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Rewarding experiences?

Immigrant wage returns to host country employment

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Rewarding experiences? Immigrant wage returns to host country employment[a]

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Abstract

We examine the wage returns to host-country work experience among immigrants by reconstructing full employment histories using Swedish pension records and longitudinal matched employer–employee data. Our findings show that: (i) returns to experience are sizable and concave, consistent with standard models, and vary by gender, education, and region of origin; (ii) returns for immigrant workers have risen since the early 2000s; (iii) returns differ across industries and occupations, with experience in high-skill and high-wage workplaces being especially valuable; (iv) returns are generally greater for natives than for immigrants; and (v) potential experience serves as a reasonable proxy at lower experience levels but tends to overstate returns for more experienced workers.

Keywords: experience, wages, immigrants

JEL Codes: J31, J61

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1 Introduction

Theory suggests that labor market experience is a central determinant of worker wages, operating through e.g. human capital accumulation, positive signaling or improved matching. Departing from Mincer (1974), countless empirical studies have documented a concave age-earnings profile as a regularity across contexts and time (Lemieux, 2006; Heckman et al., 2006). As a result, the debate about the economic integration of immigrants often points to the value of acquiring work experience in the new country. The frequently observed long durations until first employment and the unstable labor market positions of many migrants emphasize the difference between years since migration and actual host country work experience. Yet, despite its fundamental role in the functioning of the labor market and the policy relevance for designing measures to improve economic integration, our knowledge on the returns to host country work experiences for the foreign-born remains limited.

We study the wage returns from post-migration employment experiences among immigrants to Sweden over several decades. The empirical analysis uses historical pension records to reconstruct complete employment histories of native and immigrant workers. Population-wide employer-employee data enables us to characterize the type of accumulated work experience and investigate how the value of labor market experience varies across different industries, skill levels, and by workplace and co-worker characteristics. Our analysis also illuminates how the returns to experience vary across groups and how it has developed during decades of demographic and structural change.

The literature suggests several mechanisms through which experience can affect earnings for workers in general. First, working presumably increases human capital either by more or less explicit investments in on-the-job-training or simply through learning-by-doing (see Deming and Silliman, 2024 for an overview). Second, when there are information asymmetries, one's employment record can serve as a signal of productivity and employers can use the hiring willingness of others as an evaluation criterion (Spence, 1973). Third, work experience may improve the efficiency of job search and the worker's ability to find good job matches (Mortensen and Pissarides, 1999). Fourth, spending time at work facilitates the development of networks which have been shown to be particularly valuable in the labor market (Calvó-Armengol and Jackson, 2004; Eliason et al., 2023; Åslund et al., 2024).

Whether the returns to experience would be greater or smaller for immigrants compared to natives depends on several factors (Friedberg, 2000). The human capital accumulation brought by work experience may be more important for immigrants, and the signaling effect of previous jobs can be particularly valuable for groups with limited employment prospects. On the other hand, limitations in country-specific skills (e.g. language) can decrease the wage returns to work experience, as can discriminatory em-

ployers.

In the absence of data on actual experience, the standard approach in the empirical literature is to proxy experience by "age minus schooling minus school-starting age". This implicitly assumes that people start working immediately after completing education, and stay employed. For those having career gaps (e.g. due to parental leave, unemployment, or illness), the approximation works less well. Some studies point out the importance of using actual instead of potential experience, especially for people with weaker labor market attachment (Altonji and Blank, 1999; Antecol and Bedard, 2004; Blau and Kahn, 2013). Regan and Oaxaca (2009) illustrates that analyses based on potential as opposed to actual experience may bias parameter estimates. Also using NLSY data to retrieve measures of actual experience, Ashworth et al. (2021) notes that failure to account for the selectivity of work experiences can affect estimates of the returns to education.[1]

Empirical studies on immigrant labor market assimilation/integration often make a similar assumption, and relate earnings and employment to years-since-migration (YSM). Typically, results suggest substantial but far from complete convergence to native earnings levels and employment rates (Borjas, 2014; Duleep, 2015). For capturing human capital accumulation through work experience, YSM suffers from the same type of measurement error as potential experience in the standard estimation of the Mincer equation. Barth et al. (2012) is an example using historical register data to construct actual employment histories. Eckert et al. (2022) shows that among refugees to Denmark, working in the metropolitan Copenhagen area yields higher returns than work in other regions. Other studies investigating the details of the labor market experiences of immigrants include Eliasson (2014), Arellano-Bover and San (2024), and Gorshkov (2024) on earnings mobility within and across establishments, and Ansala et al. (2021) characterizing entry jobs and future progress.

Labor migration to Sweden surged during the post-WWII economic expansion. From the 1970s, immigration shifted toward refugee and family migration from many parts of the world, making Sweden the biggest per capita refugee host among developed countries (Ruist, 2015; Brell et al., 2020). The result is a diverse immigrant population constituting about 20% of the total. While labor migrants were at least initially economically successful (Hammarstedt, 2000), much concern has in later years been devoted to the lack of labor market integration of refugees and their families (Åslund et al., 2017).

As in many other countries, substantial policy efforts have been made to improve the situation. Work experience programs and targeted employment subsidies are predicated on the notion that acquiring experience is crucial for improving future labor market outcomes. Evaluations support the notion, showing increased chances of regular employment for participants (see e.g. Dahlberg et al. (2024) for recent evidence, and discussions in

[1] A large literature also investigates the role of seniority, tenure and firm-level factors; e.g. Willis (1986), Topel (1991), Abowd et al. (1999) and Dustmann and Meghir (2005).

Arendt et al. (2022)). However, recent experimental evidence indicates that employers do not attach any significant value to labor market experience among immigrant applicants (Adermon and Hensvik, 2022; Ek et al., 2024).[2] While the general wage returns to experience may differ from the impact on employer selection during the hiring process, clarifying the role of experience in shaping economic opportunities appears essential.

We begin by documenting substantial wage returns to experience for the foreign-born, using specifications that incorporate individual fixed effects and allow for fully flexible experience profiles in panel data. An increase from one to five years of host country work experience is associated with an approximate 8 percent increase in wages. Adding five more years of experience increases the expected wage by another 5 percent. The estimated returns to experience are somewhat higher for natives, particularly for individuals with more than five years of experience.

The profile of the semi-parametric estimates exhibits the traditional concave pattern, flattening out after about 25 years. It is well captured by a quartic function for both immigrants and natives. Furthermore, we show that using potential experience from the Swedish labor market serves reasonably well as a proxy at low to intermediate levels of experience, but overstates the returns at higher levels. A possible interpretation is that the difference reflects a pure age component in wage setting, which would show up in the estimates for potential but not in those for actual experience.

Returns to experience can vary by individual characteristics. High-skill workers can benefit more if experience "unlocks" the value of education. Consistent with Dustmann and Meghir (2005), we find that returns are greater among workers with tertiary education compared to less educated workers. Our estimates also show that men have steeper wage profiles than women, which again suggests that rewards are greater for groups with a stronger position. However, we also find that the returns are more pronounced for people born outside Western countries compared to other migrants. While wages are lower on average for these workers, gaining experience seems to be even more important in this group dominated by non-labor migrants often entering the labor market slowly.

The expected impact of technological development and structural change on the importance of experience for wages is ambiguous. On the one hand, more complex and demanding tasks may have increased the relevance of experience in a historical perspective. On the other hand, with skill-biased technological change, experienced workers with less education may find themselves competing for a decreasing number of jobs. Given that job growth has been polarized (see e.g. Acemoglu and Autor (2011) for an overview and Adermon and Gustavsson (2015) for Sweden), it is uncertain to what extent the average returns to experience for immigrants have changed as a result of developments in different sectors and industries. Institutional changes, e.g. in the construction and content of col-

[2]Based on survey data, Tibajev (2023) finds that only Nordic immigrants get any returns on their foreign labor market experience, but estimate significant returns to Swedish labor market experience.

lective agreements (explicit differentiation based on experience), may also have affected the returns to Swedish labor market experience among immigrants. Cross-sectional estimates for the 1985–2018 period suggest two main patterns: (i) returns have been greater for natives than for immigrants, with very few exceptions regardless of point of evaluation and age span; (ii) since year 2000, there has been a positive trend in the returns, and for workers with limited experience this trend has been stronger for immigrants.

In line with previous evidence that the returns to experience may depend on e.g. local labor market size (Roca and Puga, 2017), our analysis provides robust evidence that the nature of work experience significantly influences wage returns. Having worked in workplaces with high average wages and highly educated coworkers yields substantially higher returns than working in low-wage and less-educated establishments. But the immigrant share among the coworkers seems to be unrelated to the value of workplace specific experience. Experience in industries characterized by less standardized and more complex tasks—such as health, public administration, and education—yields higher returns compared to experience in sectors like manufacturing and utilities. Similarly, estimates of occupation-specific returns suggest that occupations specializing in abstract and non-routine cognitive tasks are associated with greater wage returns while occupations specializing in routine manual tasks are associated with lower wage returns.

2 Data and Empirical Strategy

We use pseudonymized longitudinal population data based on administrative records, compiled by Statistics Sweden, held by the Institute for Evaluation of Labour Market and Education Policy (IFAU). The empirical analysis combines information from several data collections spanning different time periods. The main analysis period is 1985–2018, but we use information at the individual level going back to 1960.

There are four major types of data sources. The first type of data builds on population registers providing annual information on individual characteristics such as education, region of birth, migration, gender, and family status. The compilation also includes tax-based measures of annual earnings. The second type of data is matched employer-employee records, making it possible to link workers to their employers and to their coworkers. This information is used to characterize different types of experience based on workplace characteristics (e.g. average earnings). The third source are individual records on accumulated "pension points" based on earnings records (see below), which we use to construct a measure of experience. The data start from 1960, allowing us to track the full employment history of individuals who were born in or after 1944 (assuming labor market entry at age 16 at the earliest).

The fourth source contains our main outcome variable; monthly full-time contracted wages, available in the wage structure statistics (WSS) for all public sector employees

and about 50 percent of those working in the private sector. The private sector sample is stratified by firm size and includes a greater share of large firms. We us the data as-is in the main analysis and apply the sampling weights in a robustness check.[3] We also have access to tax register data on annual earnings per employer for the entire working-age population. This is used to generate alternative outcome measures as well as in the characterization of workplaces.

We construct two working samples. One adds experience based on pension points to an unbalanced 1985–2018 panel including individuals regardless of year of immigration. This sample is used in the baseline analysis and referred to as the pension-based panel. The other sample follows people from the year of immigration (1985 at the earliest) and onward. This dataset uses experience based on the matched employer-employee data; we can thus separate between different types of work experience. We refer to it as the MEE panel.

2.1 The pension-based panel

Workers in Sweden can acquire pension points based on annual pensionable income from age 16. An individual earns pension points in a given year if the pensionable income is above one price basic amount[4]. The annually acquired points increase with the pensionable income up to 6.5 points. We assume an individual obtains one year of experience if he or she has a positive amount of pension points in the given year. This way of considering annual work experience as 0/1 (i.e. not dependent on the level of earnings above the threshold) is in line with the basic Mincer model.

Pension points data start in 1960, implying an age restriction varying by observation year for full employment histories (from age 16). For example, in 1985 we can observe the full employment history of individuals if they are at most 41 years old. Naturally, this threshold increases one for each year allowing us to include more age groups in later years. When we analyze how returns to experience have developed over time, we therefore use three age groups for different time periods: 20–41 for 1985 and onward, 20–51 for 1995 and onward, and 20–61 for 2005 and onward.

The age restriction is only necessary for natives because we can observe the full host-country work history of an immigrant as long as their immigration year is in or after 1960 regardless of their age/birth year. However, in order to have a comparable sample

[3]One could argue that it would be appropriate to apply the sampling weights in the main analysis. However, it is not obvious how to define the appropriate sampling weight when an individual is observed multiple times and the analysis hinges on longitudinal variation. Also, there is a risk of inflating the estimates assigning much weight to very small firms where wage data potentially contains more noise.

[4]The Price Basic Amount (formerly known as the Basic Amount) is determined based on changes in the general price level, as outlined in the National Insurance Act (1962:381). In accordance with the relevant regulations, it is adjusted based on changes in the Consumer Price Index and rounded to the nearest SEK 100. For reference, in 2023, the Price Basic Amount was SEK 52 500, while the average monthly wage was SEK 39 900. (Source: SCB)

between the two groups we use the same age restriction for immigrants in our estimates. We also restrict the sample to immigrants whose age at arrival is 20 or older. The reason is to have a meaningful "years since migration" variable expected to capture potential host country labor market experience. For natives, potential experience is defined as $age - education - 6$. To make sure that potential experience is non-decreasing, we adjust the measure based on "jumps" in the reported years of education (assuming that the individual was in school during the preceding period corresponding to the jump).

We use 10% of natives in the analysis sample. The sample is constructed such that each native has an equal probability to be included in the draw regardless of the number of years during which they were observed in the data. Once an individual is drawn, all of their longitudinal information included in the sample.

Summary statistics for main variables are shown in Table 1. The immigrant-native difference in raw wages increased between 1985 and 2018. Although the groups do not differ much in years of schooling at any point in time, there is a relatively greater increase in the educational polarization of the immigrant population. The gap between potential and actual experience is as expected greater for immigrants, for whom years since migration constitute the more relevant benchmark potential for work history in Sweden. The country of origin composition has shifted from Nordic and other Western countries to a greater presence from other parts of the world. Note that inclusion in the sample is conditional on observing a wage and thus on employment; the distribution by region of origin can differ from the overall immigrant population.

Table 1: Summary Statistics (Pension-based Panel)

	1985-2018		1985		2018	
	Natives mean	Immigrants mean	Natives mean	Immigrants mean	Natives mean	Immigrants mean
Monthly wages (2018)	29452.5	27764.2	19141.3	18844.5	36222.8	32973.6
Log wage	9.891	9.841	9.893	9.841	9.890	9.840
Years of education	12.60	12.68	11.62	11.87	13.20	13.21
Level of education						
Elementary School	0.102	0.158	0.212	0.189	0.0509	0.117
High School	0.463	0.377	0.506	0.499	0.431	0.329
College	0.435	0.465	0.282	0.312	0.518	0.554
Age	42.83	45.02	35.11	37.83	43.47	44.91
Potential exp.	24.23	26.61	17.43	20.61	24.28	25.94
Actual exp.	21.78	14.32	13.70	11.07	22.55	12.36
Male	0.434	0.434	0.476	0.431	0.433	0.439
Log income	12.43	12.38	11.42	11.38	12.81	12.72
Years since migration		16.20		12.03		15.07
Region of origin						
Nordic countries		0.224		0.483		0.0713
The West		0.121		0.179		0.120
East Europe		0.265		0.188		0.272
North Africa and the Middle East		0.169		0.0531		0.241
Sub-Saharan Africa		0.0639		0.0155		0.107
Asia and Oceania		0.0864		0.0306		0.131
Latin America		0.0692		0.0509		0.0560
Unknown		0.000373		0.000145		0.000670
Observations	5357804	4328503	74603	34657	186975	262849

Notes: In the first column, the native sample is reweighted so that its distribution of observation years matches that of immigrants in 1985–2018, ensuring that pooled summary statistics are comparable across groups rather than reflecting differences in calendar-year composition.

2.2 The MEE panel

The sample includes individuals who immigrated in 1985 or later and were employed at any time from 1985 to 2018. We combine information from individual employment records and annual background information with establishment level information on industry affiliation and workplace size. Population-wide data linking employees to establishments also allows us to characterize work environments in terms of average earnings, level of

education, and immigrant concentration.

Since one person can be employed in more than one firm/establishment in a given year, we identify 'main employment' of individuals based on a three stage-rule. First, if an individual is employed in November in only one establishment we define this establishment as the main employer. Second, if an individual is employed in more than one establishment in November, we define the establishment from which the individual earned the highest income in November as the main employment. Finally, if an individual is not employed in November, we define the establishment from which the individual earned the highest income in a given year as the main employment. Using criteria based on November earnings is in line with measures used by Statistics Sweden for annual employment statistics. We define workplace characteristics based on the main employees in each establishment. Each year of having your main employment in a given type of establishment generates one year of experience of that type.

Similarly to the pension-based analysis, we define an individual as employed (and thus gaining experience) if earnings from the main employment are more than 1 price basic amount. In order to be able to track the full work history of immigrants we restrict our sample to people whose year of immigration is 1985 or afterwards. This translates into a work experience ceiling at 33 years. We limit our sample to individuals from age 20 to 64 and exclude the first year in the labor market.

In order to define work experience based on the wage characteristics of the firms, we calculate the average monthly earnings at a firm using the matched sample.[5] Then we classify firms as high or low-wage firms if the average monthly earnings is above or below the median. Similarly, we calculate the average years of education in a given firm based on the matched sample and classify firms as high, medium or low-education firms if the average education corresponds to the 1st, 2nd, or 3rd tertile of the distribution. Finally, using a similar approach, we calculate the distribution of immigrant ratios at firms and classify firms as high (above median) and low (below median) immigrant ratios. We also define work experience by industries using nine categories and occupations using nine categories.[6] We construct occupational measures using information from the Wage Structure Statistics (WSS). Since WSS is based on a sample of establishments, there may be interruptions in individuals' occupational histories for years when their employer is not included in the sample. An alternative source is the occupation register (Yrkesregistret), which provides more detailed occupational data and imputes missing information for certain years. However, this dataset is only available from 2001 onwards. For con-

[5]This is done after matching each individual to one firm. Even if an individual is employed in more than one firm in a given year, only the main employment source of earnings is used in the calculation. See above for the definition of main employment.

[6]Industry classification is based on groupings of industries according to NACE Rev. 1.1. The subcategories are listed in Table A.1. Occupation categories correspond to the 1-digit level of ISCO-88. The subcategories are provided in Table A.2.

sistency over time, we rely on WSS in our main analysis but also present results using Yrkesregistret for the post-2001 period and compare the two sources over the overlapping years.

Summary statistics for the matched panel data are given in Table 2. Note that the classifications of experience are only mutually exclusive within categories (one year can, e.g., provide low-wage, medium education and manufacturing experience). On average, experience is roughly equally distributed by firm wage and education level, but more concentrated to immigrant dense workplaces. Manufacturing, health and trade constitute substantial parts of the experiences. The levels of experience by occupations are lower due to the sample data, but suggest that the immigrant workers have experience from most types of occupations although less so from managerial positions.

2.3 Conceptual and empirical approach

Before describing the empirical specifications, we will briefly discuss a few conceptual issues. First, we focus on the intensive margin wage impact of gaining work experience, i.e. we do not consider potential associations with employment probabilities. This urges some caution when comparing estimates across groups, since extensive margin associations can differ. Note, though, that the use of individual fixed effects means that we remove any average outcome variation across workers and ask whether the wage of a given individual is related to her experience.

Second, we consider only the value of host country experience (apart from the fixed effect approach allowing foreign experience and other unobserved characteristics to affect entry wages) and thus implicitly assume that the marginal value of one year of work in Sweden is independent of your pre-arrival employment history. This issue is also related to a fundamental problem in comparing natives and immigrants in case there are interaction effects between worker age and the marginal value of experience. Consider, e.g., an immigrant arriving at age 30 who by definition has zero Swedish work experience. Natives with no work experience at that age would obviously be a highly selected group. It is hard to circumvent this issue. Setting Swedish experience to zero in an age-matched native control group would assume that prior experience is similar and as valuable independent of where it was gained, which goes against previous evidence suggesting zero or very small returns to pre-migration experience (see discussion in Tibajev (2023)). One could also consider studying immigrants arriving prior to expected labor market entry. However, the primary interest arguably concerns the wage determinants for people arriving as adults and potentially entering the labor market immediately.[7]

[7]One could argue that not only Swedish potential experience should be relevant for immigrants. However, two factors make interpretation of such a specification difficult. First, if the relevant dimension is actually years since migration, the individual fixed effects will make us overestimate the returns at higher values of potential experience. Second, since immigrants in the sample are at least 20 years old

Table 2: Summary Statistics (Immigrants)

	mean	sd
Monthly wages (2018)	29323.5	14387.7
Log wage	10.12	0.381
Log income	12.35	0.634
Actual exp.	7.339	5.865
Potential exp.	23.39	9.607
Age	41.71	9.208
Years since migration	11.34	7.280
Years of education	12.60	2.870
Experience by workplace characteristics		
Low wage firms	3.430	4.043
High wage firms	3.475	4.845
Low education firms	2.404	3.633
Medium education firms	2.228	3.500
High education firms	2.273	4.122
Low immigrant share firms	1.409	2.994
High immigrant share firms	5.496	5.180
Experience by industry		
Primary	0.0607	0.625
Manufacturing	1.480	3.732
Construction	0.236	1.289
Utilities and telecom	0.479	2.026
Wholesale and retail	1.208	2.932
Business services	1.128	2.712
Health, social work	1.756	3.810
Education	0.644	2.262
Public administration	0.192	1.137
Experience by occupations		
Managers	0.0476	0.504
Professionals	0.680	2.273
Technicians/Assoc.	0.374	1.591
Clerical Support	0.158	0.988
Service/Sales	0.791	2.404
Agriculture/Forestry	0.00794	0.210
Crafts/Trades	0.107	0.760
Operators/Assemblers	0.392	1.691
Elementary Occup.	0.454	1.747
Observations	5816253	

Notes: This table reports summary statistics for immigrants observed in 1985–2018. Experience measures are cumulative years across relevant firm or industry types. High/low wage/immigrant share firms indicate above or below median national average by year; education classification are by tertile per year.

Third, the baseline setup implicitly assumes that there is no independent association between age and wages. For most workers, age and experience go hand in hand, i.e. increase by one for each additional calendar year. In an individual fixed effect setting, identification of separate parameters is only available for workers with "gaps". This means that the stronger the labor market position of the group, the more selected the identifying sample would be. Since we consider the benefits of controlling for permanent individual factors important, we will focus on specifications including individual fixed effects.

We employ two types of specifications that relate wages to labor market experience, both flexible variations of Mincer (1974) regressions. First, we estimate specifications including a quartic in labor market experience (following Murphy and Welch (1990) and Lemieux (2006)), according to:

$$y_{it} = \beta_1 exp_{it} + \beta_2 exp_{it}^2 + \beta_3 exp_{it}^3 + \beta_4 exp_{it}^4 + X_{it}'\theta + \mu_i + \epsilon_{it} \tag{1}$$

The outcome variable y_{it} is a calendar-time adjusted log wage, constructed to remove year-specific wage level differences while preserving a meaningful and interpretable wage scale across the sample period. For each group (natives and immigrants), we divide the individual log wage by the average log wage in the same calendar year and then rescale the result by a common average of yearly log wage means. This adjustment is made to ensure comparability across cohorts and over time, while preventing distortions from varying sample sizes in different years.[8] μ_i are individual fixed effects, capturing all permanent observed and unobserved components. X_{it} includes dummies for level of education. The main analysis uses actual experience calculated according to the criteria described above. For comparison, we will also present estimates based on potential experience ("age minus education minus school starting age" or years since migration).

We also estimate a semi-parametric version based on dummies for each year of experience, thus allowing full flexibility in the earnings profiles:

$$y_{it} = \sum_{k=2}^{40} \beta_k * 1\{experience = k\} + X_{it}'\theta + \mu_i + \epsilon_{it} \tag{2}$$

For the pension-based panel, we estimate the wage-experience profile using specifications 1 and 2. We also estimate the development of returns to experience over calendar time, primarily using cross-sectional data but also 5-year panels including two years be-

at arrival, we will observe very few people with low values of years since leaving school in the age ranges typically seen for compulsory and secondary education. Furthermore, the combined restrictions also mean that low levels of potential experience will be limited to individuals who either migrate shortly after completing education, or complete schooling in Sweden after arriving as an adult. All in all, this raises concerns about sample selection and composition.

[8]Compared to the more common additive transformation (e.g., subtracting year-specific means), this multiplicative normalization avoids shifting the scale below zero and preserves the interpretation of wage levels. This is particularly useful for visualizing and comparing long-run wage trajectories across cohorts. The full construction and formula are provided in Appendix A.1.1.

fore and after each corresponding year. For the matched employer-employee sample, we estimate versions of specification 1 using different types of experience (see discussion above), including their polynomials up to the fourth degree. When we do not show the full estimated profiles, we present marginal effects evaluated at 5 and 10 years of experience, which are calculated as the derivatives of the fourth-order polynomial evaluated at 5 and 10 years of experience, respectively.

3 Results

We begin by presenting baseline results for wage-experience profiles, comparing also the estimated returns to actual vs potential experience and investigate heterogeneity by gender, education, and region of birth. Then we discuss the calendar time development of the experience premium before turning to the potentially differential value of different types of labor market experience.

3.1 The wage-experience profile

Figure 1 illustrates the estimated returns to experience for natives and immigrants for the period 1985-2018. Returns to one year of experience are normalized to zero. The specification includes individual fixed effects and covariates as described above. There are three sets of estimates for each group: (i) the Quartic specification including a fourth-order polynomial for experience; (ii) the Semi-parametric specification including dummy variables for each year of experience; (iii) Potential experience from the Swedish labor market, defined as years since migration for immigrants and as years since completing schooling for natives.

All specifications suggest that experience from the host country increases immigrant wages. Five and ten years of experience are associated with about 8 and 15 percent higher wages, respectively, relative to the expected level at one year of experience. However, estimated returns are considerably greater for natives: about 9 and 20 percent after with the same comparison after 5 and 10 years. The profile also highlights that the wage is expected to peak after 32 years of experience for immigrants, compared to 29 years for natives. It is notable that the quartic and semi-parametric estimates align very closely. The fact that the profiles are smooth and concave also suggests that the typical Mincer model assuming a quadratic experience profile appears to be close to (the Swedish) reality. When we below present results for marginal returns evaluated at 5 and 10 years of experience, these will be based on the quartic specification.

As noted in the introduction, there is evidence suggesting that using potential instead of actual experience may introduce a bias in estimates of the returns to experience, particularly for groups with lower labor market attachment. Antecol and Bedard (2004)

find that using actual experience, instead of potential experience, reduces the proportion of the Black-White and Mexican-White wage gaps attributed to educational differences. Similarly, Blau and Kahn (2013) show that returns to actual experience are larger than the returns to potential experience for women while the returns are more comparable for men.[9] In our setting, the results presented in Figure 1 suggests that estimated returns to potential and actual experience are quite similar at low to moderate levels of experience, whereas the profiles diverge at higher values of experience. A possible interpretation is that while employers do not measure or assign additional value to more actual experience beyond a certain point, labor market institutions such as collective agreements may be such that increasing age (equivalent to potential experience in the fixed effects specification) still yields returns.

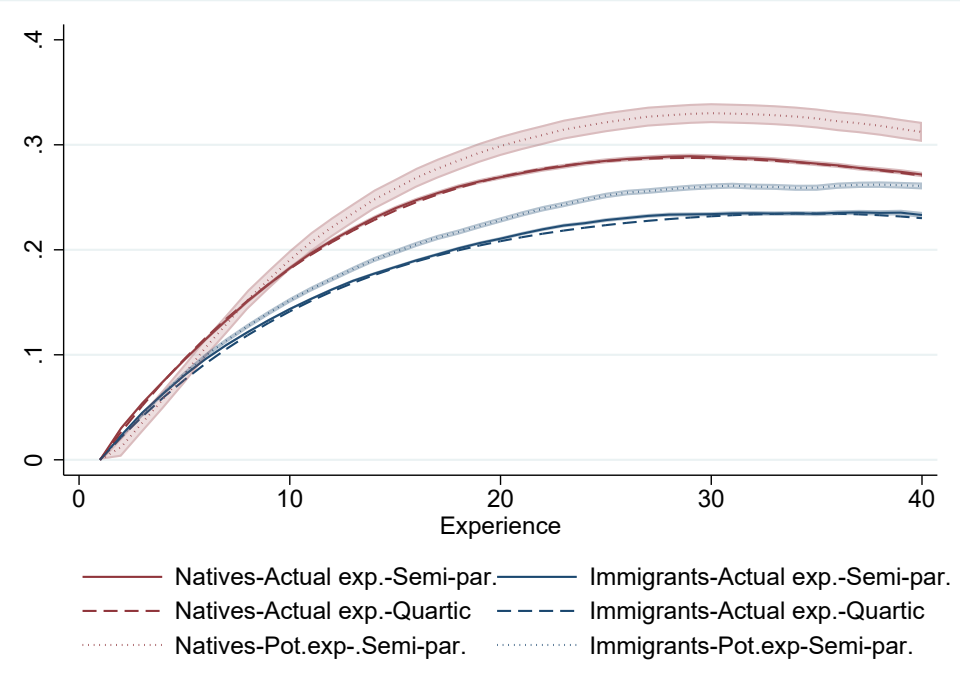

Figure 1: Wage-Experience Profile (Panel)

Notes: The graph shows the returns to actual and potential experience for each year of experience relative to one year of experience using pension-based panel. For natives, potential experience is defined as age-schooling-6; for immigrants, potential experience is years since migration. The Quartic specification includes experience up to the 4th polynomial. The semi-parametric specification includes a dummy variable for each year of experience. All specifications include education dummies and individual fixed effects. The sample is restricted to people between 20–64 years old. Individuals whose earnings are less than 1 price base amount and individuals who are in their first year in the labor market are excluded from the sample. The dependent variable is the adjusted log wage. Shaded areas show the 95% confidence intervals for semi-parametric estimations.

[9]Braga (2018) shows that potential experience also produces biased estimates for highly educated workers, who have stronger labor market attachment.

3.1.1 Robustness: Annual earnings and weighting

As discussed in section 2, the focus on intensive margin associations motivates the use of contracted monthly wages in the baseline analysis. However, the private sector wage data are only available for a sample of workers (about 50 percent of the workforce). Furthermore, previous work suggests that the probability of not being included in the wage data despite positive earnings from labor tends to be higher among marginal workers (Åslund and Engdahl, 2019). This motivates checking the sensitivity of the findings to using instead annual earnings as the outcome (available for all workers regardless of sector) or applying sampling weights to the contracted wage data.

Estimating the same specifications as in Figure 1 for annual earnings yields qualitatively similar profiles (Figure A.1) as for wages, but with some notable differences. First, the profile peaks sooner which is in line with hours decreases at higher ages. Second, the immigrant-native differences in the estimates for actual experience are less clear with the alternative outcome. Third, there is a remarkably (implausibly) steep potential experience profile for natives in the first few years. This is arguably driven by people working to a limited extent, e.g. while still in education, and gradually moving into full-time employment making the earnings differences large.

The distribution of firm size in the data is highly skewed: the median firm has 4 employees, while the mean exceeds 15, and 40% of firms account for 90% of total employment. This reflects a labor market structure in which most firms are small, but a relatively small share of large firms employs the majority of workers. The private sector wage sample used in the main analysis is stratified to include an overrepresentation of large firms relative to their prevalence in the firm population. To account for this, we re-estimate our models using survey weights. Figure A.2 suggests somewhat greater immigrant-native differences in the returns compared to the unweighted estimates. The long-term level for immigrants decreases while it increases for the native workers. Thus, assigning a greater weight to smaller firms have a differential impact on the two groups. A possible interpretation is that career mobility across firm types varies between the groups and that the small firms employing migrants differ from those employing natives.

The basic empirical similarities seen in the sensitivity analyses add to the conceptual arguments for studying the contracted monthly wages. We will therefore focus on this outcome in the remainder of the paper.

3.1.2 Heterogeneity: gender, education, and region of origin

The literature on gender differences in the labor market in the immigrant population highlights the low labor force participation of immigrant women and suggests that cultural norms play a role in labor market assimilation. For example, women from countries with low female labor force participation tend to have lower participation rates, but

they gradually converge towards the employment rates of native women (Neuman, 2018; Grönlund and Fairbrother, 2022). We find that men, both natives and immigrants, have higher returns to experience compared to women (Figure A.3). Additionally, the disparity in returns to experience between women and men is more pronounced among natives than among immigrants. Furthermore, immigrant women have a steeper wage-experience profile compared to native women.[10] This could suggest that immigrant women in Sweden are positively selected based on their pre-migration work experience, as documented by Tibajev and Nygård (2023).

Our analysis also suggests that for both natives and immigrants, college graduates have the highest returns to experience (Figure A.4). There are also differences between high school and elementary school graduates. Interestingly, immigrants with elementary school education have higher estimated returns to experience compared to natives with the same level of education.

Finally, we find that the estimated returns to experience vary by broad birth region (Figure A.5).[11] The results suggest that immigrants from western countries have lower returns to experience compared to immigrants from other countries. A somewhat speculative interpretation is that the economic migrants making up the majority of the Western group are able to enter at a relatively good position, whereas the predominantly humanitarian and family migrants in the "Other" category gradually gain from their Swedish labor market experience but from a low starting level.

3.2 The development of the returns to experience

Figure 2 illustrates how the wage returns to experience for natives and immigrants has varied from 1985 to 2018. We present marginal effects calculated at 5 and 10 years of experience based on estimations using the quartic polynomial specification using annual cross-sections. In the first years, we can only observe the full employment history (using the pension point data) for relatively young individuals. To cover as many years as possible, and to address the concern that (implicit) age restrictions can affect the estimates, we present results for three different age intervals for native and immigrant workers respectively.

The results consistently suggest that the wage returns have been positive for immigrants and natives in all age groups throughout the period, and in most cases substantially

[10] By contrast, Dustmann and Schmidt (2001) find a steeper wage profile for native women and a flat profile for immigrant women. Comparability may, however, be limited due to differences in the data. Their study focuses on Germany 1984–1995 and uses a self-reported initial experience measure.

[11] "West" includes Finland, Denmark, Norway, Iceland, UK, Ireland, Germany, Greece, Italy, Malta, Monaco, Portugal, San Marino, Spain, Vatican, Andorra, Belgium, France, Liechtenstein, Luxembourg, Netherlands, Switzerland, Austria, Canada, USA, Australia, Fiji, Kiribati, Micronesia, Nauru, New Zealand, Palau, Papua New Guinea, Solomon Islands, Tonga, Vanuatu, (Western) Samoa. "Other" includes all other countries.

higher among workers born in Sweden. Evaluated at ten years of experience, the marginal return exhibits a positive trend since year 2000. At 5 years, we see a similar trend for immigrants but none for natives.

The drop in the 5-year estimates for natives after 1990 coincides with the onset of a severe recession with rapidly increasing unemployment. A somewhat similar (but less clear) decline can be found in connection with the 2009 financial crisis. A possible interpretation is that in busts the baseline wage increases for ongoing employment spells (which are standard in the Swedish context) as well as the opportunities for rewards to experience if seeking other positions are limited. It is of course also possible that there is differential selection in the sense that low-wage inexperienced workers lose their jobs more often in recessions (recall that the data on contracted wages are by definition conditional on having a job). For immigrants, the large refugee/immigrant inflows during the early 1990s (and delayed labor market entry of people arriving in the preceding years) may affect the composition as well as the variation in the estimated returns. We therefore urge caution when interpreting the short-term dynamics.[12]

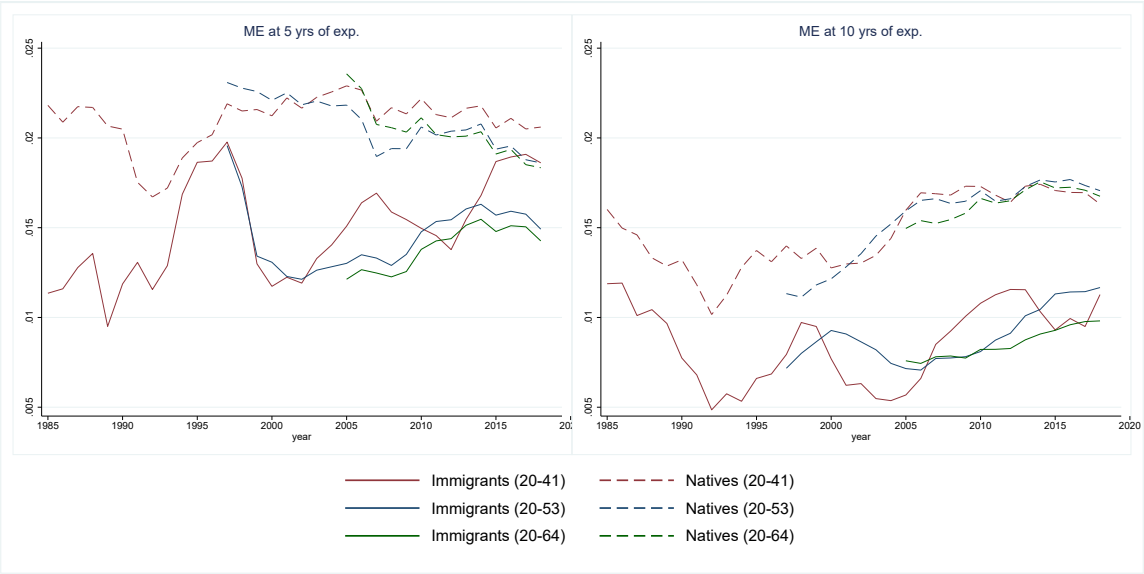

Figure 2: Returns to experience over time

Notes: The graph shows the returns to experience over time for the years 1985–2018 using pension-based panel. Marginal effects are calculated at 5 and 10 years of experience based on cross-sectional estimations where the experience is included up to the 4th polynomial. Cross-sectional estimates for each calendar year. In the estimations, three different age groups are used based on the data availability to track the full employment history of workers. Individuals whose earnings are less than 1 price base amount and individuals who are in their first year in the labor market are excluded from the sample. The dependent variable is the adjusted log wage.

[12]Figure A.6 presents estimates using panel variation for 5-year windows. These are more volatile than the cross-section estimates and differ less between immigrants and natives.

3.3 Is some experience more valuable than other?

In this section, we explore whether some types of experience yield greater wage returns than others. The analysis separates the experience-generating workplaces by average wages, level of education, and immigrant density. Furthermore, we investigate heterogeneity across industries and occupations. Our primary specification is as follows:

$$y_{it} = \sum_{j=1}^{k} \left(\beta_{1j}\text{exp\_type}_{j,it} + \beta_{2j}\text{exp\_type}^2_{j,it} + \beta_{3j}\text{exp\_type}^3_{j,it} + \beta_{4j}\text{exp\_type}^4_{j,it}\right) + X'_{it}\theta + \mu_i + \epsilon_{it}, \tag{3}$$

where y_{it} is the index log wage, exp_type from 1 to k indicates the experience gained in specific workplaces, industries, or occupations. The value of k represents the number of categories in each specification: for workplaces classified by wage and immigrant share, we use two categories; for workplaces classified by education level of workers, three; for industries, eight; and for occupations, ten. X_{it} includes education dummies as well as an indicator variable for the current workplace type, industry, or occupation.

3.3.1 Experience by workplace characteristics

Table 3 presents results from analyses using firm type experience measures constructed from matched employer-employee data from 1985 to 2018. We estimate equation 3 to explore varying returns to experience across types of workplaces characterized by wage levels, education levels and foreign background of their workers.

Conditional on the type of the current workplace, results suggest that the wage returns for immigrants are almost three times greater to experience at high-wage firms compared to low-wage firms. Having worked in an environment with highly educated colleagues also has a much higher wage impact relative to experience from lesser educated workplaces. However, the immigrant density of the workplace does not seem to be related to the value of experience. Performing the same analysis for a sample of natives confirms the qualitative differences in the returns seen for immigrants (Table A.4), although the polarization in returns appear even stronger for native workers. Note that the sometimes lower estimates for all types of experience compared to the the baseline overall estimates can be due to the fact that the type-specific estimates control for type of the contemporary workplace, and that mobility into better employers is a potential mechanism for the impact of experience.

Table 3: **Returns to experience by firm type – immigrants**

	ME at 5 yrs of exp.	ME at 10 yrs of exp.
Experience (any)	0.0133***	0.0068***
	(0.0001)	(0.0001)
Exp. at low wage firm	0.0046***	0.0022***
	(0.0001)	(0.0001)
Exp. at high wage firm	0.0124***	0.0072***
	(0.0001)	(0.0001)
Exp. at low educ. firm	0.0027***	-0.0020***
	(0.0002)	(0.0002)
Exp. at medium educ. firm	0.0048***	0.0007***
	(0.0001)	(0.0002)
Exp. at high educ. firm	0.0158***	0.0111***
	(0.0001)	(0.0001)
Exp. at low imm. ratio firm	0.0095***	0.0053***
	(0.0002)	(0.0002)
Exp. at high imm. ratio firm	0.0100***	0.0043***
	(0.0001)	(0.0001)

Notes: The table presents estimates of immigrant wage returns to different types of experience by firm type, using 1985–2018 MEE panel data. Marginal effects at 5 and 10 years of experience are calculated as the derivative of the fourth-order polynomial, evaluated at 5 and 10 years of experience, respectively. A low (high) wage firm is defined as having average monthly earnings below (above) the median of the distribution of average monthly earnings across firms in the sample. High, medium, and low education firms correspond to the 1st, 2nd, and 3rd tertiles of the distribution of average years of education across firms in the sample. A firm is classified as having a high (low) immigrant ratio if the proportion of immigrants in the firm exceeds (falls below) the median of the distribution of immigrant ratios across firms in the sample. Estimates are conditional on other type(s) of experience within each group and the current firm type. The dependent variable is the adjusted log wage. Education and individual fixed effects are included.

3.3.2 Experience by industry and occupation

The left-hand panel in Figure 3 shows the marginal effect of an additional year of experience for different industries. A first observation is that there is an experience premium in essentially all industries at both 5 and 10 years, and in many cases of similar magnitude. However, we also see that experience from industries containing a large share of routine jobs[13] tends to yield lower returns, e.g. manufacturing and utilities. Returns are greater from experience generated in business services, public administration, health and social work, and education, where one can suspect that learning-on-the-job plays a bigger role for future individual careers. A similar argument can apply to the construction industry, which stands out as particularly rewarding for experienced workers. One can also

[13]While all industries contain a diverse pool of occupations, the data suggest that jobs requiring higher education are more common in e.g. education, public administration, and business service, whereas primary, manufacturing, construction and utilities exhibit a greater presence of jobs with lower formal requirements.

note that the estimated returns within industries are typically smaller or on par with the average returns reported above. A possible reason is that the average returns also capture the gains from moving into high-wage industries (a mechanism for the value of experience, cf. above), whereas the within-industry estimations control for the current industry.

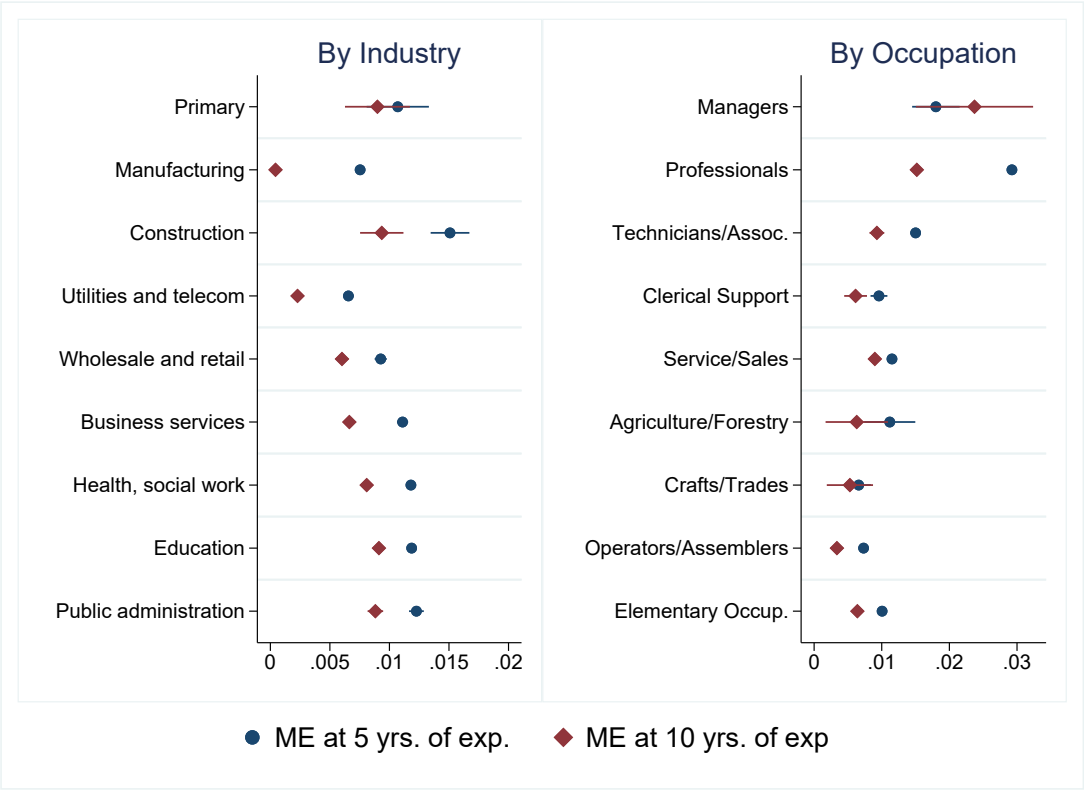

Figure 3: Returns to experience by industry and occupation – immigrants

Notes: The estimates show immigrants' wage returns to experience across different industries and occupations, using MEE panel data from 1985 (for occupation, 1995) to 2018. Marginal effects at 5 and 10 years of experience are calculated as the derivative of the fourth-order polynomial, evaluated at 5 and 10 years of experience, respectively. Industry classification is based on NACE Rev. 1.1 groupings, while occupation categories correspond to the 1-digit level of ISCO-88. Estimates are conditional on current industry or occupation and experience in other industries or occupations. Controls include education and individual fixed effects.

The right-hand panel in Figure 3 shows substantial differences in the returns to experience by broad groups of occupations.[14] Returns are particularly high for professionals, but also in for managers and technicians typically requiring higher education and specialized in abstract, non-routine cognitive tasks. The craft and operative occupations which are specialized in routine manual tasks have the lowest returns. Grouping instead occupations directly on the required skill level gives a similar message (Table A.3). According

[14] As explained in Section 2, occupation-specific experience is based on wage structure statistics, which may include gaps in occupational history due to sample coverage. Figure A.8 (for immigrants) and Figure A.9 (for natives) shows that results are similar when using the population-wide occupation register available for 2001-2018.

to the estimates, an additional year of experience in a low-skill occupation (level 1) for an individual with 5 years of experience in this occupation is 0.4% while an additional year of experience in a high-skill occupation (level 4) for an individual with 5 years of experience in this occupation is 1.88%. The general pattern of differential returns by industry/occupation is similar for immigrants and natives (see Figure A.7 for native estimates). However, the association between skill content and the returns to experience appears to be even more stable in the latter group. Also in line with the stronger polarization in returns noted above, for some occupation categories the estimated returns are zero or even negative.[15]

4 Conclusions and discussion

This study investigates the wage returns to actual labor market experience for immigrant and native workers, using unique longitudinal data from Sweden that allow us to construct detailed employment histories. Our analysis uncovers several important findings. First, we document substantial wage returns to host-country experience among immigrants, though these returns are consistently lower than those observed for native workers. Consistent with basic human capital theory, the marginal returns are decreasing, which results in a concave wage profile plateauing after approximately 25 years. Second, significant heterogeneity exists across demographic and socioeconomic groups: men, tertiary-educated workers exhibit steeper wage profiles. The same is true for immigrants from non-Western countries (compared to Western migrants), albeit from a lower base. Third, since the year 2000, there appears to be a positive trend in the long-run returns to experience.

The results also reveal that the type of work experience significantly influences wage outcomes. Experience gained in high-wage workplaces with educated coworkers and in industries characterized by less standardized, more complex tasks generates higher returns. Conversely, experience in routine-intensive or low-wage environments yields relatively modest returns, emphasizing the importance of qualitative aspects of work history in shaping economic outcomes.

These findings have important implications for both research and policy. The reliance on proxy measures of experience, such as age minus years of schooling, risks overstating returns at higher levels of experience and underestimating differences among workers with irregular labor market attachment. Incorporating actual work histories into empirical analyses is therefore critical for capturing the nuances of labor market careers, particularly for immigrants. For policymakers, the results highlight the need to design

[15] Adermon et al. (2022) studies the growth in occupational wage premia and time-varying occupation-specific life-cycle profiles for Swedish workers. Although using a different empirical approach focusing on another group of workers, their results for occupations resemble ours in many ways.

interventions that not only provide immigrants with work experience but also improve access to higher-quality job opportunities. Programs aimed at facilitating entry into industries or workplaces associated with higher returns could prove particularly effective in supporting long-term economic integration.

Despite the strengths of our data, certain limitations should be acknowledged. While the availability of historical employment records and matched employer-employee data allows us to measure actual experience with precision, the findings are based on institutional and economic conditions that may not fully generalize across all labor market settings. For instance, the returns to experience might vary under different wage-setting mechanisms or labor market structures, such as those with greater wage dispersion or less extensive collective bargaining.

Finally, our results raise broader questions about the evolving role of labor market experience in the face of technological and structural change. With job growth increasingly polarized and skill demands shifting, the value of experience may vary significantly across sectors and over time. Our results indicate a positive trend in the long-run returns during the 2000s but also show period of decreasing returns. Further investigating how such dynamics affect not only immigrants but also other vulnerable labor market groups is a promising direction for future research. By providing evidence on the returns to experience and their determinants, this study contributes to a deeper understanding of economic integration and the labor market mechanisms that shape wage trajectories over the life course.

References

Abowd, John M, Francis Kramarz, and David N Margolis (1999). "High wage workers and high wage firms". *Econometrica* 67.2, 251–333.

Acemoglu, Daron and David Autor (2011). "Skills, tasks and technologies: Implications for employment and earnings". *Handbook of labor economics*. Vol. 4. Elsevier, 1043–1171.

Adermon, Adrian, Simon Ek, Georg Graetz, and Yaroslav Yakymovych (2022). *Understanding occupational wage growth*.

Adermon, Adrian and Magnus Gustavsson (2015). "Job polarization and task-biased technological change: Evidence from Sweden, 1975–2005". *The Scandinavian Journal of Economics* 117.3, 878–917.

Adermon, Adrian and Lena Hensvik (2022). "Gig-jobs: Stepping stones or dead ends?" *Labour Economics* 76, 102171.

Altonji, Joseph G and Rebecca M Blank (1999). "Race and gender in the labor market". *Handbook of labor economics* 3, 3143–3259.

Ansala, Laura, Olof Åslund, and Matti Sarvimäki (2021). "Immigration history, entry jobs and the labor market integration of immigrants". *Journal of Economic Geography* (lbaa038).

Antecol, Heather and Kelly Bedard (2004). "The racial wage gap: The importance of labor force attachment differences across black, Mexican, and white men". *Journal of Human Resources* 39.2, 564–583.

Arellano-Bover, Jaime and Shmuel San (2024). *The Role of Firms and Job Mobility in the Assimilation of Immigrants: Former Soviet Union Jews in Israel 1990-2019*. SSRN Scholarly Paper. Rochester, NY.

Arendt, Jacob Nielsen, Christian Dustmann, and Hyejin Ku (2022). "Refugee migration and the labour market: lessons from 40 years of post-arrival policies in Denmark". *Oxford Review of Economic Policy* 38.3, 531–556.

Ashworth, Jared, V. Joseph Hotz, Arnaud Maurel, and Tyler Ransom (2021). "Changes across Cohorts in Wage Returns to Schooling and Early Work Experiences". *Journal of Labor Economics* 39.4. Publisher: The University of Chicago Press, 931–964.

Åslund, Olof and Mattias Engdahl (2019). "Open Borders, Transport Links, and Local Labor Markets". *International Migration Review* 53.3, 706–735.

Åslund, Olof, Mattias Engdahl, and Sébastien Willis (2024). "Professional networks and the labour market assimilation of immigrants". Tech. rep. 2024:9. IFAU - Institute for Evaluation of Labour Market and Education Policy.

Åslund, Olof, Anders Forslund, and Linus Liljeberg (2017). "Labour market entry of non-labour migrants-Swedish evidence". Tech. rep. Working Paper.

Barth, Erling, Bernt Bratsberg, and Oddbjørn Raaum (2012). "Immigrant wage profiles within and between establishments". *Labour Economics* 19.4, 541–556.

Blau, Francine D and Lawrence M Kahn (2013). "The feasibility and importance of adding measures of actual experience to cross-sectional data collection". *Journal of Labor Economics* 31.S1, S17–S58.

Borjas, George J (2014). *Immigration economics*. Harvard University Press.

Braga, Breno (2018). "Earnings dynamics: The role of education throughout a worker's career". *Labour Economics* 52, 83–97.

Brell, Courtney, Christian Dustmann, and Ian Preston (2020). "The Labor Market Integration of Refugee Migrants in High-Income Countries". *Journal of Economic Perspectives* 34.1, 94–121.

Calvó-Armengol, Antoni and Matthew O. Jackson (2004). "The Effects of Social Networks on Employment and Inequality". *American Economic Review* 94.3, 426–454.

Dahlberg, Matz, Johan Egebark, Ulrika Vikman, and Gülay Özcan (2024). "Labor market integration of refugees: RCT evidence from an early intervention program in Sweden". *Journal of Economic Behavior & Organization* 217, 614–630.

Deming, David J. and Mikko I. Silliman (2024). *Skills and Human Capital in the Labor Market*. Working Paper.

Duleep, Harriet Orcutt (2015). "The adjustment of immigrants in the labor market". *Handbook of the economics of international migration*. Vol. 1. Elsevier, 105–182.

Dustmann, Christian and Costas Meghir (2005). "Wages, experience and seniority". *The Review of Economic Studies* 72.1, 77–108.

Dustmann, Christian and Christoph M Schmidt (2001). "The wage performance of immigrant women: full-time jobs, part-time jobs, and the role of selection". *Part-Time Jobs, and the Role of Selection (February 2001)*.

Eckert, Fabian, Mads Hejlesen, and Conor Walsh (2022). "The return to big-city experience: Evidence from refugees in Denmark". *Journal of Urban Economics* 130, 103454.

Ek, Simon, Mats Hammarstedt, and Per Skedinger (2024). "Low-skilled jobs, language proficiency, and job opportunities for refugees: an experimental study". *The Scandinavian Journal of Economics* 126.2, 355–386.

Eliason, Marcus, Lena Hensvik, Francis Kramarz, and Oskar Nordström Skans (2023). "Social connections and the sorting of workers to firms". *Journal of Econometrics* 233.2, 468–506.

Eliasson, Tove (2014). *Empirical essays on wage setting and immigrant labor market opportunities*. Department of Economics, Uppsala universitet.

Friedberg, Rachel M (2000). "You can't take it with you? Immigrant assimilation and the portability of human capital". *Journal of Labor Economics* 18.2. Publisher: The University of Chicago Press, 221–251.

Gorshkov, Andrei (2024). "Job ladders and labour market assimilation of immigrants". *Labour Economics* 90, 102594.

Grönlund, Anne and Malcolm Fairbrother (2022). "No escape from tradition? Source country culture and gendered employment patterns among immigrants in Sweden". *International Journal of Sociology* 52.1, 49–77.

Hammarstedt, Mats (2000). "The Receipt of Transfer Payments by Immigrants in Sweden". *International Migration* 38.2, 239–268.

Heckman, James J., Lance J. Lochner, and Petra E. Todd (2006). "Chapter 7 Earnings Functions, Rates of Return and Treatment Effects: The Mincer Equation and Beyond".

Handbook of the Economics of Education. Ed. by E. Hanushek and F. Welch. Vol. 1. Elsevier, 307–458.

Lemieux, Thomas (2006). "The "Mincer Equation" Thirty Years After Schooling, Experience, and Earnings". *Jacob Mincer A Pioneer of Modern Labor Economics*. Ed. by Shoshana Grossbard. Boston, MA: Springer US, 127–145.

Mincer, Jacob (1974). "Schooling, Experience, and Earnings. Human Behavior & Social Institutions No. 2."

Mortensen, Dale T. and Christopher A. Pissarides (1999). "Chapter 39 New developments in models of search in the labor market". *Handbook of Labor Economics*. Vol. 3. Elsevier, 2567–2627.

Murphy, Kevin M. and Finis Welch (1990). "Empirical Age-Earnings Profiles". *Journal of Labor Economics* 8.2. Publisher: The University of Chicago Press, 202–229.

Neuman, Emma (2018). "Source country culture and labor market assimilation of immigrant women in Sweden: evidence from longitudinal data". *Review of Economics of the Household* 16.3, 585–627.

Regan, Tracy L and Ronald L Oaxaca (2009). "Work experience as a source of specification error in earnings models: implications for gender wage decompositions". *Journal of Population Economics* 22.2, 463–499.

Roca, Jorge De La and Diego Puga (2017). "Learning by Working in Big Cities". *The Review of Economic Studies* 84.1, 106–142.

Ruist, Joakim (2015). "The Fiscal Cost of Refugee Immigration: The Example of Sweden". *Population and Development Review* 41.4, 567–581.

Spence, Michael (1973). "Job Market Signaling". *The Quarterly Journal of Economics* 87.3, 355–374.

Tibajev, Andrey (2023). "The Economic Return to Labour Market Experience of Immigrants in Sweden". *Social Indicators Research* 170.1, 5–23.

Tibajev, Andrey and Olav Nygård (2023). "Origin-country gender norms, individual work experience, and employment among immigrant women in Sweden". *Frontiers in Human Dynamics* 5, 1071800.

Topel, Robert (1991). "Specific capital, mobility, and wages: Wages rise with job seniority". *Journal of political Economy* 99.1, 145–176.

Willis, Robert J (1986). "Wage determinants: A survey and reinterpretation of human capital earnings functions". *Handbook of labor economics* 1, 525–602.

A Appendix

A.1 Additional description and results

A.1.1 Construction of the Calendar-Time Adjusted Log Wage

The adjusted log wage is computed as:

$$y_{it} = \left(\frac{\log(w_{it})}{\overline{\log(w)}_{gt}} \right) \cdot \overline{\overline{\log(w)}}_{g}$$

where:

- $\log(w_{it})$: log wage of individual i in year t,
- $\overline{\log(w)}_{gt}$: average log wage in year t for group $g \in \{\text{natives}, \text{immigrants}\}$,
- $\overline{\overline{\log(w)}}_{g}$: inverse-weighted average of yearly log wage means for group g, defined as:

$$\overline{\overline{\log(w)}}_{g} = \sum_{t=1}^{T} \left(\frac{1}{T} \cdot \frac{1}{n_{gt}} \cdot N_g \cdot \overline{\log(w)}_{gt} \right)$$

with:

- n_{gt}: number of observations in group g in year t,
- N_g: total number of observations in group g over the entire period,
- T: number of years in the sample.

A.1.2 Appendix tables and figures

Table A.1: Broad Industry Categories and Subcategories

Broad Industry	**Subcategory**
Primary	Agriculture, hunting, forestry, and fishing
	Mining and quarrying
Manufacturing	Food products, beverages and tobacco
	Textiles, textile products, leather and footwear
	Wood and products of wood and cork
	Pulp, paper, paper products, printing and publishing
	Chemical, rubber, plastics and fuel
	Other non-metallic mineral products
	Basic metals and fabricated metal products
	Machinery, not elsewhere classified
	Electrical and optical equipment
	Transport equipment
	Manufacturing not elsewhere classified; recycling
Construction	Construction
Utilities & Telecom	Electricity, gas, water supply
	Transport and storage
	Post and telecommunications
Wholesale & Retail	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel
	Wholesale trade and commission trade, except of motor vehicles and motorcycles
	Retail trade, except of motor vehicles and motorcycles; repair of household goods
	Hotels and restaurants
Business Services	Financial intermediation
	Real estate activities
	Renting of machinery and equipment and other business activities
Health & Social Work	Health and social work
	Other community, social and personal services
Education	Education
Public Administration	Public administration, defence, and compulsory social security

Table A.2: Occupation Descriptions

Occupation	**Description**
Managers	Executives, directors, and senior officials responsible for planning, directing, coordinating, and evaluating the overall activities.
Professionals	Occupations requiring a high level of educational attainment and theoretical knowledge for increasing the stock of human knowledge, applying scientific concepts, or teaching.
Technicians and Associate Professionals	Occupations requiring knowledge and experience of technical and professional methods and procedures.
Clerical Support Workers	Occupations involved in storing, organizing, computing, and retrieving information; or performing financial and client-oriented clerical tasks.
Service and Sales Workers	Occupations providing personal services, protection services, or selling goods in shops or markets.
Skilled Agricultural, Forestry and Fishery Workers	Occupations primarily involved in market-oriented production of crops, livestock, forestry, or fisheries products.
Craft and Related Trades Workers	Occupations requiring the knowledge and skills of a skilled trade for producing and maintaining goods, buildings, and structures.
Plant and Machine Operators and Assemblers	Occupations involved in operating and monitoring industrial and agricultural machinery, plants, and equipment, or assembling products.
Elementary Occupations	Occupations that involve the performance of simple and routine tasks, requiring mostly physical effort.

Table A.3: **Returns to experience by skill level (Wages)**

	ME at 5 yrs of exp.	ME at 10 yrs of exp.
Experience (any)	0.0133***	0.0068***
	(0.0001)	(0.0001)
Exp. from skill level 1	0.0038***	0.0041***
	(0.0001)	(0.0001)
Exp. from skill level 2	0.0046***	0.0043***
	(0.0001)	(0.0001)
Exp. from skill level 3	0.0081***	0.0054***
	(0.0002)	(0.0002)
Exp. from skill level 4	0.0187***	0.0102***
	(0.0002)	(0.0002)

Note: The table presents estimates of immigrant wage returns to different types skill groups, using 1985–2018 MEE panel data. Marginal effects at 5 and 10 years of experience are calculated as the derivative of the fourth-order polynomial, evaluated at 5 and 10 years of experience, respectively. The four levels group occupations based on the formal education level normally required to perform the work. Level 1 contains occupations requiring no than primary school. Level 2 covers occupations requiring upper secondary education or post-secondary of up to two years. Level 3 refers to occupations where practical or vocational tertiary education 2–3 years is typically needed. Level 4 includes occupations requiring long theoretical or research-oriented academic education at the university level. Estimates are conditional on current skill level. The dependent variable is the adjusted log wage. Education and individual fixed effects are included.

Table A.4: **Returns to experience by firm type (Natives)**

	ME at 5 yrs of exp.	ME at 10 yrs of exp.
Experience (any)	0.0127***	0.0073***
	(0.0001)	(0.0001)
Exp. at low wage firm	-0.0042***	-0.0052***
	(0.0002)	(0.0002)
Exp. at high wage firm	0.0131***	0.0083***
	(0.0001)	(0.0001)
Exp. at low educ. firm	-0.0017***	-0.0038***
	(0.0003)	(0.0003)
Exp. at medium educ. firm	0.0030***	-0.0007***
	(0.0002)	(0.0002)
Exp. at high educ. firm	0.0154***	0.0098***
	(0.0002)	(0.0002)
Exp. at low imm. ratio firm	0.0095***	0.0057***
	(0.0001)	(0.0001)
Exp. at high imm. ratio firm	0.0058***	0.0002
	(0.0002)	(0.0002)

Notes: The table presents estimates of native wage returns to different types of experience by firm type, using 1985–2018 MEE panel data. Marginal effects at 5 and 10 years of experience are calculated as the derivative of the fourth-order polynomial, evaluated at 5 and 10 years of experience, respectively. A low (high) wage firm is defined as having average monthly earnings below (above) the median of the distribution of average monthly earnings across firms in the sample. High, medium, and low education firms correspond to the 1st, 2nd, and 3rd tertiles of the distribution of average years of education across firms in the sample. A firm is classified as having a high (low) immigrant ratio if the proportion of immigrants in the firm exceeds (falls below) the median of the distribution of immigrant ratios across firms in the sample. Estimates are conditional on other type(s) of experience within each group and the current firm type. The dependent variable is the adjusted index log wage. Education and individual fixed effects are included.

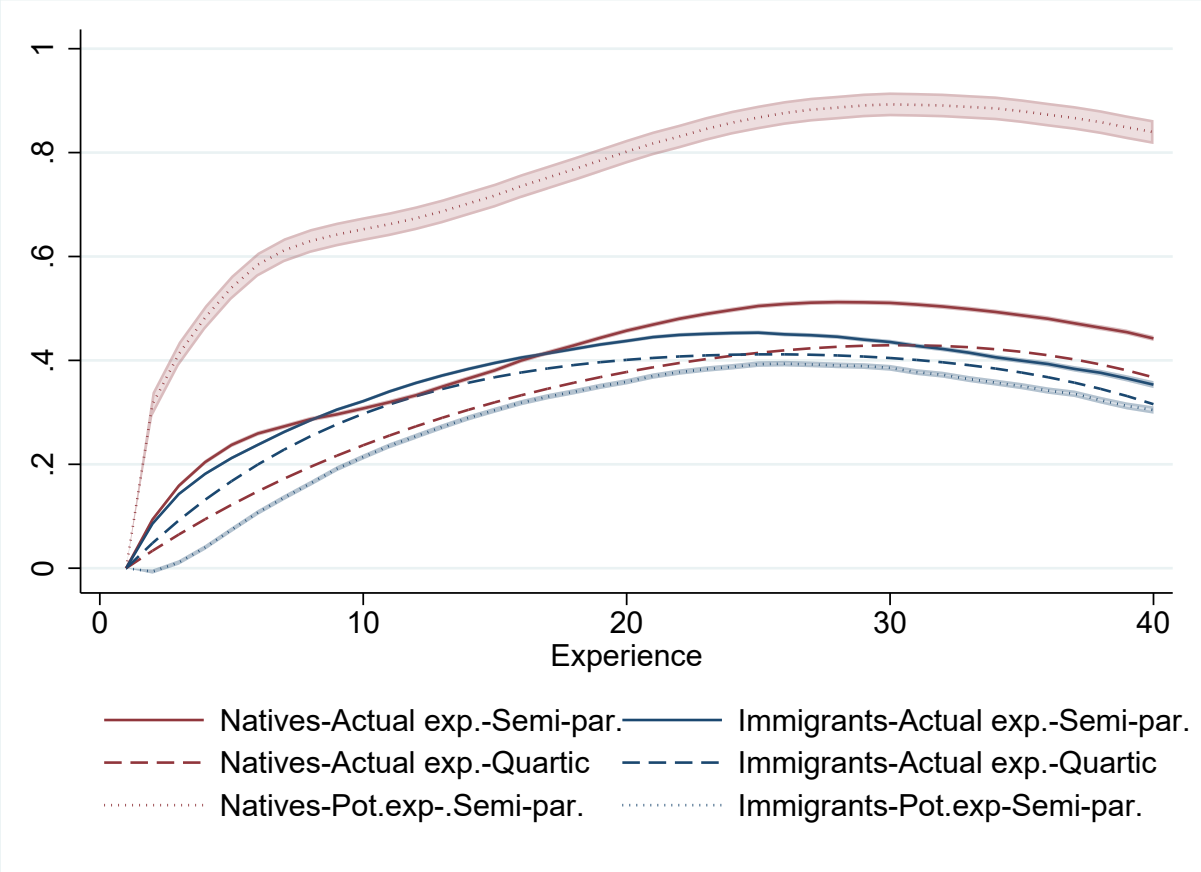

Figure A.1: Experience profiles for log annual earnings

Notes: The graph shows the returns to experience for each year of experience relative to one year of experience for natives and immigrants using pension-based panel. The polynomial specification includes experience up to the 4th polynomial. The semi-parametric specification includes a dummy variable for each year of experience. Both specifications include education dummies. The sample is restricted to people between 20-64 years old. Individuals whose earnings are less than 1 price base amount and individuals who are in their first year in the labor market are excluded from the sample. The dependent variable is the adjusted log annual earnings.

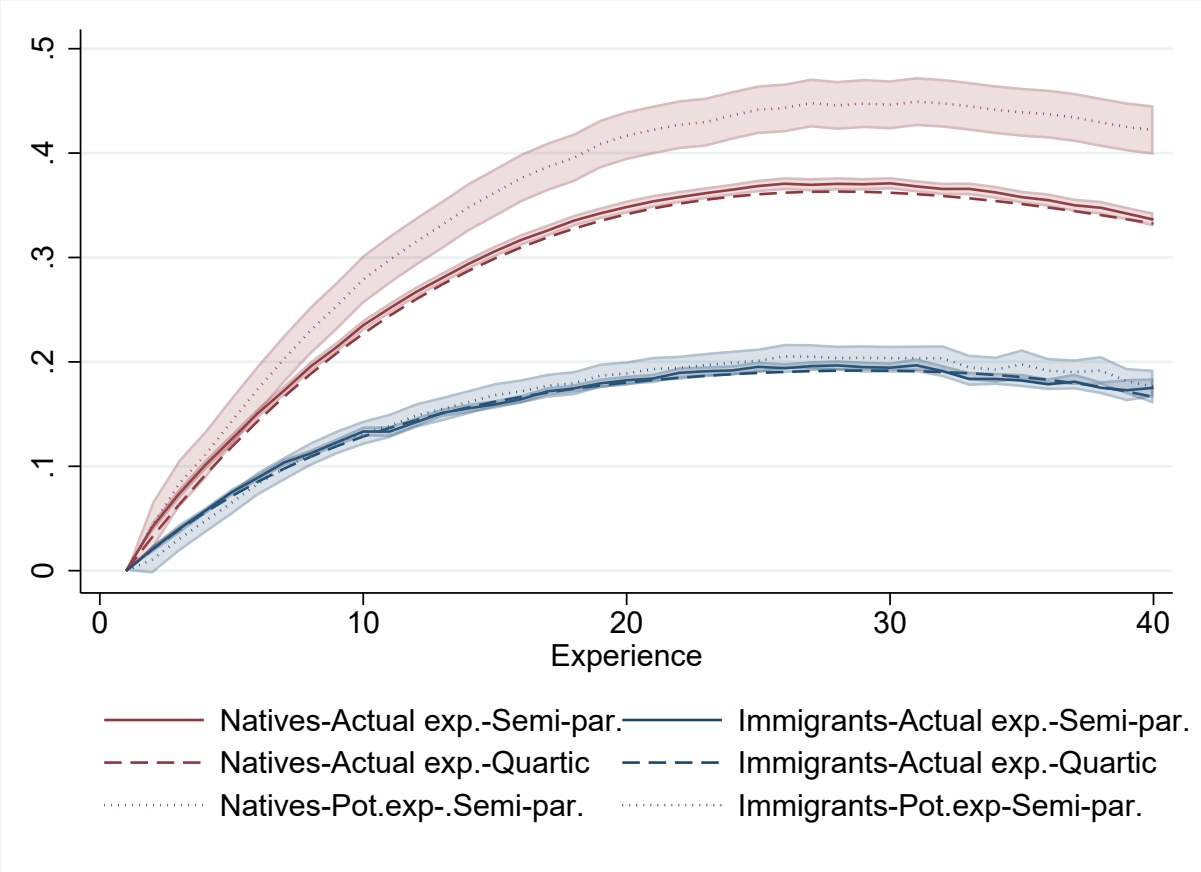

Figure A.2: Experience profiles for monthly wages applying sample weights

Notes: The graph shows the returns to experience for each year of experience relative to one year of experience for natives and immigrants using pension-based panel. The polynomial specification includes experience up to the 4th polynomial. The semi-parametric specification includes a dummy variable for each year of experience. Both specifications include education dummies. The sample is restricted to people between 20-64 years old. Individuals whose earnings are less than 1 price base amount and individuals who are in their first year in the labor market are excluded from the sample. The dependent variable is the adjusted log wage. The regressions apply the size-based firm sampling weights for the wage structure statistics.

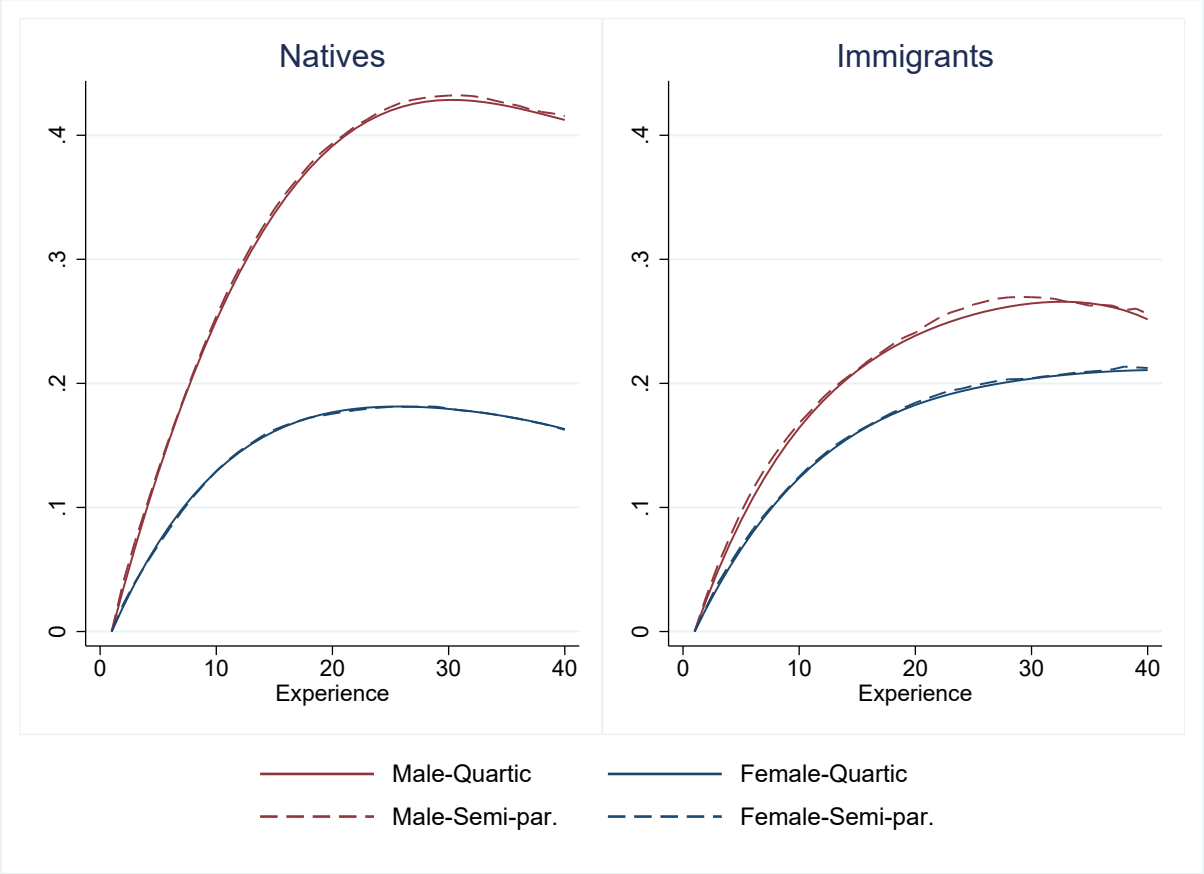

Figure A.3: Estimated returns to experience by gender

Notes: The graph shows the returns to experience by gender for each year of experience relative to one year of experience for natives and immigrants using pension-based panel. The polynomial specification includes experience up to the 4th polynomial. The semi-parametric specification includes a dummy variable for each year of experience. Both specifications include education dummies. The sample is restricted to people between 20-64 years old. Individuals whose earnings are less than 1 price base amount and individuals who are in their first year in the labor market are excluded from the sample. The dependent variable is the adjusted log wage.

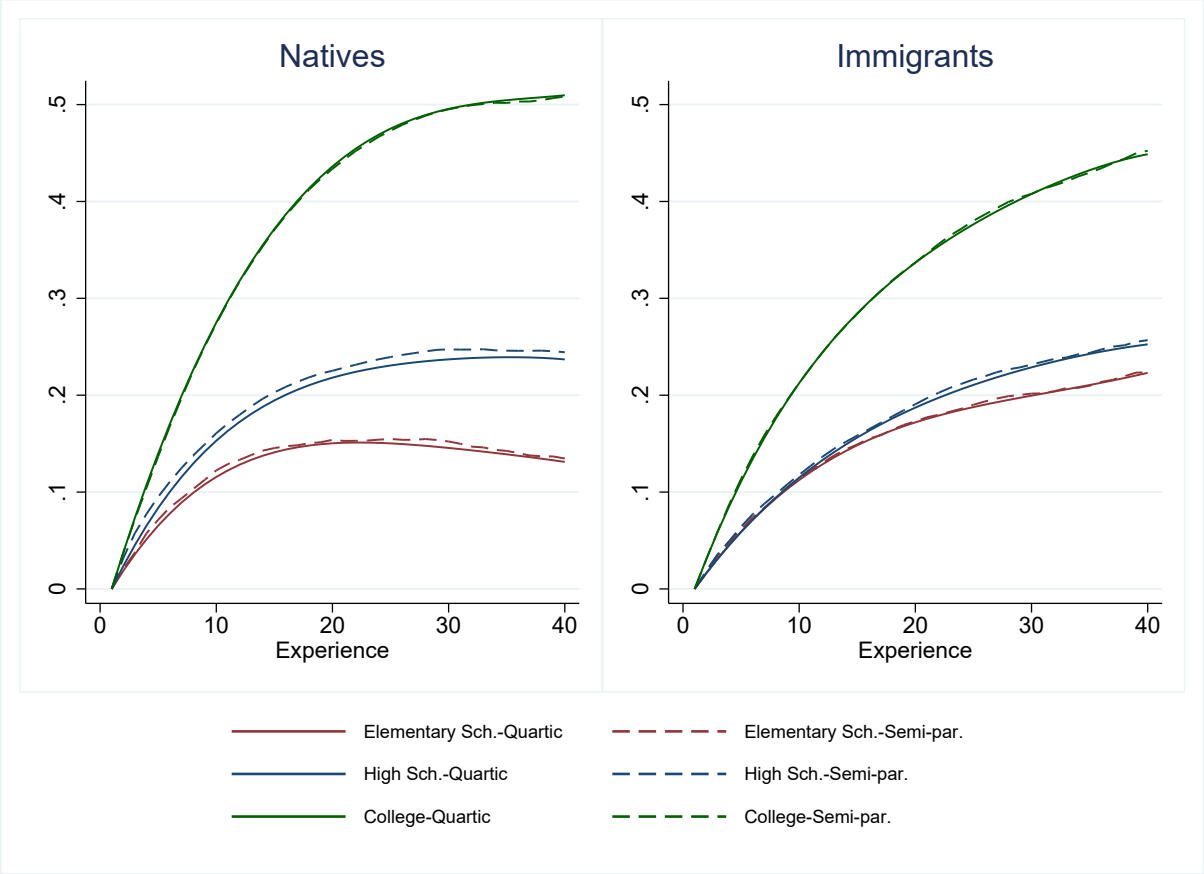

Figure A.4: Estimated returns to experience by education level

Notes: The graph shows the returns to experience by education level for each year of experience relative to one year of experience for natives and immigrants using pension-based panel. The polynomial specification includes experience up to the 4th polynomial. The semi-parametric specification includes a dummy variable for each year of experience. Both specifications includes education dummies. The sample is restricted to people between 20-64 years old. Individuals whose earnings are less than 1 price base amount and individuals who are in their first year in the labor market are excluded from the sample. The dependent variable is the adjusted log wage.

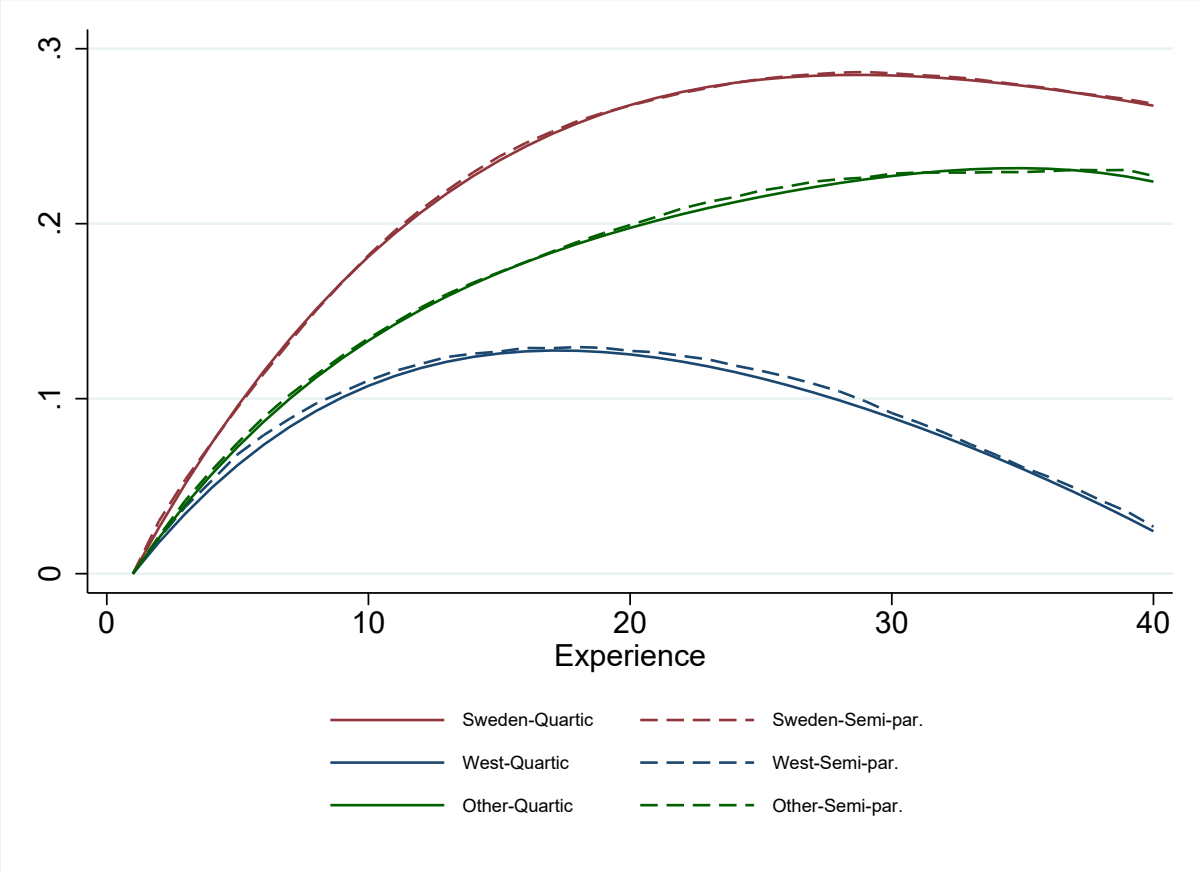

Figure A.5: Estimated returns to experience by region of origin

Notes: The graph shows the returns to experience by region of origin for each year of experience relative to one year of experience using pension-based panel. The quartic specification includes experience up to the 4th polynomial. The semi-parametric specification includes a dummy variable for each year of experience. Both specifications include education dummies. The sample is restricted to people between 20-64 years old. Individuals whose earnings are less than 1 price base amount and individuals who are in their first year in the labor market are excluded from the sample. The dependent variable is the adjusted log wage.

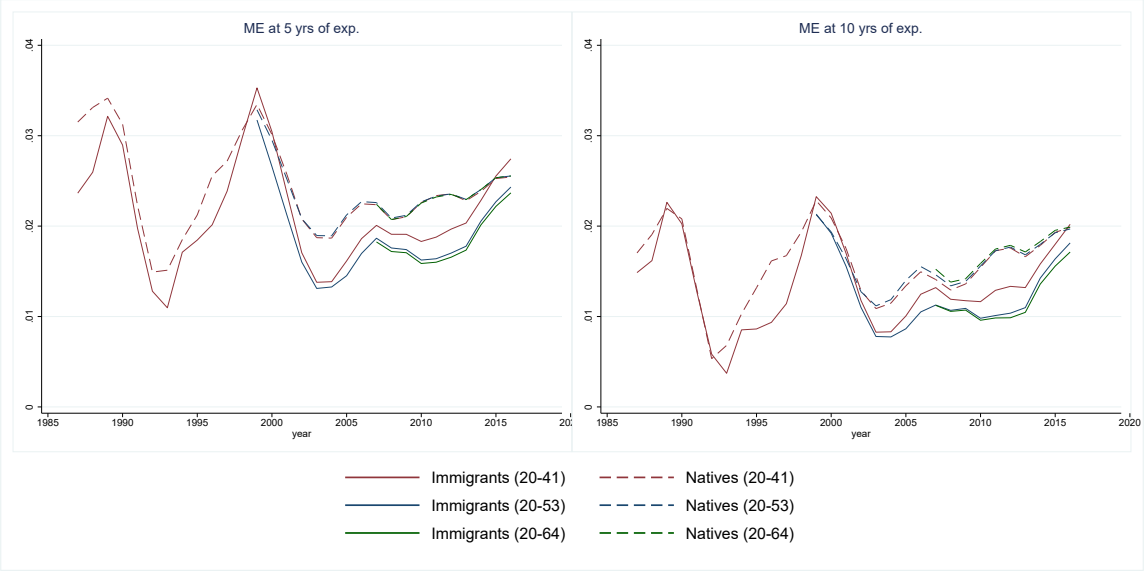

Figure A.6: Returns to experience over time (5-year panels)

Notes: The graph shows the returns to experience over time for the years 1985-2018 using pension-based panel. Marginal effects are calculated at 5 and 10 years of experience based on panel estimations where the experience is included up to the 4th polynomial. Each year's estimate corresponds to panel estimations including two years before and after the corresponding year. In the estimations, three different age groups are used based on the data availability to track the full employment history of workers. Individuals whose earnings are less than 1 price base amount and individuals who are in their first year in the labor market are excluded from the sample. The dependent variable is the adjusted log wage.

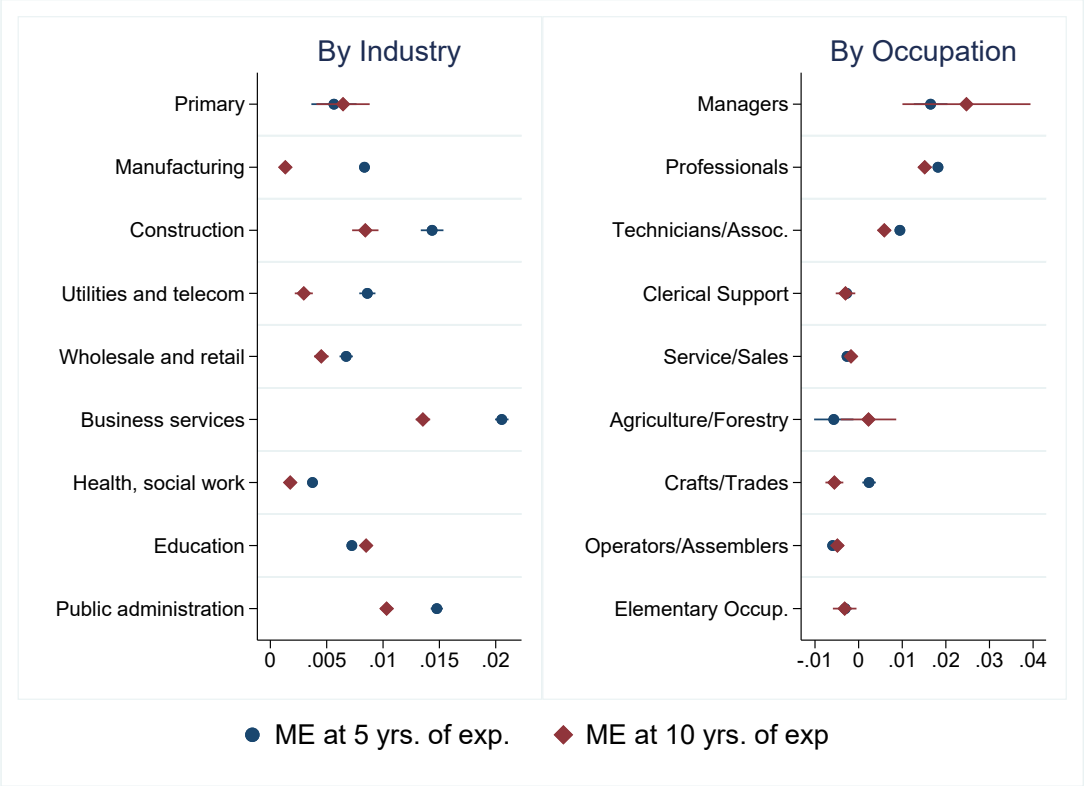

Figure A.7: Returns to experience by industry and occupation (Natives)

Notes: The estimates show natives' wage returns to experience across different industries and occupations, using MEE panel data from 1985 (for occupation, 1995) to 2018. Marginal effects at 5 and 10 years of experience are calculated as the derivative of the fourth-order polynomial, evaluated at 5 and 10 years of experience, respectively. Industry classification is based on NACE Rev. 1.1 groupings, while occupation categories correspond to the 1-digit level of ISCO-88. Estimates are conditional on current industry or occupation and experience in other industries or occupations. Controls include education and individual fixed effects.

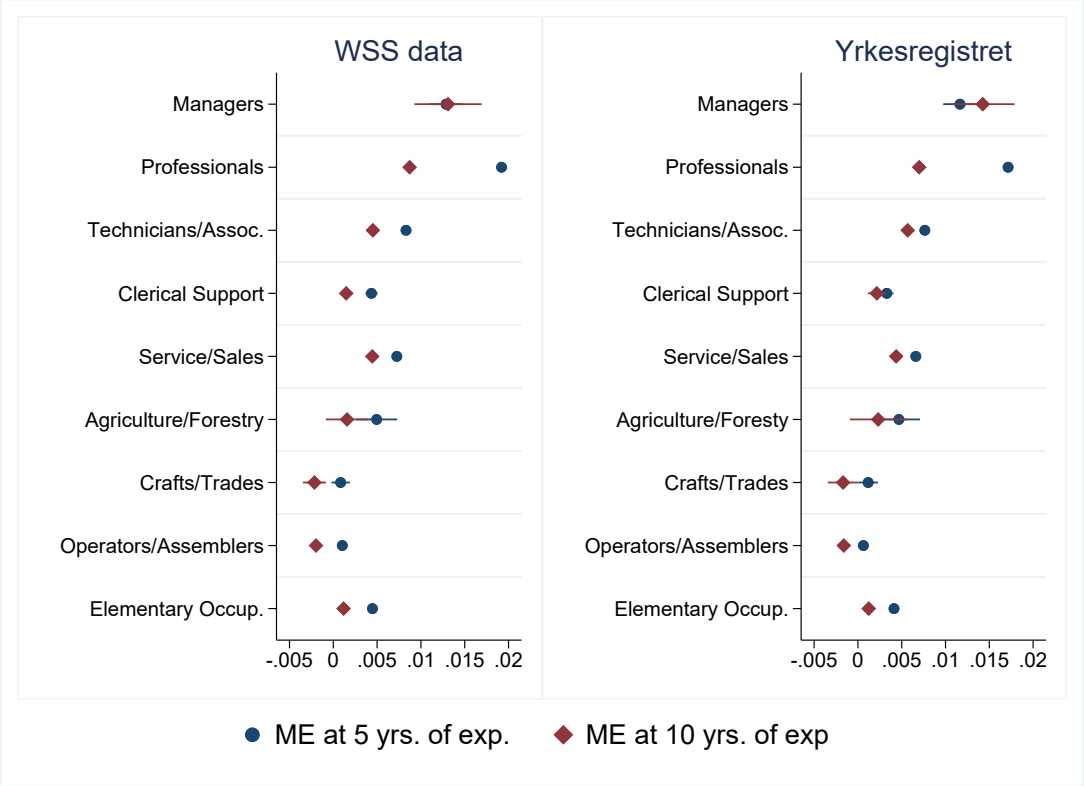

Figure A.8: Returns to experience by occupation, comparison of yrkesregistret and WSS (Immigrants)

Notes: The estimates show immigrants' wage returns to experience across different occupations, using MEE panel data from 2001 to 2018. The left panel uses occupation information from wage structure statistics while the right panel uses occupation register. Marginal effects at 5 and 10 years of experience are calculated as the derivative of the fourth-order polynomial, evaluated at 5 and 10 years of experience, respectively. Occupation categories correspond to the 1-digit level of ISCO-88. Estimates are conditional on current occupation and experience in other occupations. Controls include education and individual fixed effects.

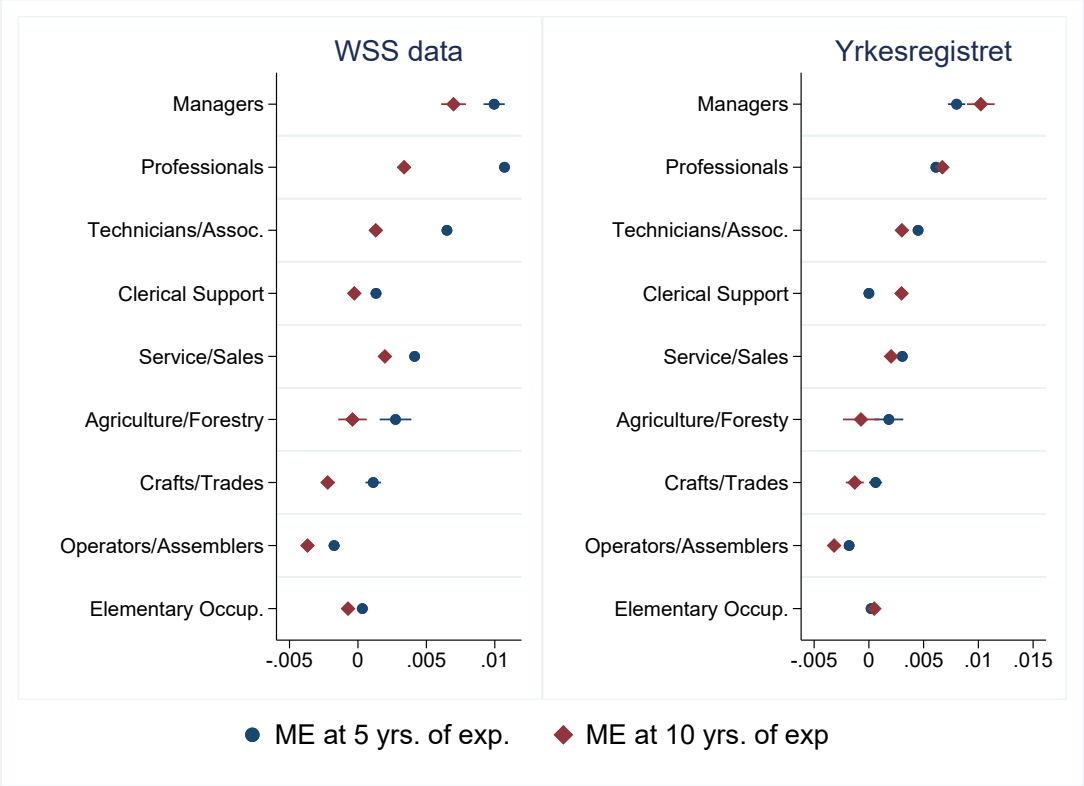

Figure A.9: Returns to experience by occupation, comparison of yrkesregistret and WSS (Natives)

Notes: The estimates show natives' wage returns to experience across different occupations, using MEE panel data from 2001 to 2018. The left panel uses occupation information from wage structure statistics while the right panel uses occupation register. Marginal effects at 5 and 10 years of experience are calculated as the derivative of the fourth-order polynomial, evaluated at 5 and 10 years of experience, respectively. Occupation categories correspond to the 1-digit level of ISCO-88. Estimates are conditional on current occupation and experience in other occupations. Controls include education and individual fixed effects.