April 11, 2019

Immigration and Social Mobility

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Abstract

Using Norwegian administrative data, we examine how exposure to immigration over the past decades has affected natives' relative prime age labor market outcomes by economic class background. Class background is established on the basis of parents' earnings rank. By exploiting variation in immigration patterns over time across commuting zones, we find that immigration from low-income countries has reduced intergenerational mobility and thus steepened the social gradient in natives' labor market outcomes, whereas immigration from high-income countries has leveled it. Given the large inflow of immigrants from low-income countries to Norway since the early 1990s, this can explain a considerable part of the relative decline in economic performance among natives with lower class background, and also rationalize the apparent polarization of sentiments toward immigration.

JEL Classification: J62, J15, J24

Keywords: immigration, intergenerational mobility

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* This research has received support from the Norwegian Research council (grants # 236992 and 280350) and the Ministry of Labor and Social Affairs (project "Effects of Labor Migration"). Administrative registers made available by Statistics Norway have been essential. Thanks to Bernt Bratsberg and Mette Foged for useful comments and discussions. Thanks also to seminar participants and a number of Norwegian colleagues that have participated in a public debate about our findings and our empirical strategy. Correspondence to Knut Røed: knut.roed@frisch.uio.no.

1 Introduction

This paper provides an empirical analysis of the causal relationship between immigration and intergenerational economic mobility within a native population. While there is a large, yet inconclusive, literature on the impacts of immigration on natives' average labor market outcomes as well as on the outcomes of particular skill groups, this paper is, to our knowledge, the first to examine its impacts on natives' intergenerational mobility. More specifically, we study how exposure to immigration from different types of source countries affects natives' relative prime-age employment and earnings outcomes by economic class background. The latter is specified in terms of the parents' earnings rank within their generation, as in, e.g., Dahl and DeLeire (2008), Chetty et al. (2014), Corak et al. (2014), Bratberg et al. (2017), and Pekkarinen et al. (2017).

The basic idea behind our empirical approach is that economic class background is highly correlated with ultimate skill levels, such that heterogeneity in the impacts of immigration on natives' economic performance can be traced in its impact on the social gradient. Economic theory suggests that natives with qualifications that are complementary to the qualifications of immigrants gain from higher immigration, at least in relative terms, whereas natives with qualifications similar to those of immigrants may lose; see, e.g., Borjas et al. (1996) or Borjas (1999; 2014). Since natives with a disadvantaged family background have a disproportionally high probability of competing in the low-skill segment of the labor market, we expect immigration from countries with a large low-skill component to steepen the social gradient in economic outcomes. Conversely, we expect immigration from countries with a large high-skill component to level the social gradient.

Our empirical analysis builds on data from Norway, which is one of the rich-world countries with the most rapid rise in the immigrant population share, particularly after the expansion of the European labor market in 2004. The overall immigrant share of the adult population (age 25-66) increased from 5 % in 1992 to 18 % in 2016, and the vast majority of the new immigrants came from countries with much lower earnings levels and living standards than Norway; i.e. from less developed countries (LDC) and Eastern Europe. At the same time, recent empirical evidence indicates that economic mobility declined considerably for natives born into the poorest families. With economic class background defined in terms of parents' earnings rank, Markussen and Røed (2019) examine economic mobility among native offspring born between 1952 and 1975 and show that the bottom decile has fallen systematically behind in terms of own adult earnings rank as well as employment propensity.

The question we seek to answer in this paper is whether – and to which extent – there is a causal relationship between the rise in immigration and the decline in intergenerational mobility among natives. We use administrative register data covering all individuals born in Norway from 1960 through 1980. The identifying variation in immigration exposure comes from commuting-zone-birth-cohort cells, where each individual is assigned the commuting zone believed to have been the zone of residence during adolescence and at the time of labor market entry (based on their mothers' addresses). Immigrant exposure is measured as the immigrant population shares in the respective commuting zones by age 32, whereas adult economic outcomes are measured during age 33-36. This setup implies that the identified effects of immigration potentially capture its influence both on educational and occupational choices, and on job opportunities and wage prospects given these choices. To take into account that immigrants from different source countries compete in different skill segments of the labor market, we estimate separate effects of exposure to immigration originating in different types of source countries.

We focus on three outcomes: i) earnings rank within own birth cohort and commuting zone, ii) earnings level relative to the cohort and commuting zone average, and iii) employment (relative to a reference class background). The causal explanatory variables of interest are interaction terms between measures of exposure to immigration and class background (indicators of parental earnings rank). In our baseline model, we control for commuting-zone-by-birth-cohort and class-by-cohort fixed effects. The latter implies that we control for all national changes in the different classes' relative outcomes. Only the cross-sectional variation and the differential time trends across commuting zones contribute to identification of the effects on economic mobility. The identifying assumption is then that immigration patterns across commuting zones have not been affected by (or otherwise been spuriously correlated with) *relative* job prospects for workers with different class backgrounds.[1] This assumption does not necessarily hold. For example, it is possible that immigration from, say, low-income countries has been disproportionally directed toward regions with relatively favorable labor demand conditions for low-skill workers. We will show, however, that our findings are robust with respect to the inclusion of differential trends in the class-specific outcomes at geographical levels higher than commuting zones. Our main findings also remain the same when we divide the country into larger regions, and exploit the variation across commuting zones within each of those regions only. They also remain similar when the models are estimated separately for metropolitan and more rural areas. Finally, they are robust with respect to the inclusion/exclusion of pure cross-sectional and pure longitudinal variation in the set of identifying variation. Arguably, we can also determine the probable sign of any remaining bias a priori, as demand-driven immigration of a particular skill group will tend to be accompanied by favorable labor demand conditions for the same native skill group, ceteris paribus. As our results are going to point in exactly the opposite direction, they appear robust with respect to the most plausible sources of remaining selection bias.

Our empirical strategy also circumvents some common challenges in the empirical literature on the impacts of immigration on native outcomes (see the next section). First, by using family background to characterize natives rather than their actual education, experience, or occupation, we avoid simultaneity problems related to endogenous choices of these skill characteristics. Second, since family background is observed for complete birth cohorts, we can examine impacts on *all* na-

[1] Note that our identification strategy does not require that the allocation of migrants across local labor markets is as good as randomly assigned. In particular, it does not require that immigration flows are unaffected by local labor demand, only that they are unrelated to the relative demand for workers with different class background.

tives, and thus include prime-age employment status as an outcome of interest. This is potentially important, as recent research has indicated much larger immigration effects on employment than on wages in a setting similar to the one analyzed in the present paper (Dustmann et al., 2017). Third, by categorizing immigration flows in terms of origin country rather than formal skills, we avoid missing observations due to lack of data on immigrants' human capital, and yet obtain a grouping which corresponds closely to the skill segments of the labor market. At the same time, we circumvent the skills downgrading problem discussed by Dustmann et al. (2016); i.e., that immigrants' formal skills are "downgraded" upon arrival in the host country. Finally, by examining the outcomes of individuals rather than of cell averages, and by assigning each individual a fixed predetermined commuting zone, we steer clear of simultaneity problems related to endogenous migration across commuting zones.

While the focus on predetermined family background as the key distinguishing feature of natives solves some methodological problems, it also provides the most direct route toward answering the research question addressed in this paper: Can recent immigration patterns explain why lower class individuals have fallen systematically behind in economic outcomes over the past few decades? Our findings suggest that the answer to this question is a clear "yes": Immigration has indeed played an important role in the steepening of the social gradient in labor market outcomes among natives. We present robust evidence showing that immigration from low-income countries has significantly reduced social mobility and thus steepened the social gradient, whereas immigration from high-income countries has levelled it. And since immigration from low-income countries has been much larger than immigration from high-income countries over the past decades, this can explain a considerable part of the changes in the social gradients in economic outcomes over this period.

Our findings also rationalize the apparent polarization of politics in relation to immigration, and in particular the rise of anti-immigrant sentiments among lower-class natives. Existing evidence from many different countries shows that higher education and higher labor market skills invariably mean more support for liberal immigration policies (Scheve and Slaughter, 2001; Mayda, 2006;

Hainmueller and Hiscox, 2007), and some studies suggest a direct causal relationship between fears of labor market competition and attitudes toward immigration (Malhotra et al., 2013; Dancygier and Donnelly, 2013). Relatedly, recent empirical evidence demonstrates that jobs-threatening import competition from China has led to more political polarization and increased support for nationalist populism in both the US (Autor et al., 2018) and Europe (Colantone and Stanig, 2018). While our study does not examine the impacts of immigration on attitudes or voting behavior directly, it arguably indicates that the historically large influx of migrants from low- to high-income countries, by reducing social mobility and steepening the social gradient in native outcomes, has also laid the foundation for a more polarized political environment in the host countries.

2 Related literature

Our paper relates to a large, yet inconclusive, empirical literature on the impacts of immigration on natives' earnings and employment patterns; see, e.g., Longhi et al. (2010), Peri (2014), Borjas (2014), Card and Peri (2016), and Dustmann et al. (2016) for recent overviews and discussions about the literature's conflicting results. Empirical specifications differ along a number of dimensions, such as the margin of variation in immigration flows (e.g., by skill cells, by geographical cells, or by a combination of the two), the way immigration flows are measured (e.g., relative to the current or the past labor force), and the selection of endogenous outcome (e.g., wages versus employment). For the papers relying on spatial variation in immigrant exposure, there is also a major identification issue caused by endogenous migration patterns: Immigrants do not randomly sort into locations, but are instead disproportionally attracted to areas with favorable labor demand conditions. Many of the empirical contributions to the literature rely on a shift-share identification strategy, whereby actual immigration flows to each labor market region are instrumented by the corresponding national flows interacted with each region's initial fractions of the respective immigrant groups. However, the literature does not provide a consistent picture of the causal effects. Jaeger et al. (2018) argue that this ambiguity is related to fundamental methodological problems with the shift-share strategy: If regional labor demand shocks are serially correlated, the exclusion restriction does not hold, and even if it holds, the inclusion of past settlement patterns in the instrument may conflate the short and long term effects of immigration.

The literature focusing more directly on differential impacts by skill or experience categories is also characterized by conflicting results. While some empirical studies claim to have found evidence of large adverse impacts of immigration on similarly skilled native workers (e.g., Borjas, 2003; Jaeger, 2007; Borjas and Katz, 2007), others report small or insignificant effects (e.g., Card, 2001; Friedberg, 2001, Dustmann et al., 2005; Carrasco et al., 2008; Ottaviano and Peri, 2008; 2012; Manacorda et al., 2012). A recent contribution to this literature based on Norwegian data is Bratsberg and Raaum (2012), who use occupational licensing requirements within a particular industry (the construction sector) as a source of exogenous variation in immigrant employment across occupations, and find evidence of a significant negative causal relationship between an occupation's exposure to immigration and its wage level. This may give natives in exposed occupations an incentive to move towards less exposed, and presumably better paid, occupations. Based on a random-assignment like dispersion of refuges (and family migrants) across municipalities in Denmark, Foged and Peri (2015) find evidence of such effects for low-skilled native workers.

A common feature of existing research into the differential impacts of immigration is that the natives' skill level is wholly or partly interpreted as exogenous, such that the analysis is conditioned on educational attainment, occupation, or experience, and in many cases also on (initial) employment. These studies cannot tell the whole story, however, as educational and occupational choices are likely to be affected by immigration. Studies conditioning on occupation – and thereby also on employment – also miss out on one of the most plausible channels for impact of immigration, namely on the inflow of natives into work (Dustmann et al., 2017). To our knowledge, the present paper is the first to examine differential impacts of immigration based on a native characteristic that is highly correlated with ultimate skills, yet fully predetermined, and can be calculated for everyone. This allows for a completely unconditional analysis with respect to the individuals' own educational or labor market achievements, facilitating employment as an important outcome.

3 Data and identification strategy

Our data include all natives born between 1960 and 1980 who are still residents in Norway by age 32, and the purpose of our analysis is to examine how exposure to immigration during adolescence and young adulthood has affected relative prime age (33-36) earnings and employment outcomes by economic class background. As we are going to use the variation in immigration patterns across commuting zones (travel-to-work areas) as the key source of identification, we need to assign each person to a commuting zone. Our definition of commuting zones follows Bhuller (2009), which divides Norway into 46 such zones. Since the commuting zone of actual residence in adulthood may have responded endogenously to immigration patterns, our intention is to assign each person to the strictly predetermined commuting zone of childhood/adolescence. In that sense, our analysis will have an intention-to-treat flavor. However, as we do not have reliable residential information until 1992, we proxy the childhood/adolescence commuting zone by the commuting zone in which the mother lived when the offspring was 32 years old. This can be done in a symmetric fashion for all the cohorts included in our analysis, but is likely to entail a small measurement error.[2]

[2] For the latest cohort (1980), we can assess the potential magnitude of this measurement error by comparing the commuting zones inhabited by mothers when the offspring was 32 years old (2012) with the commuting zone inhabited when the offspring was 12 (1992). We then find that 7 % of the mothers have moved to another commuting zone during this period.

3.1 Class background and economic outcomes

Each person is assigned a class background on the basis of the average of his/her parents' labor earnings when they were of age 52-58.[3] The parental ranks are computed from the earnings distribution within each commuting zone. We use commuting zones (rather than the whole country) as the foundation for ranking in this paper to ensure that we compare offspring who, conditional on parental rank, have been exposed to similar overall economic and labor market developments. Had we used a national ranking algorithm, the distribution of classes would have varied considerably across commuting zones, implying that geographically differentiated economic trends could have affected different classes differently. For each annual birth cohort, the ranking is made separately for sons and daughters based on earnings comparisons with all other parents to offspring born in the same year and living in the same commuting zone. Since all parents are measured at the same age, their earnings may be obtained in different calendar years, and we adjust for that by removing the influence of general wage growth. Administrative registers ensure that 93-99 % of all native birth-cohorts are included in the dataset with appropriate information on both class background and commuting zone. In total, we have 1,116,835 observations that can be used in the empirical analysis.

For the offspring generation, we focus on three prime-age labor market outcomes:

- Earnings rank: The rank position in the gender- and cohort-specific distribution of age 33-36 earnings within the commuting zone, measured in vigintiles (5 % bins).
- Earnings share: The total earnings obtained in the age 33-36 period divided by the gender- and cohort specific average in the commuting zone.

[3] Based on a detailed analysis of complete lifecycle earnings histories for all Norwegians born in 1945 and 1946, Markussen and Røed (2019) show that the mid 50's is the period in the lifecycle for which annual earnings are most highly correlated with lifetime earnings.

- <u>Employment</u>: A dummy variable equal to one if average annual labor earnings obtained in the age 33-36 period exceeded approximately one third of average full-time-full-year earnings in Norway.[4]

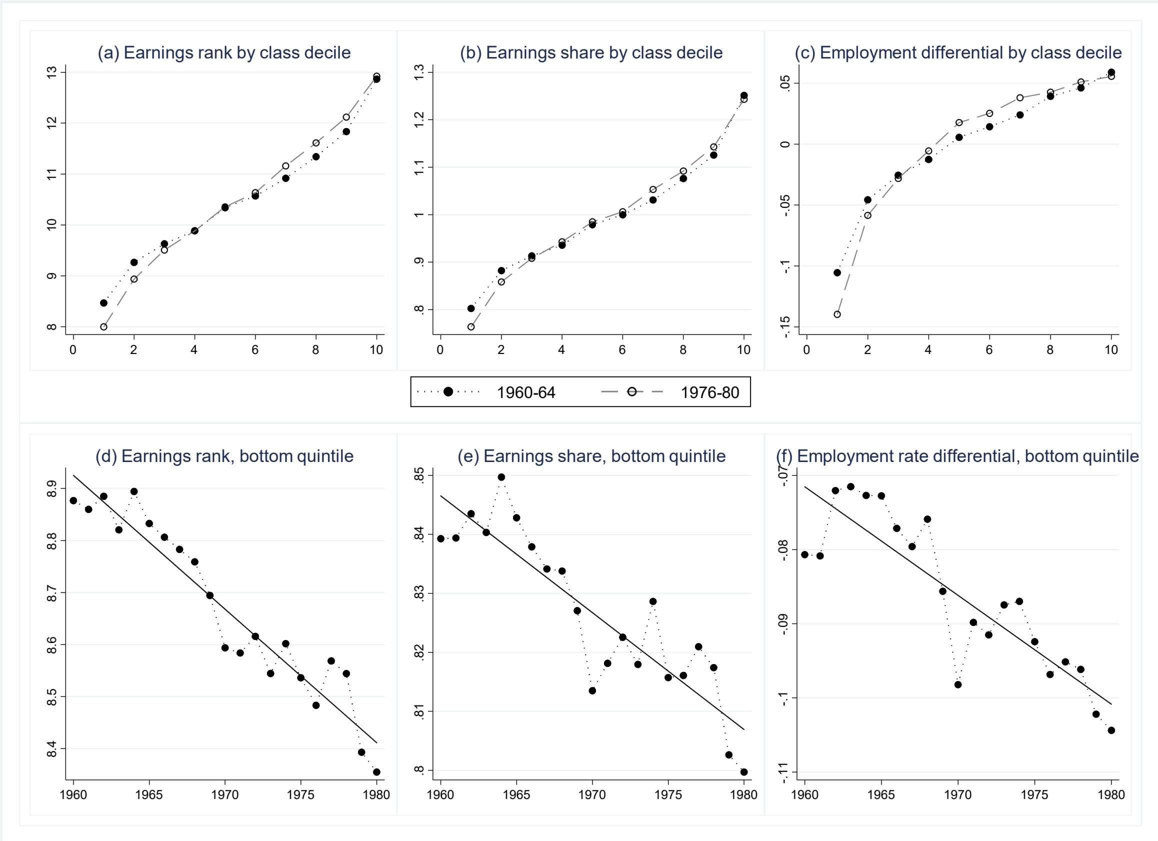

Figure 1. Average economic outcomes at prime age (33-36) by class (parental earnings decile) and year of birth.
Note: Panels (a) and (d) show average earnings vigintile rank within own birth cohort, by class. Panels (b) and (e) show average earnings by class, normalized by average earnings for the whole birth cohort. Panels (c) and (f) show the average employment rate by class minus the corresponding employment rate for the whole birth cohort. The solid lines in panels (d)-(f) are linear regression lines.

Figure 1 illustrates how the relationships between class background and economic outcomes have developed for offspring born from 1960 through 1980. Panels (a)-(c) first show, for the first and

[4] More precisely, we require average annual earnings during these 4 years to exceed 2 times the so-called Basic Amount (BA) in the Norwegian pension system, which is adjusted each year approximately in line with the general wage growth. This definition of employment implies that it can be satisfied by having a very weak attachment to the labor market over 3-4 years or by having a strong attachment over just 1-2 years.

the last five cohorts in our dataset, the social gradients (by parental earnings decile) in average outcomes. It confirms the finding in Markussen and Røed (2019) that people born into the lowest socioeconomic classes have fallen behind over time, whereas individuals in the upper middle classes have improved their relative position. In particular, it is notable that average earnings rank, earnings share, and employment propensity have declined for the two bottom class deciles. To assess the time path of these apparent changes in mobility patterns, panels (d)-(f) show trends in average outcomes for the two bottom deciles (the bottom quintile). Although there are some fluctuations from year to year, it seems evident that the decline of the lower classes represents a stable trend, at least for cohorts born after the mid-1960s. And, importantly, we see no indication whatsoever that this trend has come to a halt.

3.2 Occupational class structure of native and immigrant employees

Before we examine the relationship between natives' labor market outcomes and their exposure to immigration, we take a closer look at the kind of jobs that immigrants actually take in order to see which groups of natives they compete with in the labor market. To do this, we first need to characterize jobs in terms of their class status. From around 2003, the Norwegian employee register contains detailed occupational codes, based on the International Standard Classification of Occupations (ISCO 88).[5] We use these auxiliary data to assess the class-structure of all occupations observed in our data (344 different occupations). This assessment is based on the population of employed adult natives, for which we have data on class background, i.e.; we characterize each occupation's socioeconomic status by computing the average class background of its native employees. Since the parental classes are defined in terms of earnings decile rank (running from 1 to 10), with mean equal to 5.5, the occupational status codes will also be defined on this scale. Equipped with these occupational status codes, we compare the distribution of employees across occupational statuses for natives

[5] The application of this standard on Norwegian data is described in Statistics Norway (1998), which also include a list of all occupations.

and immigrants. As the occupational structure varies considerably between immigrants from different origin countries, we start out by dividing the immigrant population into three groups based on origin country: i) other rich countries, ii) less developed countries (LDC), and iii) Eastern Europe. We then compare the occupational class structure observed for natives and the three immigrant groups.

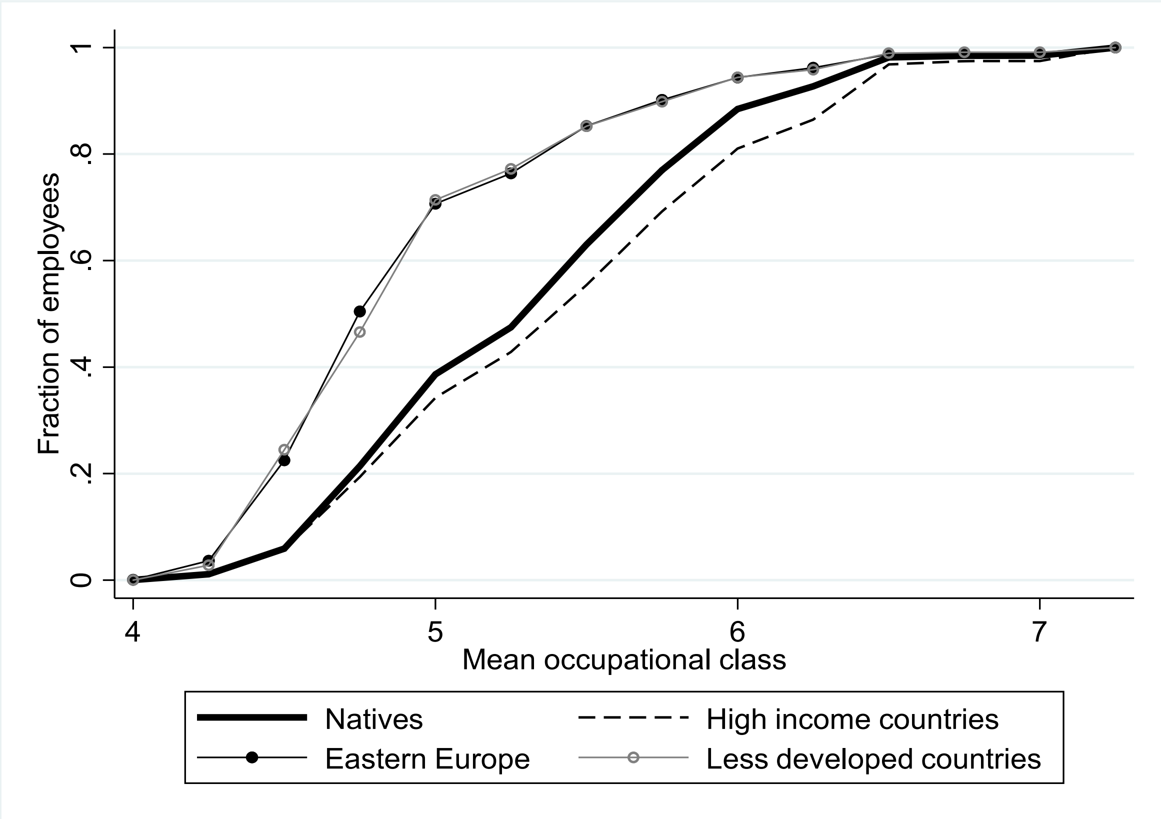

Figure 2. The socioeconomic rank of occupations held by immigrants and natives
Note: The figure shows distribution functions for the socioeconomic rank of all occupations held at age 32 by natives and three different immigrant groups. An occupation's socioeconomic rank is computed as the average class background of all natives in the occupation in 2005, where each employee's class is computed as the parents' decile position in their generations' earnings distribution.

Figure 2 shows distribution functions for the resultant occupational class structure. Although individual class backgrounds vary from 1 to 10, the averages taken over occupations essentially vary between 4 and 7. A first point to note from Figure 2 is that immigrant workers from less developed countries (LDC) and Eastern Europe are heavily overrepresented in occupations typically held by natives from the lower classes, whereas immigrants from high-income countries are overrepresented in occupations held by natives with high rank. A second point to note is that the class structures of the jobs held by immigrants from less developed countries and from Eastern Europe are hardly distinguishable. Hence, in an economic class context, immigrants from these two country groups compete in exactly the same segments of the labor market. Based on this observation, we aggregate these two immigrant groups into a single one. In our empirical analysis, we thus divide the immigrant population into two groups:

- Low-income countries: Eastern Europe plus all non-OECD countries outside Europe. The quantitatively most important countries in this group are Poland (2.8 % of the adult population by 2016), Lithuania (1.1 %), Somalia, Iraq, and the Philippines (all with 0.6 % of the population).
- High-income countries: All OECD countries except Eastern Europe. The most important countries in this group are Sweden (1.0 % of the adult population by 2016), Germany (0.6 %), Denmark (0.4 %), Great Britain (0.3 %), and the United States (0.2 % of the population).

Based on the occupational structure described in Figure 2, we expect immigrants from low-income countries to offer labor services of a type that primarily is a substitute for low-class native workers and a complement for high-class native workers, whereas immigrants from high-income countries offer services of a type that is a substitute for high-class and a complement for low-class native workers.

3.3 Exposure to immigration from high- and low-income countries

We measure the degree of exposure to immigration as the immigrant adult (age 25-66) population shares (from high-income and low-income countries, respectively) in each offspring's childhood commuting zone by age 32. These variables are then meant to represent the overall exposure to immigrant labor market competition through adolescence and young adulthood. At the same time, they are measured strictly prior to the outcome variables and can therefore safely be considered predetermined. As immigration shares are stock variables, with moderate variation from year to year, this obviously implies that there is little variation in immigration exposure across birth cohorts that are born just a few years apart in the same commuting zone. Hence, identification of causality primarily relies on the longer trends and on the variation across commuting zones. Figure 3 shows, however, that there has been considerable variation in exposure to immigrant population shares, both over the longitudinal and the cross-sectional dimensions, particularly for immigration from low-income countries.

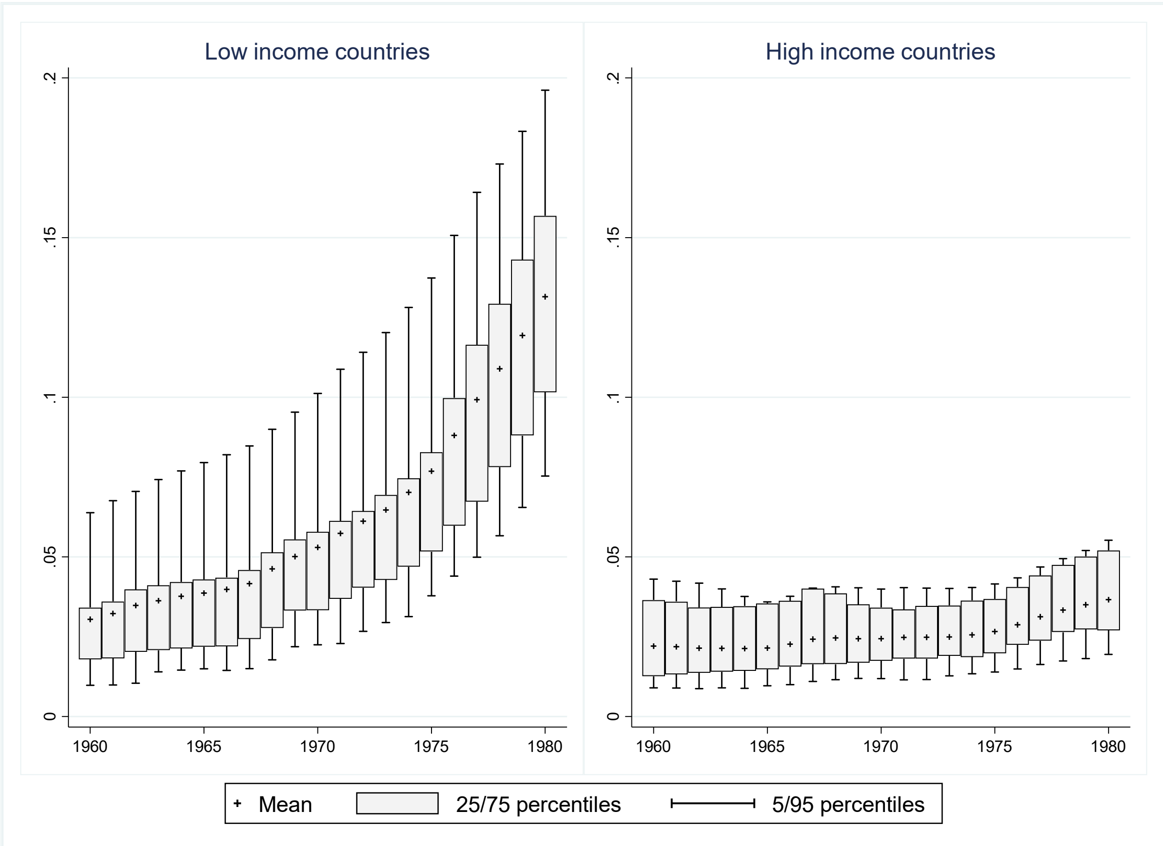

Figure 3. Longitudinal and cross section variation in exposure to immigration. By birth cohort.
Note: The figures show, for each birth cohort, selected statistics describing the variation in immigrant adult (age 25-66) population shares by age 32 across commuting zones. The reported statistics are percentiles and means in the respective distributions of all individuals.

4 Effects of immigration on native outcomes

In this section, we estimate the effect of immigrant exposure on natives' age 33-36 labor market outcomes, based on the variation in immigrant shares across birth cohorts and commuting zones. We focus on the three outcomes described in the previous section; i.e., earnings rank, earnings share (earnings level relative to the gender-specific cohort average in the commuting zone), and employment. Motivated by the mobility trends shown in Figure 1, in particular the finding of a steady decline in labor market prospects for the two lowest deciles, we divide the population into class background quintiles (20 % bins) in this section; that is, we seek to quantify the differential impacts of migration for each quintile in the parental earnings distribution. In a subsequent robustness analysis, we will perform the analysis based on smaller bins.

Given that the allocation of immigrant shares across commuting zones may be endogenously related to labor market demand conditions, our interest lies not in the way the economic outcomes on average are associated with immigrant shares, but in the way these associations vary with class background. Hence, the aim of the analysis is to identify the effects of immigration on the social gradient in natives' economic outcomes.

4.1 Econometric model

We model the three outcomes described in the previous section as functions of immigrant exposure; i.e., prime-age earnings rank and earnings share within cohort-gender-commuting-zone cells and employment, all measured at age 33-36. Let y_{icgzt} be one of the outcomes measured for individual *i,* with class background *c* (defined as quintile in the parental earnings distribution), of gender *g,* belonging to commuting zone *z,* and born in year *t.* A baseline version of our statistical model can then be described as follows

$$\begin{gathered} y_{icgzt} = \alpha_{cgt} + \delta_{zgt} + \sum_{c \neq 3} \left[(\beta_c^H IMM_{zt}^H + \beta_c^L IMM_{zt}^L) I_c \right] + \varepsilon_{icgzt}, \\ c = 1,...,5; \quad g = male, female; \quad z = 1,...,46; \quad t = 1960,...,1980, \end{gathered} \tag{1}$$

where α_{cgt} is a class-by-gender-by-year fixed effect (represented in the model by 210 dummy variables), δ_{zgt} is a commuting-zone-by-gender-by-year fixed effect (represented in the model by 1,932 dummy variables), and I_c is a dummy equal to 1 for persons belonging to class (quintile) *c* (and otherwise 0) . This specification implies that any effects of immigration on the outcomes of middle class individuals (quintile 3) will be absorbed by the commuting-zone-by-gender-by-year fixed effect. The β coefficients captures the additional effects on the lower and upper classes and thus reflects the impacts on the social gradient of offspring outcomes. If, say, immigration from low-income countries disproportionally hurts low-class natives and benefits high-class natives relative to its impact on the middle classes, β_1^L and β_2^L will be negative and β_4^L and β_5^L will be positive. Conversely, if immigration from high-income countries benefits low-class natives and hurts high-class natives, β_1^H and β_2^H will be positive and β_4^H and β_5^H will be negative.

The inclusion of class-by-gender-by-year fixed effects in Equation (1) ensures that trends in mobility patterns that are common across the country do not contribute to identification of the causal effects. Hence, the coefficients of interest are identified by the cross sectional variation and its changes over time. Although our focus on the social gradients implies that we do not rely on the assumption that migration patterns are completely exogenous, we do need to assume that they are exogenous with respect to the relative labor demand conditions for natives with different class backgrounds. This assumption could be violated if, for example, immigrants from low-income countries are disproportionally attracted to commuting zones with particularly high demand for low-skill labor normally recruited from the lower classes. Although we cannot test the identifying assumption directly, we can examine the sensitivity of our findings with respect to the geographical level at which it is assumed to apply. We return to this in a robustness analysis below, where we, instead of exploiting the time variation in immigration shares across all commuting zones, use the variation within larger regions characterized by more similar economic and industrial developments or the variation within larger city districts as opposed to rural areas. In addition, we estimate models where we instead of (or in addition to) controlling for common national mobility trends control for stable differences between the different commuting zones with class-by-gender-by-commuting-zone fixed effects and control for time-varying mobility differences related to economic cycles by interacting the class variables with variables measuring local economic conditions.

While our empirical strategy still cannot eliminate concerns regarding simultaneity completely, it is notable that the most plausible violations of our identifying assumption arguably will imply that our effect estimates related to immigration from low-income countries are biased toward a flatter social gradient and that the estimates related to immigration from high-income countries will be biased toward a steeper social gradient. As we are going to establish exactly the opposite effect pattern, it is difficult to see how our results could have been driven by simultaneity.[6]

4.2 Estimation results

The main results are presented in Table 1, and the point estimates are illustrated graphically in Figure 4 with 95 % confidence intervals. In line with expectations built on economic theory, our results show that exposure to immigration from low-income countries steepens the social gradients in all three outcomes, whereas exposure to immigration from high-income countries levels them. This pattern is remarkably consistent across the class distribution, and the estimated effects are significant both from a statistical and a substantive viewpoint. For example, our estimates indicate that relative to the (unidentified) impact on middle class natives (the third quintile), a 10 percentage point increase in the share of immigrants from low-income countries reduce the expected rank outcome for a low-class (first quintile) native by 0.55 vigintile classes (2.8 percentiles), reduces expected labor earnings relative to the cohort average by 5 %, and reduces the expected employment rate relative to the

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[6] It could be argued that our empirical model is subjected to a reverse causality problem, as, e.g., reduced employment particularly among lower class natives triggers inflow of replacement workers from low-income countries. To check this, we have regressed the annual change in a commuting zone's immigrant share (from low –and high-income countries, respectively) on the lagged changes in the employment rates for each class quintile, controlling for commuting-zone-fixed and year-fixed effects. The estimated effects of lagged employment changes are generally close to zero, and none of them are statistically significant at conventional levels. For low class employment, the point estimate also goes in the opposite direction of that suggested by the replacement argument, as a recent employment decline for this group yields lower subsequent immigration from low-income countries.

third quintile by 4 percentage points. For a top-class native, on the other hand, it raises the expected rank outcome by 2.6 percentiles, raises the expected labor earnings relative to the cohort average by 7 %, but has no significant influence on relative employment. The asymmetry with respect to the influence on employment suggests that while increased supply of low-skill labor primarily affects low-class natives by pushing some of them out of the labor market, it affects high-class natives by raising their expected earnings. This pattern is consistent with downward rigidity in native low-skill wages.

The estimated impacts of immigration from high-income countries are more or less mirror images of the impacts identified for immigration from low-income countries. Relative to the middle classes, more high-income immigration benefits low-class natives and hurts high-class natives. The magnitudes of the effects are even larger than for low-income immigration. One possible interpretation of that finding is that immigrants from high-income countries on average participate more actively in the Norwegian labor market, and therefore exert a larger overall influence on native labor market outcomes.[7] However, the statistical uncertainty is also much larger, and it is important to keep in mind that the changes over time in the immigrant share from high-income countries are almost negligible compared to the changes in the immigrant share from low-income countries; confer Figure 3.

Figure 5 shows estimated impacts by gender, based on separate regressions for men and women. The overall influence on the social gradients is similar for men and women. While the estimated effects of immigration from low-income countries are largely the same, the effects of immigration from high-income countries are somewhat larger for women.

[7] In our data, 84 % of the adult immigrants from high-income countries are employed in a given year, whereas this is the case for only 63 % of the immigrants from low-income countries

Table 1. Main estimation results – effects of immigrant shares at age 32 on native outcomes at age 33-36

	I Earnings rank	II Earnings share	III Employment
Immigration from low income countries by parental earnings rank			
Quintile 1	-5.51*** (1.06)	-0.53*** (0.10)	-0.43*** (0.07)
Quintile 2	-3.50*** (0.92)	-0.33*** (0.09)	-0.25 (0.07)
Quintile 3	Ref.	Ref.	Ref.
Quintile 4	2.64*** (0.91)	0.34*** (0.09)	-0.04 (0.06)
Quintile 5	5.13*** (1.09)	0.72*** (0.12)	-0.08 (0.06)
Immigration from high income countries by parental earnings rank			
Quintile 1	8.57*** (3.22)	0.77** (0.31)	0.76*** (0.21)
Quintile 2	8.75*** (2.70)	0.69*** (0.26)	0.66*** (0.19)
Quintile 3	Ref.	Ref.	Ref.
Quintile 4	-1.40 (2.67)	-0.26 (0.27)	-0.04 (0.18)
Quintile 5	-7.64*** (3.13)	-0.63* (0.33)	-0.18 (0.17)
Fixed effects			
class-by-gender-by-year	210	210	210
commuting-zone-by-year-by-gender	1,932	1,932	1,932
R-squared	0.050	0.049	0.055
N	1,116,835	1,116,835	1,116,835

Note: Earnings include all gross labor-related earnings (including self-employment earnings) obtained in the age 33-36 period. Earnings rank is defined within each of 1,932 cohort-commuting-zone-gender cells and measured in vigintiles (5 % bins). Earnings share is defined as own labor earnings divided by the cell average. Employment is equal to 1 when average annual earnings exceed 2 Basic amounts in the Norwegian pension system (approximately one third of average full-time-full-year earnings), and otherwise zero. Immigrant shares are defined as the fractions of the adult (age 25-66) population in the commuting zone that have emigrated from low-income – and high-income countries, respectively. The regression model is described in Equation (1). Standard errors (clustered at commuting-zone-by-year-cells) are reported in parentheses. */**/*** indicates statistical significance at the 10/5/1 % level.

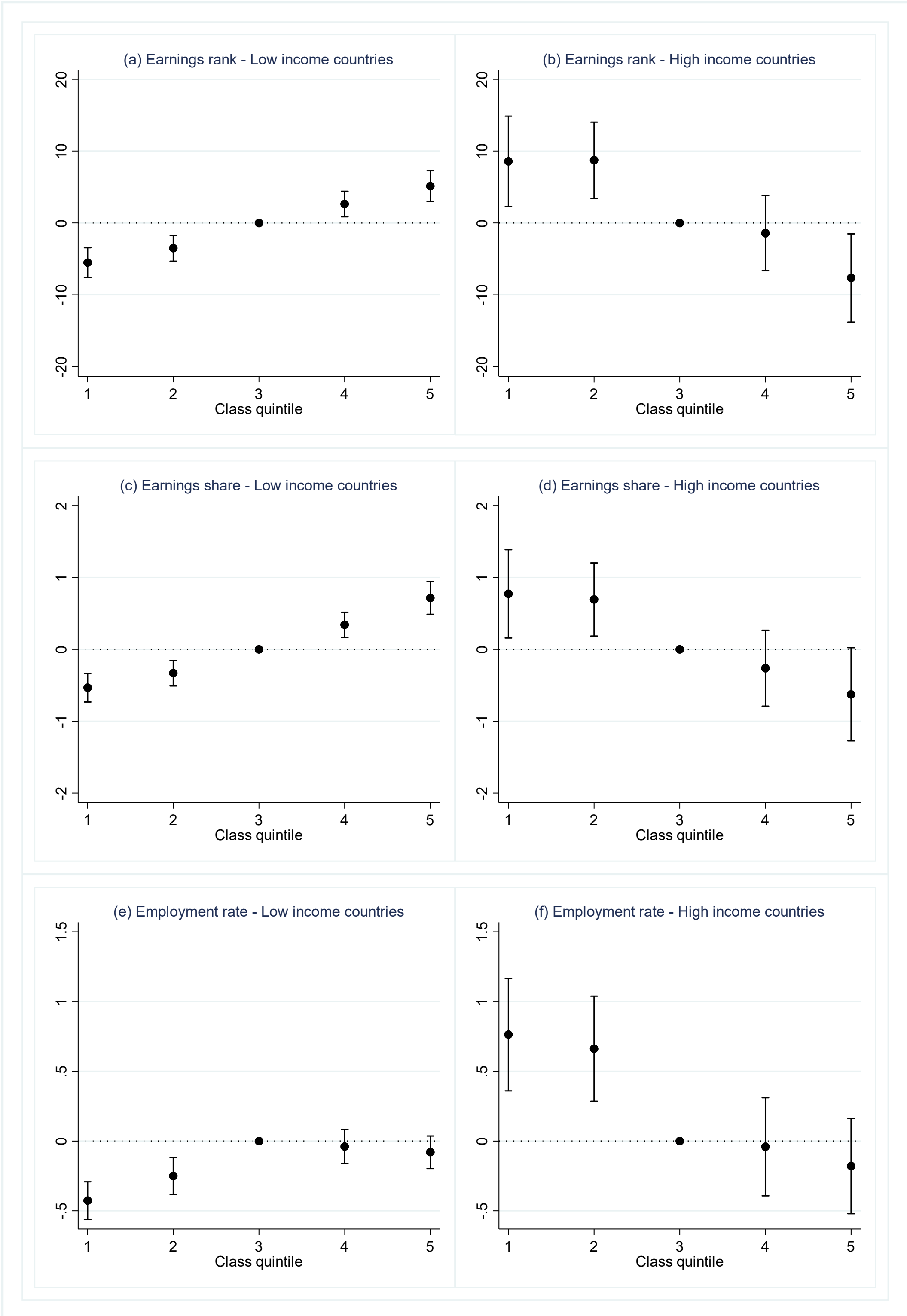

Figure 4. Main estimation results. Effects of immigrant shares on native outcomes by class background.

Note: The graphs show the point estimates reported in Table 1, with 95 % confidence intervals. See also notes to Table 1.

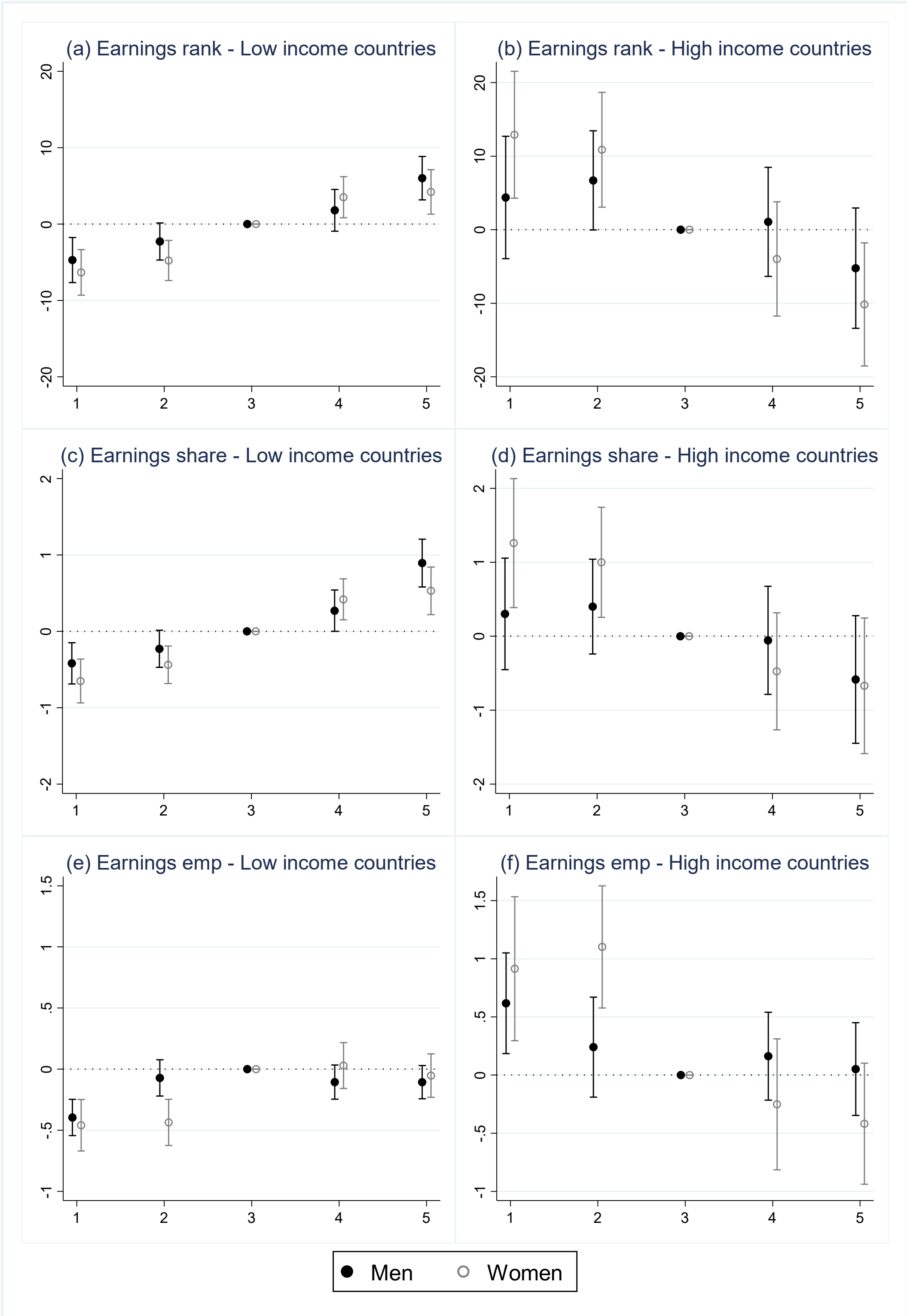

Figure 5. Separate estimation results for men and women. Effects of immigrant shares on native outcomes by class background.

Note: The graphs show the point estimates with 95 % confidence intervals. The numbers of observations are 569,829 in the male regression and 547,006 in the female regression See also notes to Table 1.

4.3 The overall influence of immigration on the social gradients

We started this paper by pointing out that social mobility appears to have declined over the last decades, particularly at the bottom of the class distribution. Based on the estimated model, we now examine how the actual changes in immigrant shares (conf. Figure 3) have contributed to the changes in the social gradients. For this purpose, we compare the social gradients for the first and the last five birth-cohorts included in our dataset; conf. Figure 1, panels (a)-(c). This is illustrated in Figure 6, where we show the actually observed changes in each class's average outcomes from the first to the last of these periods (measured as deviation from the third quintile), together with the changes that according to the estimated model are directly attributable to the changes in immigration shares. The observed changes are marked in the figures with gray bars, whereas the various predictions are marked with dots (indicating the point estimate) and 95 % confidence intervals. The panels to the left ((a), (d), and (g)) show the isolated predicted impacts of the observed change in immigration from low-income countries, the panels in the middle ((b), (e), and (h)) show the isolated predicted impacts of the observed change in immigration from high-income countries, and the panels to the right ((c), (f), and (i)) show the predicted impacts of the combined change in immigration from low- and high-income countries.

Starting with the earnings rank outcomes in panels (a)-(c), the rise in immigration from low-income countries is estimated to have reduced the earnings rank outcome for the bottom quintile by 0.45 vigintiles, which happens to correspond almost exactly to the actually observed decline for this class (panel (a)). On the other hand, the rise in immigration from high-income countries has contributed to an improvement of 0.1 vigintiles for this class (panel (b)). Taken together, our model therefore estimates that increased immigration shares explain a 0.35 vigintile drop in expected earnings rank for the bottom class over this period (panel (c)), corresponding to approximately 75 % of the observed decline. Similar patterns apply for the other two outcomes.

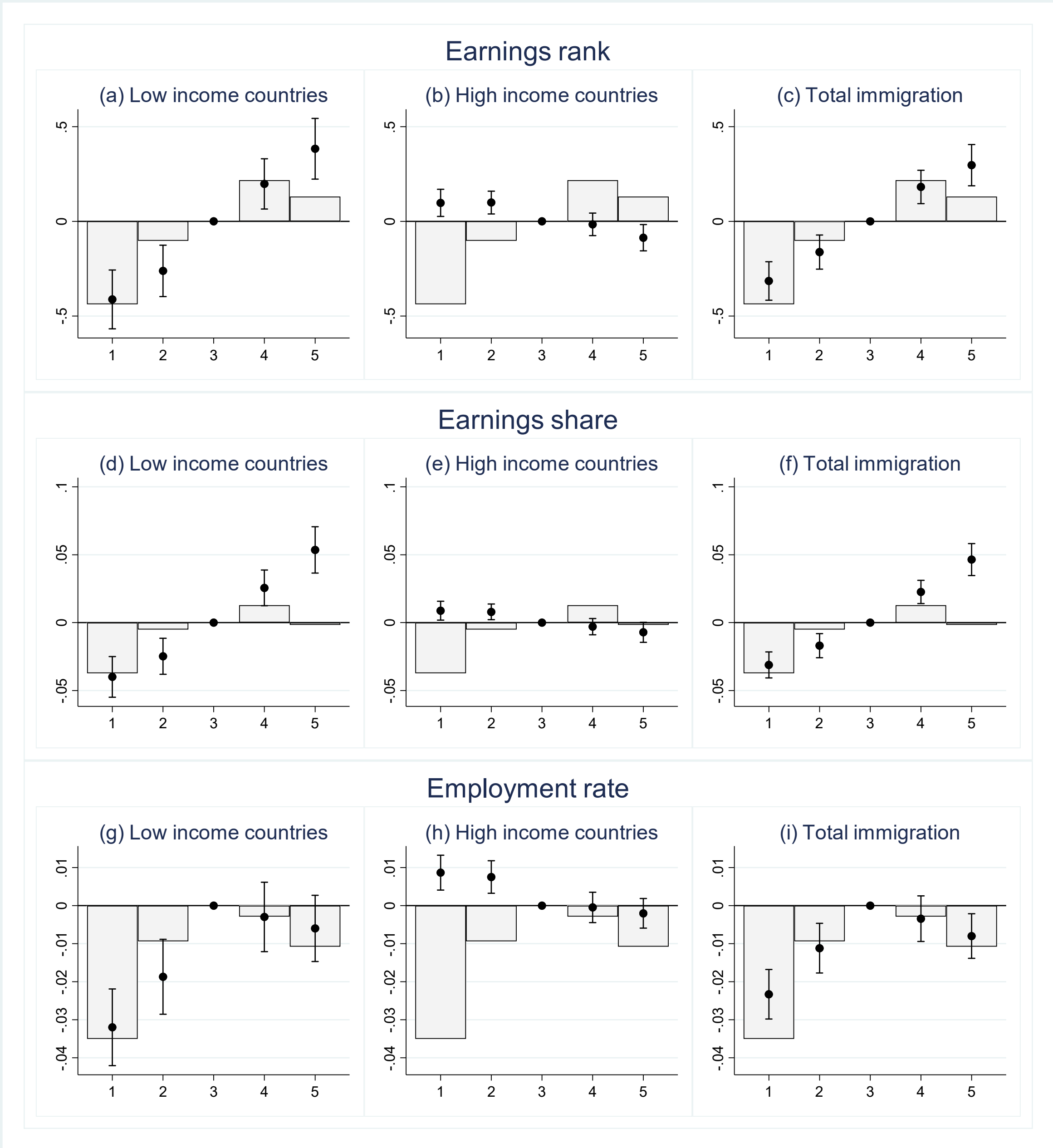

Figure 6. Estimated impacts of changed immigration patterns on the social gradients in economic outcomes. The 1976-80 versus the 1960-64 birth cohorts.

Note: The grey bars show the actually observed change in mean outcomes by class background, from the 1960-64 to the 1976-80 birth cohorts, in both periods measured as deviations from the third quintile. The black dots indicate (with 95 % confidence intervals) the estimated impacts of the observed changes in the immigrant shares indicated above each panel.

Viewed as a whole, it is clear that immigration patterns can explain a considerable part of the observed changes in the social gradients for all the three labor market outcomes, and in particular the falling-behind of the lower classes. Without the rise in immigration, our model predicts that there would have been no major changes in the social gradients, except that the very upper quintile would then have reduced their earnings share; see panel (f).

To take a closer look at the developments at the bottom of the class distribution, Figure 7 shows the estimated influence of immigration for the bottom class quintile year by year (again, measured as deviation from the third quintile); conf. Figure 1, panels (d)-(f). While the model is not able to explain the apparent improvement in bottom class outcomes in the beginning of the period – suggesting that other leveling forces were at work for these cohorts – it explains the developments for individuals born after the mid 1960's quite nicely.

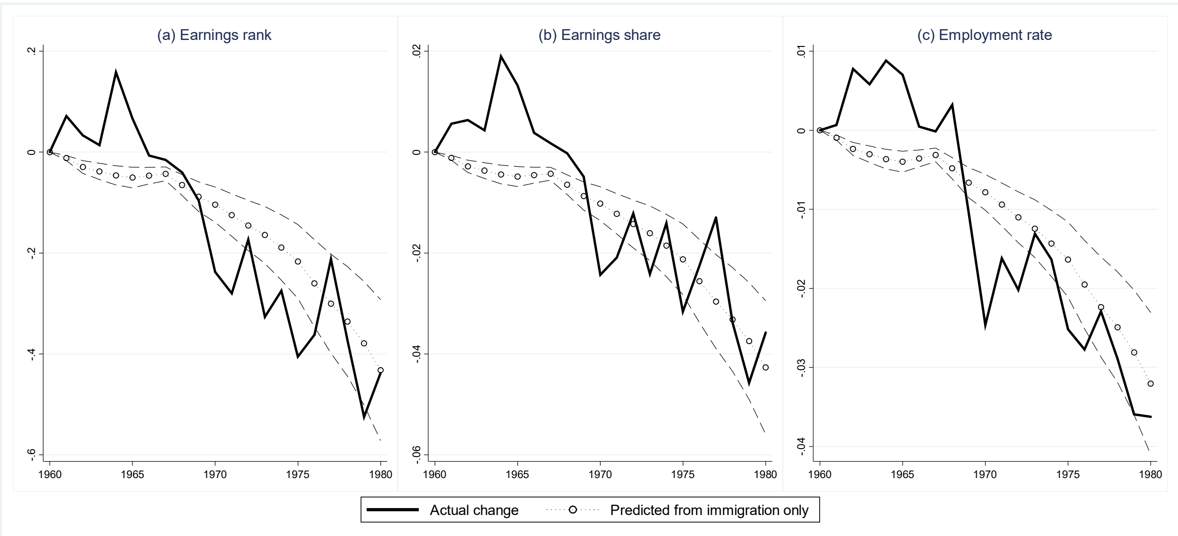

Figure 7. Estimated impacts of changes in immigrant shares on changes in outcomes of the bottom class. By birth-cohort.
Note: The solid lines show actually observed mean outcome changes for the bottom quintile measured as deviation from the third quintile, relative to the 1960 birth cohort. The open dots indicate (with 95 % confidence intervals) the estimated impacts of the observed changes in the immigrant shares.

5 Robustness

As explained in Section 3.1, the identifying assumption behind our point estimates is that migration patterns are exogenous with respect to the relative labor demand conditions for natives with different class backgrounds, conditional on the fixed effects included in Equation (1) which control for all national changes in relative economic outcomes by class. The validity of this assumption can be questioned for at least two reasons. The first is that regional variation in the relative demand for different skills – and thus for labor from different classes – has also affected the level and composition of migration. In particular, it is probable that regional business cycle fluctuations affect both immigration patterns and the relative performance of different classes. The second is that immigration flows for some other reasons have been distributed across commuting zones in a way that correlates with the social gradient in natives' economic outcomes, e.g., as a result of migrant concentration in the larger cities and other urban areas.

In this section, we examine the empirical relevance of these concerns based on two different strategies. First, we examine the sensitivity of our findings with respect to the geographical level at which the identifying assumption is assumed to hold. We do this by dividing the country into different larger regions or into separate zones based on urbanity, and use the variation within these geographical units only to identify the causal effects. The second strategy is that we add into the model a number of additional class-specific controls, related to local economic conditions as well as a combination of class-by-cohort and class-by-commuting-zone fixed effects. To ensure sufficient statistical power, this latter approach is based on a more restrictive functional form assumption regarding the effects on the social gradient; i.e., we impose the effects of immigration to be linear in class decile.

5.1 Identification based on within-region variation only

While we have exploited the variation in immigration shares across all Norwegian commuting zones in the analysis above, we now divide the country into five geographical regions, characterized by somewhat different industry composition and labor market developments. The division into regions follows Bhuller (2009), and the five regions are Øst-Norge (Capital region), Sør-Norge (Southern region), Vest-Norge (Western region), Midt-Norge (Central region), and Nord-Norge (Northern Region). We then exploit the variation in immigration patterns within these regions only. Figure 8 illustrates the variation in the immigrant exposure variables within each of these regions. While there is considerable longitudinal variation in immigrant shares from low-income countries within all regions, it is notable that the cross-sectional variation is much larger in the capital region than in the rest of the country. With respect to the immigrant shares from high-income countries, there is limited variation in both types in all regions.

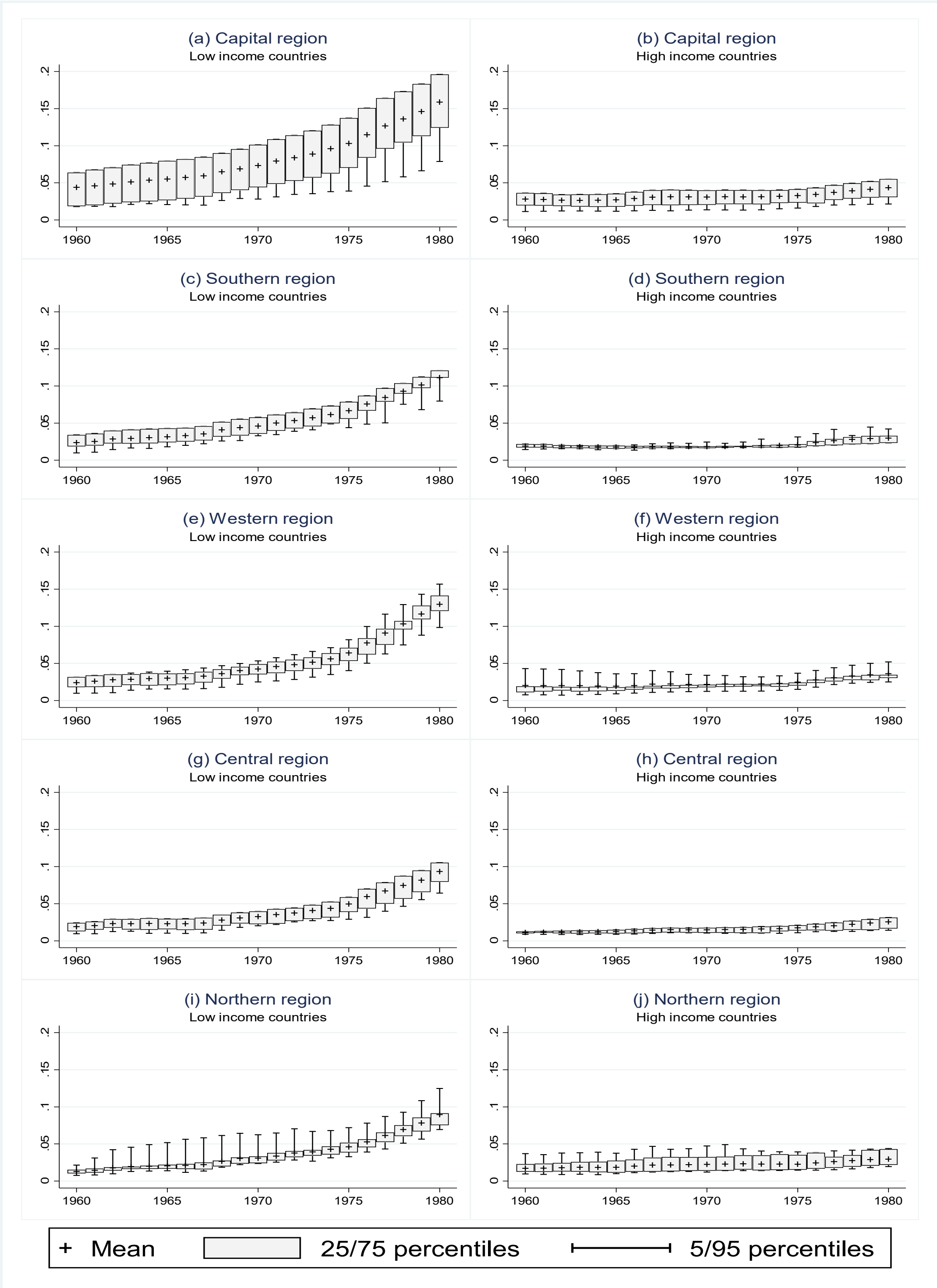

Figure 8. Longitudinal and cross sectional variation in exposure to immigration from low-income countries (left) and high-income countries (right). By region and birth cohort.

Note: The figures show, for each birth cohort, selected statistics describing the variation in immigrant adult (age 25-66) population shares by age 32 across commuting zones within regions. The reported statistics are percentiles and means in the respective distributions of all individuals.

We first use the within-region variation to estimate common immigration effects for all regions by replacing the class-by-gender-by-year fixed effects in Equation (1) with class-by-gender-by-year-*by-region* fixed effects. The results from this extended model are presented graphically in Figure 9, where we for ease of comparison have also repeated the estimates from the baseline model. While the estimated impacts on the lower classes remain more or less unchanged, the estimated impacts on the higher classes are reduced. As a further check for robustness, we also split the sample into the five regions, and estimate Equation (1) separately for each region. The results are presented in Figure 10. Although there are variations in point estimates across regions, the main pattern is robust: Immigration from low-income countries steepens the social gradient, whereas immigration from high-income countries levels it. As an alternative to the regional split, we also divide the country into areas based on the urbanity of the commuting zone. Specifically, we estimate separate models for the major city zones (the commuting zones around Oslo, Bergen, Trondheim, and Stavanger), for the smaller cities and the rural areas, and for the most rural areas only. The results shown in Figure 11 again confirm our main findings.

The controls for common national or regional mobility trends imply that the cross-sectional variation plays a relatively important role for identification. As an additional robustness check we control for all stable differences across commuting zones by using class-by-gender-by-commuting-zone fixed effects instead of the class-by-gender-by-year fixed effects included in the baseline model (we return to a combination of the two fixed effects sets below). This way, we tip the source of identification from the cross-sectional toward the longitudinal variation. The results from this alternative model are also shown in Figure 9. With respect to immigration from low-income countries, the estimates are similar to those obtained from the baseline, particularly for the lower classes. However, with respect to immigration from high-income countries, it appears that the identifying information becomes too thin to say anything of substance.

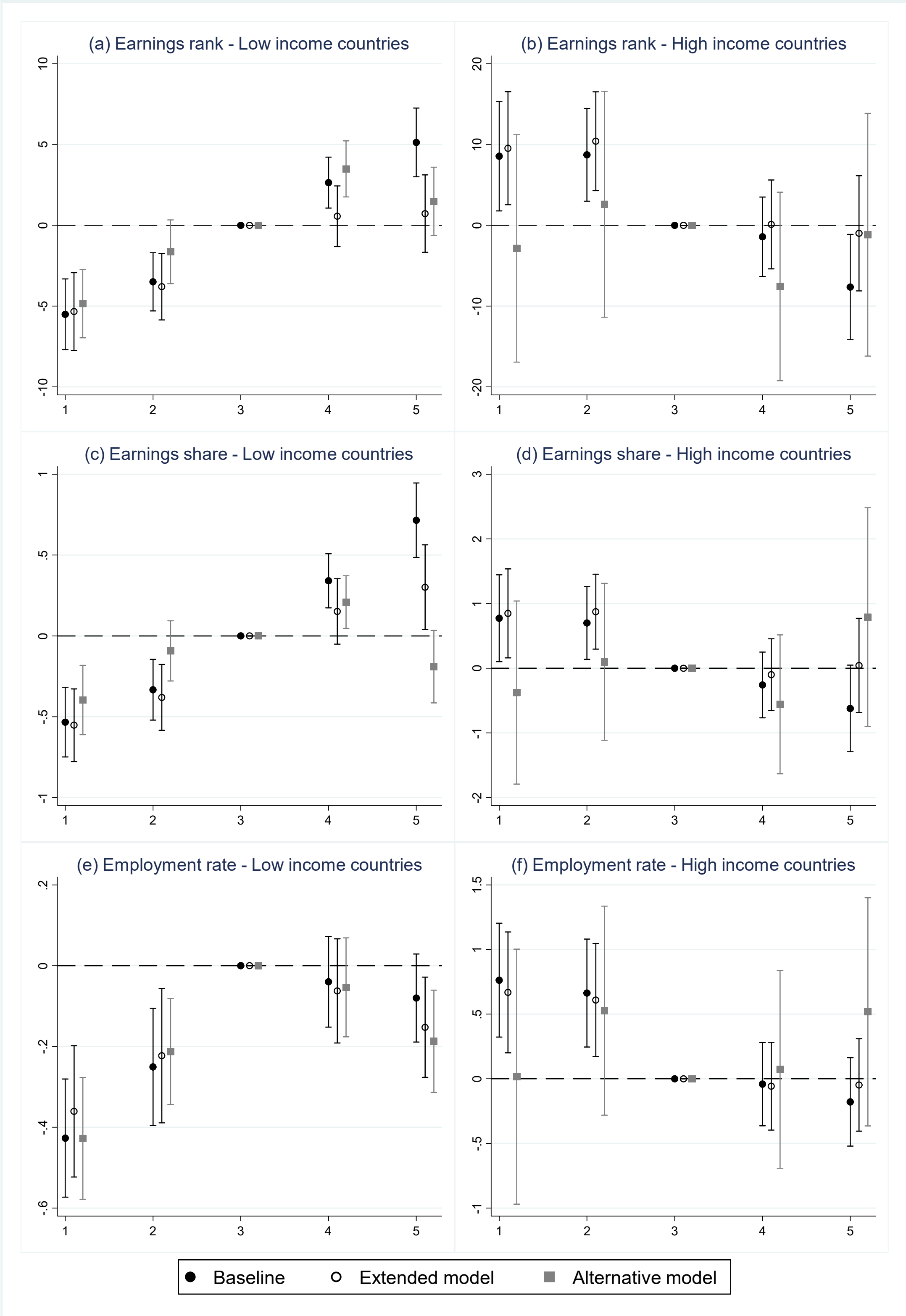

Figure 9. Estimation results based on different sources of variation in immigrant shares. Effects of immigrant shares on native outcomes by class background.

Note: The "Extended model" controls for 1,050 class-by-gender-by-year-by-region fixed effects instead of the 210 class-by-gender-by-year fixed effects included in the baseline model. The "Alternative model" controls for 460 class-by-gender-by-commuting-zone fixed effects instead of the 210 class-by-gender-by-year fixed effects included in the baseline model. The graphs show the point estimates with 95 % confidence intervals. See also notes to Table 1.

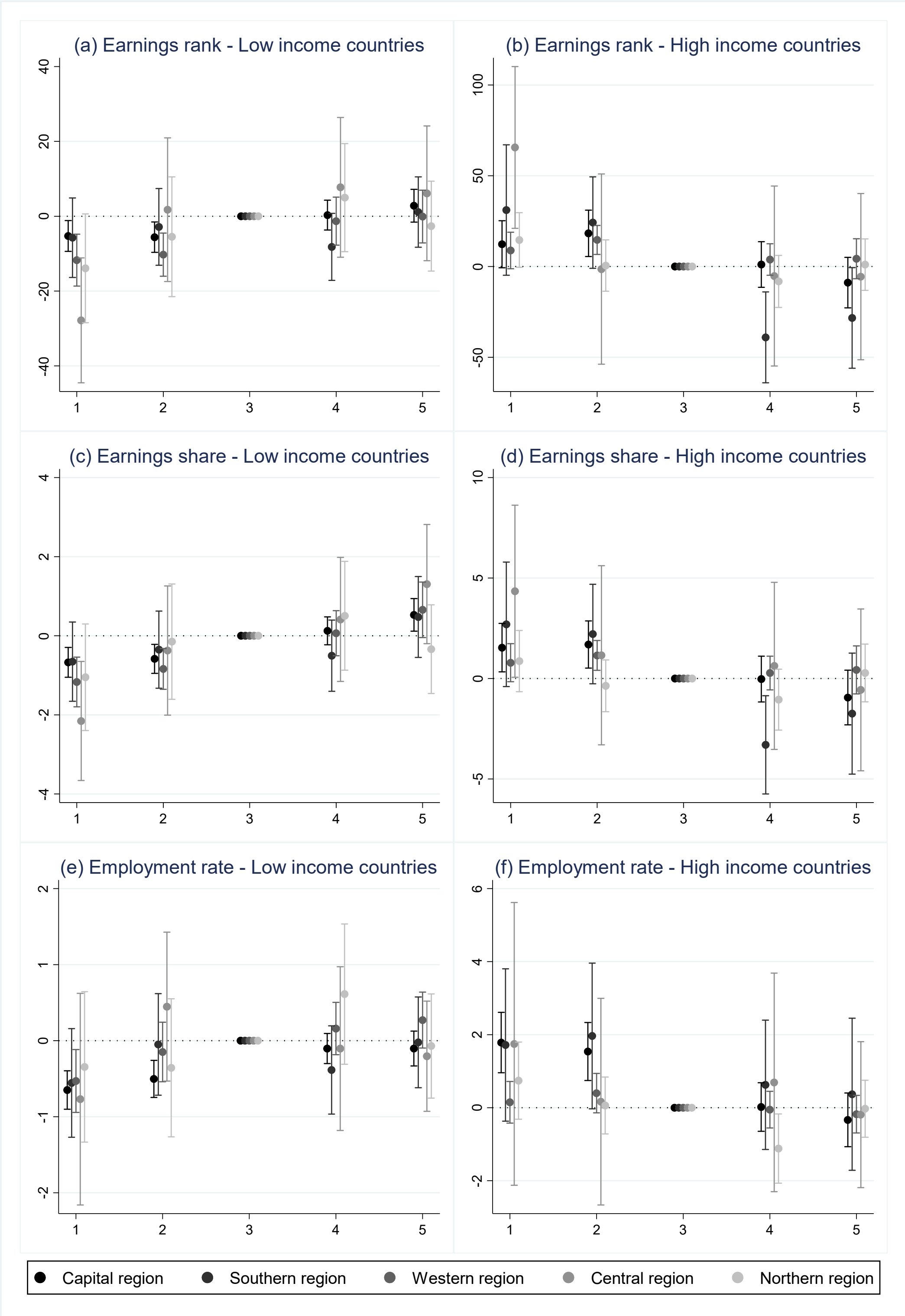

Figure 10. Separate estimation results for each geographical region in Norway. Effects of immigrant shares on native outcomes by class background.

Note: The graphs show the point estimates with 95 % confidence intervals. The numbers of observations (commuting zones) in the various regressions are as follows: The capital region: 451,781 observations (13 commuting zones); the Southern region: 111,269 (6); the Western region 312,065 (12); the Central region: 130,091 (5); and the Northern region: 111,629 (10). See also notes to Table 1.

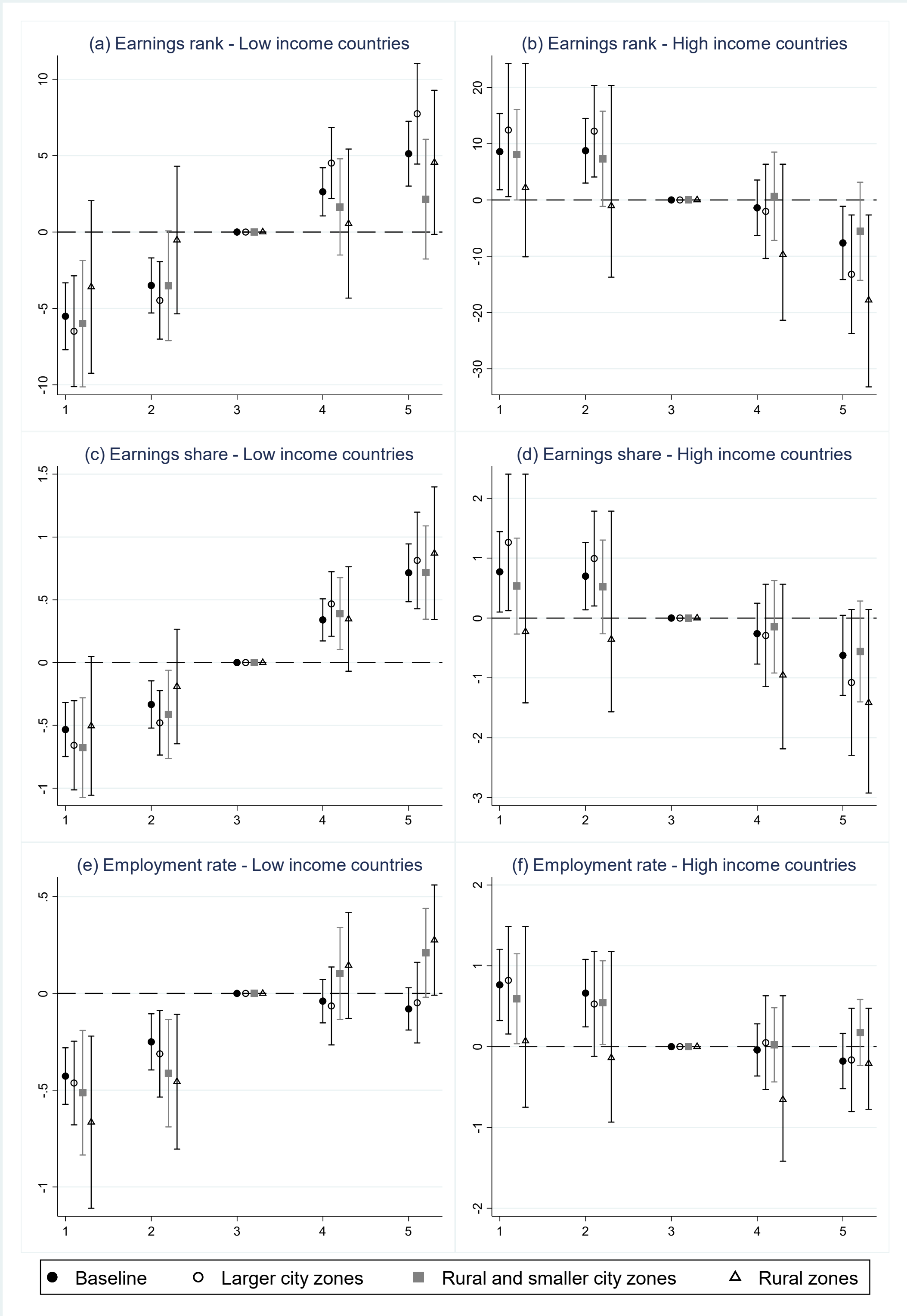

Figure 11. Separate estimation results for larger city zones and rural areas. Effects of immigrant shares on native outcomes by class background

Note: The graphs show the point estimates with 95 % confidence intervals. The numbers of observations (commuting zones) are as follows "Rural and smaller city zones": 623,410 observations (42 commuting zones), "Larger city zones" (4 commuting zones around Oslo, Bergen, Stavanger og Trondheim): 493,425 observations.

5.2 Identification based on models with added class-level controls

As a final robustness analysis, we add into the model a number of class-specific control variables. However, to facilitate such an analysis without losing too much statistical power, instead of interacting the immigration variables with class dummies, we interact them with a scalar variable based on class decile, and thus taking the value from 1 (bottom class) to 10 (top class). This implies that we estimate directly the influence of immigration on the respective class gradients. Before we add any additional control variables, we examine how well this parametric restriction fits the data. Figure 12 plots the results from a non-parametric model with decile-specific (instead of quintile-specific) immigration effects, together with estimates based on linearity. There are two points to be noted from this figure. The first is that substituting deciles for quintiles does not noticeably change the results.[8] The second is that the linearity assumption fits extremely well for the earnings rank and relative earnings outcomes, but appears less appropriate for the employment outcome.

[8] The statistical uncertainty increases considerably though, both because we in the decile model estimate a larger number of immigrant-by-class effects and because we then have to control for twice as many class-related fixed effects (420 class-by-gender-by-year fixed effects in the model exploiting national variation in immigration shares and 2,100 class-by-gender-by-year-by-region fixed effects in the model with within-region variation).

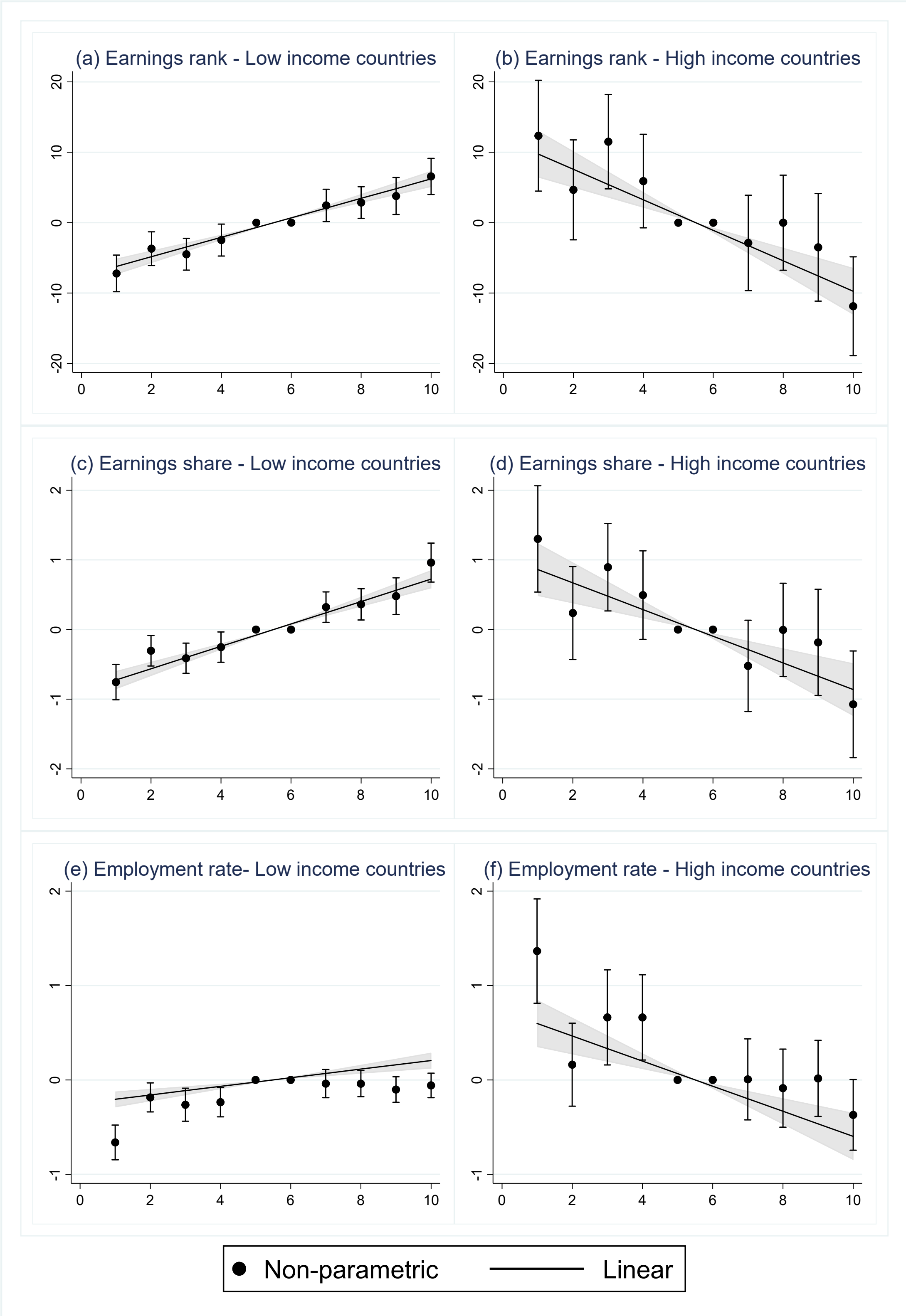

Figure 12. Estimation results based on decile class background, with separate effects for each class (non-parametric) and with effects restricted to follow a linear pattern in class (linear).

Note: The non-parametric model is repeated from Figure 12 (baseline). The linear model is obtained by interacting each of the two immigration variables with a scalar variable indicating class decile. The shaded area indicates the 95 % confidence interval.

Table 2. Estimation results based on a linear-in-decile effects model – effects of immigrant shares at age 32 on native outcomes at age 33-36

	I	II	III
Earnings rank			
Immigration from low income countries interacted with class decile (1-10)	1.38***	1.61***	0.85***
	(0.12)	(0.13)	(0.31)
Immigration from high income countries interacted with class decile (1-10)	-2.17***	-2.35***	-2.17**
	(0.32)	(0.38)	(0.85)
Earnings share			
Immigration from low income countries interacted with class decile (1-10)	0.16***	0.18***	0.05
	(0.01)	(0.01)	(0.03)
Immigration from high income countries interacted with class decile (1-10)	-0.19***	-0.24***	-0.23***
	(0.03)	(0.04)	(0.09)
Employment			
Immigration from low income countries interacted with class decile (1-10)	0.05***	0.05***	0.03
	(0.01)	(0.01)	(0.02)
Immigration from high income countries interacted with class decile (1-10)	-0.13***	-0.13***	-0.08*
	(0.02)	(0.02)	(0.05)
Included control variables			
Class-by-gender-by-year fixed effects	420	420	420
Class-by-gender-by-commuting-zone fixed effects			920
Commuting-zone-by-year-by-gender fixed effects	1,932	1,932	1,932
Economic conditions interacted with class-by-cohort		420	420
N	1,116,835	1,116,835	1,116,835

Note: Economic conditions are measured in the form of two scalar variables recording average earnings and average employment within commuting-zone-by-cohort cells. The regressions are based on Equation (1), with added controls in Columns II and III, but instead of interacting the two immigration variables with class dummies, they are interacted with a scalar variable indicating class decile. See also note to Table 1. Standard errors (clustered at commuting-zone-by-year-cells) are reported in parentheses. */**/*** indicates statistical significance at the 10/5/1 % level.

Table 2 reports the slope coefficients estimated from the linear interaction model. Column I first shows the estimates without added controls (i.e., the slopes in Figure 12). We then include variables that allow overall economic conditions to influence the different classes differently. This is done by interacting cohort-by-class dummy variables with the average earnings level and the average employment rate within each commuting-zone-by-birth-cohort cell. The result of this exercise is shown in Table 2, Column II. As expected, they indicate that the effects of immigration on the social gradients are a bit larger than estimated in the baseline model, reflecting that the economic performance of lower-class people are particularly sensitive with respect to economic fluctuations in combination with business-cycle sensitive immigration. Finally, we add in both class-by-commuting-zone-by-gender fixed effects and class-by-cohort-by-gender fixed effects, thus exploiting the idiosyncratic variation across commuting zones over time only. This specification attenuates some of the causal point estimates and also raises statistical uncertainty considerably. Yet leaves the main conclusions unchanged.

6 Concluding remarks

One of the starting points of this paper was the observation that the social gradients in natives' economic outcomes have become steeper over time, and in particular that the intergenerational mobility out of the lower social classes has declined. We have examined whether this development is attributable to skill-biased changes in labor supply caused by the rise in the number of immigrants from less developed countries and Eastern Europe. As these immigrants have been disproportionally recruited to jobs typically held by lower-class natives, the hypothesis is that they have crowded out lower-class natives in the labor market.

Our findings suggest that immigration patterns have indeed been a major force behind changes in the social gradients in adult economic outcomes for natives born in Norway between 1960 and 1980. While immigration from low-income countries has steepened the social gradients in native employment and earnings outcomes, immigration from high-income countries has levelled them. And since immigration from low-income countries has been much larger than immigration from high-income countries, the net effect of the actual immigration to Norway over the past decades has been to reinforce the influence of family background on economic outcomes and thus to reduce social mobility.

While our empirical analysis cannot say anything about the aggregate effects of recent immigration patterns on native outcomes, it establishes without reasonable doubt that it has skewed relative economic success away from the lower and toward the higher economic classes. Hence, it rationalizes the apparent polarization of sentiments regarding immigrants and immigration policies. To the extent that people's political opinions are influenced by own economic interests, it may explain why the higher classes tend to favor a more liberal immigration policy than the lower classes.

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