01**
Growth	**1.46**	**2.64**	**3.71**	0.43	1.99
Alternative composition measure 2					
Level	**–1.91**	**–1.43**	**–3.20**	**–2.98**	**–3.28**
Composition (% refugee share)	**–0.58**	–0.12	**–0.38**	**–0.91**	–0.06
Growth	**4.52**	**5.80**	**6.13**	**3.14**	**6.54**
Alternative composition measure 3					
Level	**–2.41**	**–2.73**	**–3.17**	**–2.77**	**–5.17**
Composition (% share not Europe/West)	**0.34**	**0.81**	–0.00	–0.09	**1.16**
Growth	**6.23**	**7.59**	**6.83**	**4.58**	**8.90**

All models adjusted for gender, age, age squared, marital status 2004 as in Table 4. Units of all regional-level variables: 5 percentage points. **Bold** = p-values < 0.001.

Table C Correlation matrix 46 labor market regions

Regional-level predictors	2	3	4	5
1. Level of immigration 2004/2015 %	–0.10	**0.73**	**0.62**	–0.01
2. Composition 2004/2015 % low educ. immigrants		–0.13	–0.11	0.01
3. Growth in immigration 2004/2015 perc.points			**0.63**	**0.33**
4. Change % 2004/2015 number of employed in the region				0.17
5. Change % 2004/2015 employment level low edud. natives				

Bold = p-values < 0.05. Correlations between regional values estimated from cross-sectional information about all regional residents aged 22–59 in 2004 and 2015.