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Sameeksha Desai, Johan Eklund and Pardis Nabavi

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Labor market outcomes of immigrants and natives: Evidence on wages in Sweden, 2001-2012

Sameeksha Desai
Indiana University
Email: desai@indiana.edu

Johan Eklund
Swedish Entrepreneurship Forum and Jönköping International Business School
Email: johan.eklund@entreprenorskapsforum.se

Pardis Nabavi*
Centre of Excellence for Science and Innovation Studies
Royal Institute of Technlogy
Email: pardis.nabavi@indek.kth.se

Abstract: The influence of immigration on local labor market outcomes in receiving regions is of significant policy interest especially given the 2014-ongoing global trend. Existing research points to the role of human capital, specifically previous local labor market (observed) experience and level of education, as key determinant of immigrant labor market outcomes. Using a unique matched employer-employee dataset for Sweden, we investigate the labor market dynamics of migrants compared to natives, aged 25-65, for the period 2001-2012. First, we identify key labor market outcomes among male and female migrants and natives. Second, we empirically test how human capital, observed labor market experience and education, influence wage outcomes of migrants as compared to natives. In addition to significant differences in wages among migrants and natives, our findings reveal differences in wage outcomes of migrants based on gender, occupation, age, sending region and region in Sweden.

Keywords: migrant, labor market, wage, immigration, Sweden, integration, natives, human capital

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JEL codes: J01; J15; J31; J61

* Corresponding author

1. Introduction

The need for informative research on economic integration of immigrants into a receiving region is urgent given the 2014-ongoing flows of conflict-induced migrants from numerous countries, including Syria, Iraq, Eritrea, Afghanistan and Yemen, into receiving countries with a wide range of institutional and development conditions, e.g. Lebanon, Turkey, and many European countries. Many migrants from the most recent 2014-ongoing wave who make it to Europe, though usually arriving in southern Europe, ultimately seek entry to countries in western and northern Europe, such as Germany and Sweden.

The labor market outcomes of immigrants are important considerations for policymakers for many reasons, with consequences for individuals and broader economic performance. Labor market integration of immigrants could provide economic, political and social benefits in the receiving countries. For example, in countries with shrinking numbers of the economically active native-born, due to low population growth or aging or both, labor market participation of immigrants may yield productivity gains, and advance job creation and income generation. Labor market integration can support the spillover of knowledge and creativity from and to immigrants and natives. In some countries, like the United States, immigrants contribute significantly not only through employment but also through entrepreneurship, generating significant innovation and welfare gains. There could also be political and social gains from effective labor market integration, such as by increasing opportunities for interaction and outreach, improving access and knowledge about receiving country rules, boosting more rapid language and skill acquisition which also have economic implications, and so on.

Labor market participation both reflects the extent to which immigrants are economically productive, and conditions and policies in the receiving regions. These policies can range from

the quality and length of public programs to credentialing standards in receiving regions. In addition to policies, key determinants of labor market outcomes of immigrants are their own human capital, reflective both of labor market experience and educational attainment, as well as gender, age, structure of labor market participation, and family background. Human capital is important because it endows an individual with the ability to attain a resulting level of economic participation. Returns on education and returns on labor market experience, in terms of outcomes like wages, reflect the extent to which human capital of an individual generates economic value (Becker, 1964; Mincer, 1958). These are all parts of a multi-dimensional understanding of labor market participation. An important consideration is the skill (mis)match of immigrants and ability to maximize economic contributions from their human capital. Nurses and doctors who have fled their home countries can wind up working as domestic help or in other low-skill household jobs in receiving countries. This may occur in the short term and be followed by transition into higher skill jobs, or this could continue in the long term. The extent to which this occurs, and for how long, could reflect several things, such as a mismatch of skill at the individual level, inadequate regulatory support for skill transferability at an institutional level, and can affect economic productivity at the national level.

We investigate the trend and determinants of wages among immigrants, as compared to natives, for the years 2001-2012 in Sweden. We consider economically active employees aged 25-65, and draw upon a unique, individual-level dataset to empirically investigate wage trends and key individual, occupation, and regional determinants. We focus specifically on human capital, measured both as education and labor market experience, and assess systematic differences in wages of immigrants and natives by gender, age, age at migration (for immigrants), sender region, self-employment participation, parent immigrant status, occupation,

and labor market region. Our findings show significant disparities in wages between immigrants versus natives across almost all groups and occupations, as well as poorer outcomes for females overall. We consider four groups – natives, second generation which have at least one foreign-born parent, western immigrants, and non-western immigrants. Our findings show significant differences in the wage outcomes of these groups, not only across gender but also across level of education (less than high school, high school, less than college, college). We also find that the returns to observed labor market experience and to education differ significantly for each of our groups by gender and by education; further, we find that self-employment not only provides negative returns for all groups but the magnitude varies significantly.

The remainder of the paper is as follows. Next, we discuss the relevant literature and key conditions which we include in our analysis. In the third section, we present our data, method, and empirical strategy, followed by results from our estimations and robustness checks in the fourth section. We interpret and discuss our results and identify related research questions in the fifth section. We end with a brief conclusion.

2. Literature review

2.1. Immigration and context in Sweden

The foreign-born population in Sweden grew from about 12 percent to 17 percent between 2001 and 2015. The number of asylum seekers has been growing substantially, from about 30,000 per year during the 2002- 2012 period to more than 160,000 in 2015. Asylum seekers arriving in Sweden may gain the right to work if the asylum application is expected to take more than four months. However, the process of receiving work permission could be affected by a range of factors, including administrative processing, access to information on part

of the asylum seekers, social services packages, skills match and human capital, etc, and therefore can be difficult in practice.

Two noteworthy things about Sweden could have important implications for labor market outcomes. First, labor market regulation in Sweden is extensive, and labor market entry is difficult for immigrants. Sweden also has among the highest minimum wages in OECD (OECD, 2015)[1]. Second, like other welfare states, Sweden provides generous welfare benefits and access to public services. This may lower incentives for immigrant labor market participation, as well as speed of entry. Wiesbrock (2011) argues that extensive reliance of immigrants on the Swedish welfare system reduces integration into the regular labor market.

The combination of these two factors makes Sweden somewhat unique as a receiving country. Developing countries which take in large numbers of immigrants and especially refugees do not have generous welfare programs, e.g. Turkey and Lebanon, which have taken in refugees from Iraq and Syria, and the Democratic Republic of Congo which took in Angolan refugees. Other European countries with generous welfare policies do not have such tightly regulated labor markets, such as Denmark, which is one of the least restrictive labor markets in the OECD. In Germany, the labor market became quite flexible after a decade of reforms, more flexible jobs and lower employment costs, mini-jobs, changes to unemployment insurance and the last year legislation of a minimum wage (for details on Germany see e.g. Audretsch and Lehmann, 2016). A restrictive labor market or generous welfare programs, or some combination of the two, as in Sweden, could be especially attractive for immigrants (and natives) in low-paying jobs, because returns to entry into the labor market may be shaped depending on if the state welfare programs offer similar rewards, i.e. the reservation wage can be assumed to be relatively high in Sweden.

[1] There is no statutory minimum wage in Sweden, but through collective bargaining the implicit minimum wags is

Aggregated data point to a long time for immigrants to enter the Swedish labor market, indicating a discouraging effect induced by high barriers to labor market participation or by generous welfare benefits, or some combination. Time to labor market participation varies among immigrants in Sweden, but is in general high overall. Compared with other countries, time to labor market participation for immigrants in Sweden is higher. The employment-population ratios of natives and immigrants reflect more time and less participation overall in Sweden (see Appendix A). For example, the difference in the employment-population ratio[2] of natives and immigrants in the United States is 6 percent if immigrants have less than 5 years of residence, but falls to almost zero with 6 to 10 years of residence and further, to -4 percent with more than 10 years of residence[3]. In Sweden, the difference is 18 percent if immigrants have up to 5 years of residence, 27 percent with 6 to 10 years of residence, and 8 percent with more than 10 years of residence.

With respect specifically to refugees, about half of refugees and their relatives were found to have entered the labor market after 8 years in Sweden, whereas it was found to take five years for half of the refugees to manage to reach employment in Germany (SCB and IAB, 2015).

Among foreign-born individuals aged 16-64, labor force participation in 2013 was 69.5 percent for those who have been resident up to 9 years, while it was significantly higher among those who lived in Sweden between 10-19 years (77.6 percent) and highest among those resident in Sweden from 20-29 years (82.1 percent).

When time to Swedish labor market participation is broken down by education, employment of individuals aged 20-64 after 9-11 years of residence is highest among those with

[2] Defined as share of the country's working-age population that is employed by OECD.
[3] International Migration Outlook (OECD, 2011), available online at: http://dx.doi.org/10.1787/888932440907

a university education (79.6 percent), followed by those with a high school education (64.1 percent), and is lowest among those who did not finish high school (46.5 percent).

For refugees with university education in Sweden, the employment rate is 56.1 percent after 8 years of being resident (70.6 after plus 10 years), while 57.4 percent of those with only high school education are employed after 8 years (65.6 percent after more than 10 years). Also, 38.4 percent of the refugees with 9 years of education and 35.2 percent of those with less than 9 years of education have employment after 8 years of residence in Sweden (48.4 and 43.2 percent respectively after more than 10 years of being resident)[4].

2.2. Human capital and labor market participation

Human capital specific to the receiving country's labor market can be acquired through primarily two channels, namely, through labor market experience or through formal education. From an economic perspective, the most effective means of acquiring this human capital is where the relative returns are highest. The extent to which the education of an individual is in excess of the required education needed for that person's job is called overeducation[5].

Empirical studies on wage trends among immigrants and natives in high-income countries provide a fairly consistent picture over time. Adsera and Chiswick (2007), in a study of 15 European countries, find around a 40 percent significant negative effect of foreign birth on earnings, as compared to natives. This impact varies across origin, destination and by gender. Chiswick and Miller (2008) find that earnings of workers are more closely associated with their occupation than with years of education. They also find that education of high-skilled

[4] These statistics are based on www.ekonomifakta.se, which uses two databases from the Statistics Sweden (SCB); Registerbaserad arbetsmarknadsstatistik (RAMS) and Arbetskraftsundersökningarna (AKU) as sources.

[5] Joona et al. (2014) point out that while overeducation may be voluntary for some individuals who are investing in work experience to improve future employment prospects (see Sicherman, 1991; Sicherman and Galor, 1990), overeducation among immigrants is not likely to be voluntary. This could be because of mismatch in the labor market, lack of recognition of foreign credentials by employers, or due to lack of information about the quality of foreign education (Joona et al., 2014).

immigrants decreases with time in the US. Similarly, Zorlu (2013) showed that more educated immigrants in The Netherlands usually start with low-skilled jobs on arrival due to a low level of skill transferability, but their position improves considerably over time. Joona et al. (2014) found overeducation to be higher among immigrants in Sweden, especially those from countries where the flow is dominated by refugees, and further that returns to overeducation is considerably less for immigrants. Overeducation has been found to be higher among immigrants in other studies, on Sweden (Katz and Österberg, 2013; Dahlstedt, 2011) as well as other high-income countries, e.g. Canada (Wald and Fang, 2008) and Denmark (Nielsen, 2011)[6]. This could be due to imperfect transferability of home country human capital.

Katz and Österberg (2013) show that most young immigrants to Sweden, especially from Africa, Asia and Latin America, have lower wages and smaller returns to education as compared to natives. Lundborg (2013) finds that refugees from culturally distanced countries and regions (Iran/Iraq and Horn of Africa) experience the greatest problems when initially entering the labor market, despite living in Sweden for many years. Even among those able to join the labor market, skill transferability appears to be generally low (Zorlu, 2013), and job mobility among immigrants is found to be lower than it is for natives (Joona et al., 2014).

Next, we examine trends in labor market outcomes among groups of immigrants and natives in Sweden, and we empirically test how human capital, observed labor market experience and education can influence wage outcomes.

3. Data and method

3.1. Sample

[6] In some contexts, overeducation may be mitigated by other factors, like large returns to occupation skills (as opposed to qualifications) among some immigrant groups in the UK (Lindley, 2009).

Our sample comes from a unique matched and detailed employer-employee database for Sweden. The data come from Statistics Sweden and provides register information, based on annual reports, for all individuals between 16 and 84 years old, employed in November of each years. The database include a wide range of information for each individual: age, gender, education attainment, region of birth, year of migration, Swedish labor market experience from 1986 and onwards, occupation, income, place of work, residence, and employment/self-employment status. Our sample covers all individuals between 25 and 65 years of age, employed in November each year. Since the database matches employers with employees, we also restrict our sample to individuals employed in the private sector[7], and further to individuals with at least 120,000 SEK (just under US $15,000) in annual income (see Antelius and Björklund, 2000).

3.2. Variables

Our dependent variable is annual *wages* earned by each employee in firm. We are not able to use hourly wages due to the nature of the dataset, but previous research shows that excluding individuals with low incomes results in similar findings using either hourly wages or yearly earnings (Antelius and Björklund, 2000).

Our variables, definitions, sources, and basic descriptive statistics (range, min, max) are listed in Table 1.

[7] For robustness check, the sample of all the employees in public and private sector is used, with a control for private sector. The results are similar and available upon request.

Table 1: Variables, sources, and descriptive statistics

Variable names	Source	Definition	min	max
Log wage	LISA	Logarithm of annual earnings	11.70	13.94
			11.70	13.46
Age	LISA	Age of each individual	25	65
Obs-Exp	FAD and Own calculation	Number of observed years in Swedish Labor market	1	27
Edu years	LISA, converted	Years of education, based on the standard classification of individual education level, SUN 2000	8	21
Self-employed	LISA	Registered business owner - either in an incorporated business or a sole proprietorship	0	1
Swedish Edu	LISA and Own calculation	A dummy for Foreign-born with highest education degree from Sweden	0	1
Age at migration	LISA and Own calculation	The earliest year of migration subtracted by year of birth	0	65
Metro Cities	LISA	Stockholm, Gothenburg, Malmö	0	1
Metro Regions	LISA	municipalities where 100 percent of the population live within cities or within a 30 km distance from these cities	0	1
Urban areas	LISA	municipalities with a population of at least 30,000 inhabitants and where the largest city has a population of 25,000 people or more	0	1
Remaining regions	LISA	Remaining Municipalities	0	1
Private sector	Foretagregistret Basdata	Individuals working in private sector	0	1
Natives	LISA	Born in Sweden with two Swedish-born parents	0	1
Second Generation	LISA	Born in Sweden with at least one foreign-born parent	0	1
Western Immigrants	LISA	Born in Europe, North America or Oceania	0	1
Non-Western Immigrants	LISA	Born in Africa, Asia or South America	0	1

Our key explanatory variables are *observed experience* in the Swedish labor market and level of *education*. We measure *observed experience* as Swedish labor market experience, calculated as the number of years each individual was employed in Sweden since 1986. We measure *education* based on the standard classification of individual education level, SUN 2000 converted into years of education, which includes all potential years of schooling from 8 to 21

years. We use the observed experience measure over potential experience[8] because it is more appropriate specifically in the context of migration. Observed information about some subgroups in the population (such as immigrants and women is necessary, because labor market participation may not be continuous. Using potential work experience based on education would overestimate the effect of schooling and underestimate the rate of returns to actual local labor market experience. We use both the education and observed experience measures because the nature of immigration means some employees will have gained education and experience abroad as well as in Sweden, which could influence wage effects and other outcomes (see Akee and Yuksel, 2008; Schaafsman and Sweetman, 2001).

We control for key individual, industry and geographic characteristics. We control for differences in labor market participation by gender among *males* and *females* for both immigrants and natives (Adsera and Chiswick, 2007; Joona et al. 2014). Age is an important consideration for labor market participation, so we introduce several controls for age. We use *age* in years for both immigrants and native employees, introduced as four dummies for the age bands 25-34 years, 35-44 years, 45-54 years, and 55-65 years. A high age at arrival has been found to negatively influence wages (see Borjas, 1995); among immigrant employees, we account for *age at migration* using four dummies for the categories <16 years, 16-30 years, 31-45 years, and >45 years. We also identify immigrants based on region and distinguish between *western* (from Europe, North America and Oceania) and *non-western* immigrants (from Asia, Africa and South America), in line with recent research (Tomaskovic-Devey et al., 2015; Joona et al., 2014). Non-western immigrants appear to face greater difficulty entering the Swedish labor market. Migrant flows from Asia and Africa to Sweden have been primarily dominated by refugees and their relatives seeking reunification. Labor migration to Sweden has come largely

[8] This is usually measured as [age of an individual – years of schooling – 6] (see e.g. Ferrer and Riddell 2008).

from Europe and the United States. In order to assess labor market outcomes among the children of immigrants (see Nordin and Rooth, 2007; Rooth and Ekberg, 2003), we use *natives* to capture Swedish-born and specify *second generation* to capture Swedish-born with at least one foreign-born parent[9].

We control for occupation using dummies at the one-digit level (see Appendix B), excluding military workers (Joona et al. 2014). These are obtained from standard occupation classification codes (SYYK codes), and are available starting 2001.

Lastly, we include geographic controls to account for the size of local labor markets, agglomeration economies and urban centers. We use four location types based on the division at the Swedish Board of Agriculture (see Appendix C). *Metro cities* are Stockholm, Gothenburg and Malmö; *metro regions* include municipalities where 100 percent of the population live within cities (except for Stockholm, Gothenburg and Malmö) or within a 30 km distance from these cities; *urban areas* are municipalities at least 30,000 inhabitants and where the largest city has a population of 25,000 people or more; *rural areas* are the remaining municipalities in Sweden.

Table 2 provides some summary statistics for 2,044,290 unique male employees, grouped as natives with native parents, second generation, western immigrants and non-western immigrants. We also see from Table 2 that 25 percent of western immigrants and 30 percent of non-western immigrants have obtained their education in Sweden. There is no average wage difference among natives and the second generation. Non-western immigrants on average have the lowest observed experience and slightly higher years of education. Although non-western immigrants are on average 4 years younger than natives, their observed experience is 7.6 years lower. The

[9] We do not have access to marital status or number of children of an individual. Marriage and number of children are associated with lower earnings for women and slightly higher earnings for men (Adsera and Chiswick, 2007), and we assume here that these two omitted variables have similar effects for natives and immigrants.

gap between observed experience of non-western immigrants and native males cannot be explained only by age. Occupational trends of male employees differ by group: On average, 10 percent of natives and 9 percent of immigrants are in the management profession. Among immigrants, 6 percent of western and 4 percent of non-western immigrants are in the management profession. It is worth noting that, despite higher average years of education, non-western immigrants hold elementary occupations 5 times more than natives (15 percent versus 3 percent). On average, western immigrants came to Sweden at a younger age. We also see that the prevalence of self-employment[10] is 8 percent among natives, 7 percent among second generation, 5 percent of western immigrants and 4 percent of non-western immigrants. Finally, trends among male employees vary by region. 15 percent of natives work in metro cities compared to 22 percent of second generation immigrants, and 48 percent of natives work in rural areas compared to 36 percent of second generation immigrants. Among immigrants, we see that 24 and 11 percent of western immigrants work in metro cities and rural areas respectively, compared to 36 and 18 percent of non-western immigrants who work in metro cities and rural areas respectively.

[10] Self-employment is defined as being the owner of a firm with or without other employees, while most of your income is from that firm.

Table 2: Summary statistics for male fulltime equivalent private sector employees

	(1)	(2)	(3)	(4)
	Natives		Second	Western	Non-Western Immigrants
	mean/sd		mean/sd	mean/sd	mean/sd
Log wage	12.60		12.60	12.51	12.40
	0.37		0.38	0.37	0.36
Age 25-34	0.25		0.32	0.20	0.34
	0.43		0.47	0.40	0.47
Age 35-44	0.29		0.35	0.30	0.34
	0.45		0.48	0.46	0.47
Age 45-54	0.25		0.24	0.28	0.24
	0.43		0.42	0.45	0.42
Age 55-65	0.21		0.09	0.21	0.09
	0.41		0.29	0.41	0.28
Obs-Exp	17.17		16.00	13.39	9.98
	5.78		6.19	7.12	6.36
Edu years	11.85		12.01	11.87	12.05
	2.20		2.12	2.49	2.60
Managers	0.10		0.09	0.07	0.04
	0.31		0.29	0.25	0.19
Professionals	0.14		0.15	0.12	0.11
	0.35		0.36	0.32	0.31
Technicians &	0.20		0.20	0.13	0.10
associate professionals	0.40		0.40	0.34	0.30
Clerks	0.05		0.06	0.05	0.08
	0.21		0.23	0.22	0.27
Service shop sales	0.06		0.07	0.06	0.15
	0.23		0.26	0.24	0.36
Skilled agricultural and	0.01		0.01	0.01	0.00
fishery workers	0.11		0.08	0.09	0.06
Craft and related	0.20		0.18	0.20	0.11
trades workers	0.40		0.39	0.40	0.31
Plant and machine	0.20		0.19	0.28	0.25
operators and assemblers	0.40		0.39	0.45	0.43
Elementary	0.03		0.04	0.08	0.16
	0.18		0.20	0.26	0.37
Self-employed	0.08		0.07	0.05	0.04
	0.27		0.25	0.22	0.19
Swedish Edu	-		-	0.24	0.31
	-		-	0.43	0.46
Age at migration	-		-	21.68	23.03
	-		-	11.80	11.01
Age at migration<16				0.29	0.23
				0.45	0.42
Age at migration 16-30				0.48	0.52
				0.50	0.50
Age at migration 31-45				0.20	0.23
				0.40	0.42
Age at migration >45				0.03	0.01
				0.18	0.12
Metro Cities	0.15		0.22	0.23	0.36
	0.35		0.41	0.42	0.48
Metro Regions	0.25		0.31	0.24	0.30
	0.43		0.46	0.43	0.46
Urban areas	0.12		0.11	0.25	0.23
	0.33		0.32	0.43	0.42
Rest	0.48		0.36	0.28	0.12
	0.50		0.48	0.45	0.32
Observations	12,476,117		1,466,791	1,118,561	598,009

Summary statistics for 1,266,737 unique female employees are provided in Table 3, grouped as natives with native parents, natives with at least one foreign-born parent (second generation immigrants), western immigrants and non-western immigrants. Differences among female employees are similar but smaller compared to the trends for male employees. Non-western immigrants are the youngest group among females, and have the lowest observed experience and slightly less education on average. Non-western female immigrants are on average 4.5 years younger than natives when they enter the labor market, and they also average 7.5 fewer years of education. We see a similar pattern for occupation and self-employment as with male employees, but with smaller numbers overall. The prevalence of natives and second generation with management occupations is the same (6 percent), and among immigrants, 4 percent of western and 3 percent of non-western immigrants are in management occupations. We also see that self-employment is the same among natives and second generation (4 percent), and there is a very small difference in self-employment among western (3 percent) and non-western (2 percent) immigrants[11]. We also see regional differences among female employees. Among natives, 20 percent work in metro cities and 40 percent work in rural areas, compared to 27 percent in metro cities and 33 percent in rural areas among second generation immigrants. Among immigrants, 28 percent of western immigrants and 36 percent of non-western immigrants work in metro cities, and 29 percent of western immigrants and 19 percent of non-western immigrants work in rural areas.

Table 3: Summary statistics for female fulltime equivalent private sector employees

	(1)	(2)	(3)	(4)
	Natives	Second Generation	Western Immigrants	Non-Western Immigrants
	mean/sd	mean/sd	mean/sd	mean/sd
Log wage	12.39	12.40	12.37	12.29
	0.35	0.35	0.34	0.33

[11] Note we have lower share of self-employed both among males and females due to eliminating low-income earners.

Age 25-34	0.25	0.32	0.18	0.34
	0.43	0.47	0.39	0.47
Age 35-44	0.30	0.35	0.30	0.37
	0.46	0.48	0.46	0.48
Age 45-54	0.25	0.24	0.31	0.23
	0.43	0.43	0.46	0.42
Age 55-65	0.20	0.09	0.21	0.06
	0.40	0.29	0.41	0.24
Obs-Exp	16.80	15.69	13.56	9.60
	5.86	6.23	7.18	6.09
Edu years	12.23	12.37	12.19	12.01
	2.20	2.10	2.57	2.71
Managers	0.06	0.06	0.04	0.03
	0.23	0.23	0.20	0.16
Professionals	0.17	0.17	0.14	0.11
	0.38	0.38	0.35	0.31
Technicians &	0.24	0.24	0.18	0.13
associate professionals	0.43	0.43	0.38	0.34
Clerks	0.20	0.19	0.15	0.10
	0.40	0.40	0.36	0.30
Service shop sales	0.20	0.20	0.19	0.31
	0.40	0.40	0.39	0.46
Skilled agricultural and	0.01	0.01	0.00	0.00
fishery workers	0.08	0.07	0.07	0.05
Craft and related	0.02	0.02	0.02	0.02
trades workers	0.13	0.13	0.16	0.13
Plant and machine	0.07	0.07	0.14	0.09
operators and assemblers	0.25	0.25	0.34	0.28
Elementary	0.05	0.05	0.13	0.21
	0.21	0.22	0.34	0.41
Self-employed	0.04	0.04	0.03	0.02
	0.20	0.19	0.18	0.15
Swedish Edu	0.00	0.00	0.26	0.33
	0.00	0.00	0.44	0.47
Age at migration	.	.	21.68	21.86
	.	.	11.04	11.96
Age at migration<16	0.00	0.00	0.25	0.27
	0.00	0.00	0.43	0.45
Age at migration 16-30	0.00	0.00	0.54	0.49
	0.00	0.00	0.50	0.50
Age at migration 31-45	0.00	0.00	0.18	0.22
	0.00	0.00	0.38	0.41
Age at migration >45	1.00	1.00	0.03	0.02
	0.00	0.00	0.17	0.12
Metro Cities	0.20	0.27	0.27	0.36
	0.40	0.45	0.44	0.48
Metro Regions	0.22	0.27	0.28	0.32
	0.41	0.45	0.45	0.47
Urban areas	0.28	0.24	0.22	0.20
	0.45	0.42	0.41	0.40
Rest	0.31	0.22	0.23	0.12
	0.46	0.41	0.42	0.33
Observations	5,988,938	770,644	673,040	330,503

3.3. Empirical strategy

In order to estimate the returns to previous experience and the return to education for employees in different groups, we include interaction terms capturing the joint influence of background and all other covariates. The interaction terms allow us to estimate a group-specific coefficient and also to compare the marginal effect of education and of previous experience for employees across gender and occupation, and allows us to test the significant difference of marginal effects of different groups in a straightforward way. We use the Mincer (1974) wage equation, commonly used in empirical studies on earnings, but our specification is adapted for panel data, as follows:

$$lnY_{it} = \alpha_0 + \alpha_{1b}ObsExp_{it} + \alpha_{2b}ObsExp_{it}^2 + \alpha_{3b}EDUY_{it} + \alpha_{4b}SELFEMP_{it} + \alpha_{5b}AgeD_{it} + \alpha_{6b}AgeAMD_{it} + \alpha_{7b}RD_{it} + \alpha_{8b}SD_{it} + \alpha_{9b}OccupD_{it} + \alpha_{10b}YD_{it} + u_i + \varepsilon_{it}$$

where lnY_{it} is log yearly earnings of the individual employee *i* in year *t,* which is a function of $ObsExp_{it}$, (observed Swedish labor market experience), its square $ObsExp_{it}^2/100$, and $EDUY_{it}$ (total years of education). The regression also controls for self-employment status ($SELFEMP$), ages dummies (*AgeD*), age at migration dummies (*AgeAMD*), regional dummies (RD), sector dummies (SD), occupation dummies ($OccupD$) and year dummies (YD). u_i is an individual specific random element which assumed to be constant over time and ε_{it} is the random error term.

We split our sample by males and females, and run two sets of estimations for each group. A large literature has identified persistent differences in the wage patterns and labor market outcomes of males and females, both in general population and immigrant studies (see Adsera and Chiswick (2007); Ferrer and Riddell (2008)). However, since running too many

separate estimation models for different groups can lead to loss of statistical power, we do not further divide our sample in groups and instead estimate a group-specific coefficient for each independent variable, for male and female workers separately. We are also able to test the statistical difference of the estimated coefficients for different groups directly.

4. Results

Our main results using pooled OLS and random effect estimations are reported in Table 4, separately for male and female employees. Pooled OLS and random effect estimations yield similar results, but the magnitude of the coefficients in the random effect estimations are larger. We report results from the random effects estimations in this section.

Among males, returns to observed experience are lower for immigrants; among immigrant males, returns to observed experience are lower for western (3.0) than non-western immigrants (3.5). Native males and second generation males have the highest returns to observed experience (4.3 for both groups). Among females, returns to observed experience are higher for immigrants than natives. Both western and non-western females achieve returns of 2.6 and natives and second generation females achieve lower returns, both 2.0. It is worth pointing out that native females have less than half the returns to observed experience compared to native males (2.0 compared to 4.3 for both groups) but the gap between immigrant females and males is smaller (2.6 compared to 3.0 for western immigrants and 2.6 compared to 3.5 for non-western immigrants). Previous research has also found lower returns to observed experience and experience-squared for females versus males (Miller, 1993). For observed experience-squared, we see a similar pattern[12].

[12] When using observed experience squared, returns to observed experience are lowest for western immigrants (-5.6), followed by non-western immigrants (-6.6). Unlike observed experience, where natives and second-generation males achieved the same returns, we see slightly higher negative returns to observed experience-squared among all native (-7.7) males than second generation males (-7.1). Among females, we see the highest negative returns for

Table 4: Wages, Male and Female, pooled OLS and random effects estimations (group-specific coefficient)

	(1)	(2)	(3)	(4)
VARIABLES	Pooled -male	Pooled-female	RE-male	RE-female
Obs-Exp				
Swedish	0.034***	0.011***	0.043***	0.020***
	(0.000)	(0.000)	(0.000)	(0.000)
Second Generation	0.033***	0.012***	0.043***	0.020***
	(0.000)	(0.000)	(0.000)	(0.000)
Western Immigrant	0.022***	0.019***	0.030***	0.026***
	(0.000)	(0.000)	(0.000)	(0.000)
Non-Western Immigrant	0.031***	0.025***	0.035***	0.026***
	(0.000)	(0.000)	(0.000)	(0.000)
Obs-Exp^/100				
Swedish	-0.045***	0.013***	-0.077***	-0.014***
	(0.000)	(0.000)	(0.000)	(0.000)
Second Generation	-0.044***	0.012***	-0.071***	-0.010***
	(0.001)	(0.001)	(0.001)	(0.001)
Western Immigrant	-0.024***	-0.021***	-0.056***	-0.043***
	(0.001)	(0.001)	(0.001)	(0.001)
Non-Western Immigrant	-0.054***	-0.041***	-0.066***	-0.040***
	(0.001)	(0.001)	(0.001)	(0.002)
Years of Edu				
Swedish	0.036***	0.029***	0.053***	0.039***
	(0.000)	(0.000)	(0.000)	(0.000)
Second Generation	0.035***	0.026***	0.049***	0.035***
	(0.000)	(0.000)	(0.000)	(0.000)
Western Immigrant	0.024***	0.019***	0.038***	0.029***
	(0.000)	(0.000)	(0.000)	(0.000)
Non-Western Immigrant	0.018***	0.015***	0.024***	0.021***
	(0.000)	(0.000)	(0.000)	(0.000)
Metro Cities				
Swedish	0.079***	0.131***	0.084***	0.133***
	(0.000)	(0.000)	(0.001)	(0.001)
Second Generation	0.063***	0.109***	0.071***	0.116***
	(0.001)	(0.001)	(0.002)	(0.002)
Western Immigrant	0.037***	0.078***	0.037***	0.078***
	(0.001)	(0.001)	(0.002)	(0.002)
Non-Western Immigrant	0.038***	0.061***	0.032***	0.060***
	(0.001)	(0.002)	(0.003)	(0.003)
Metro Regions				
Swedish	0.092***	0.102***	0.084***	0.095***
	(0.000)	(0.000)	(0.001)	(0.001)
Second Generation	0.078***	0.092***	0.070***	0.085***
	(0.001)	(0.001)	(0.002)	(0.002)
Western Immigrant	0.054***	0.070***	0.045***	0.062***

western immigrants (-4.3) and then non-western immigrants (-4.0), with smallest negative returns among second generation (1.0) and then all native (1.4) females.

	(0.001)	(0.001)	(0.002)	(0.002)
Non-Western Immigrant	0.050***	0.055***	0.038***	0.051***
	(0.001)	(0.002)	(0.003)	(0.003)
Urban areas				
Swedish	0.020***	0.032***	0.022***	0.033***
	(0.000)	(0.000)	(0.000)	(0.001)
Second Generation	0.018***	0.027***	0.018***	0.028***
	(0.001)	(0.001)	(0.002)	(0.002)
Western Immigrant	0.011***	0.019***	0.007***	0.018***
	(0.001)	(0.001)	(0.002)	(0.002)
Non-Western Immigrant	0.014***	0.012***	0.001	0.008**
	(0.001)	(0.002)	(0.003)	(0.003)
Self-employment				
Swedish	-0.154***	-0.068***	-0.098***	-0.064***
	(0.000)	(0.001)	(0.001)	(0.001)
Second Generation	-0.154***	-0.077***	-0.106***	-0.078***
	(0.001)	(0.002)	(0.002)	(0.004)
Western Immigrant	-0.180***	-0.075***	-0.105***	-0.068***
	(0.002)	(0.003)	(0.003)	(0.004)
Non-Western Immigrant	-0.131***	-0.065***	-0.088***	-0.049***
	(0.003)	(0.004)	(0.004)	(0.006)
Occupation dummies	yes	yes	yes	yes
Age interval dummies	yes	yes	yes	yes
Age at migration interval dummies	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Sector dummies	yes	yes	yes	yes
Observations	15,248,422	7,607,694	15,248,422	7,607,694
R-squared	0.384	0.344		
Unique individual	2,044,298	1,266,737	2,044,298	1,266,737

As we noted earlier, it is important to look at returns to education because observed experience may not tell the full story about wages for women and immigrants (e.g reflecting discontinuity in the labor market), and this could lead to overestimation of the observed experience coefficient. Results for returns to education show that native employees have the highest returns to education, and this is lower for females. Among males, returns to education were highest for native (5.3) and second generation (4.9) workers, followed by western immigrants (3.8) and lowest returns for non-western immigrants (2.4). Among females, returns to education followed the same order, with highest returns for natives (3.9) and second generation (3.5), and lower returns for western immigrants (2.9) and lowest for non-western immigrants (2.1). The difference in returns to education among second generation and natives was small, about 0.5 percent for both males and females. The largest gaps in returns to education are between non-western immigrants and native employees, but this is significantly larger and more than double among males (2.4 compared to 5.3) than females (2.1 compared to 3.9).

Interestingly, when returns to observed experience are compared with returns to education, we find that all groups except non-western immigrants have higher returns to education than to observed experience. This holds for males and females who are natives, second-generation and western immigrants. However, for non-western immigrants, returns are higher to observed experience (3.5) than to education (2.4).

We also see from Table 4 that all groups have negative returns to self-employment[13]. Among males, the negative returns are lowest for non-western immigrants (-8.8), followed by natives (-9.8). The negative returns to self-employment among males are highest for second

[13] Note this result is only based on their reported wage income. We have not considered capital income. Hence, results should be interpreted with caution.

generation (-10.6) and western immigrants (-10.5), with negligible difference between the two groups. We find a similar trend among females. The smallest negative returns are for non-western immigrants (-4.9), followed by natives (-6.4), western immigrants (-6.8) and highest for second generation (-7.8). Interestingly, the negative return to self-employment is smallest for immigrant females (-7.8) and largest for second-generation males (-10.6)[14].

The estimated coefficients for regional classifications are only reported in table 4 (the rest are not reported to save space, but are available from the authors upon request). For males, using rural areas as the reference category, there is about 8.4 percent return for natives from metro cities and metro regions, and about 7 percent for second generation. Among immigrants, returns from agglomeration are lower, but still positive and highly significant, at about 4 percent for western and about 3 percent for non-western immigrants. No difference or very weak returns can be seen between urban areas and rural areas for both western and non-western immigrants, whereas both natives and the second generation have about 2 percent return from living in urban areas as compared to rural areas.

Regional differences are much higher for female employees. Living in metro regions means about 13 percent return for native females, 11 percent for second generation females, about 8 percent for western immigrants and 6.5 percent for non-western immigrants. Metro regions are associated with lower but still highly significant positive returns of about 10 percent for natives, 9 percent for second generation, 6.5 percent for western and 5.5 percent for non-western immigrants. Compared with rural areas, urban areas are still associate with positive

[14] To test if heterogeneity of income sources affects results, we also estimated the model excluding self-employed individuals and individuals reporting positive or negative revenue from business ownership, beside the main income from employment. Since there is no major dissimilarity in the results, we report the estimates for the whole population to avoid creating selectivity bias.

returns, but with lower magnitude, ranging from 3 percent for natives to lowest returns of about 1 percent for non-western immigrant females.

We now turn to Tables 5 and 6, which report random effect estimations on wages for males and females respectively, across four levels of education – less than high school, high school, some college and college.

Table 5: Wages, Males by education, random effect estimation (group specific coefficient)

	(1)	(5)	(6)	(7)
VARIABLES	Less	High School	Some College	College
Obs-Exp				
Swedish	0.034***	0.032***	0.050***	0.066***
	(0.000)	(0.000)	(0.000)	(0.000)
Second Generation	0.034***	0.033***	0.051***	0.066***
	(0.001)	(0.000)	(0.001)	(0.001)
Western Immigrant	0.028***	0.025***	0.035***	0.040***
	(0.001)	(0.000)	(0.001)	(0.001)
Non-Western Immigrant	0.027***	0.030***	0.040***	0.048***
	(0.001)	(0.000)	(0.001)	(0.001)
Obs-Exp^/100				
Swedish	-0.062***	-0.046***	-0.078***	-0.136***
	(0.001)	(0.000)	(0.001)	(0.001)
Second Generation	-0.058***	-0.045***	-0.079***	-0.131***
	(0.002)	(0.001)	(0.003)	(0.003)
Western Immigrant	-0.056***	-0.043***	-0.057***	-0.083***
	(0.002)	(0.001)	(0.003)	(0.003)
Non-Western Immigrant	-0.051***	-0.052***	-0.069***	-0.095***
	(0.003)	(0.002)	(0.004)	(0.003)
Years of Edu				
Swedish	0.094***	0.090***	-0.011***	0.048***
	(0.001)	(0.001)	(0.001)	(0.001)
Second Generation	0.066***	0.076***	0.001	0.050***
	(0.005)	(0.001)	(0.004)	(0.002)
Western Immigrant	0.031***	0.034***	0.005	0.044***
	(0.003)	(0.001)	(0.004)	(0.002)
Non-Western Immigrant	0.019***	0.018***	0.017***	0.044***
	(0.003)	(0.001)	(0.004)	(0.002)
Self-employment				
Swedish	-0.039***	-0.077***	-0.131***	-0.171***
	(0.002)	(0.001)	(0.002)	(0.002)
Second Generation	-0.047***	-0.080***	-0.132***	-0.181***
	(0.005)	(0.003)	(0.005)	(0.005)
Western Immigrant	-0.047***	-0.077***	-0.130***	-0.177***
	(0.006)	(0.004)	(0.008)	(0.007)

Non-Western Immigrant	-0.007	-0.068***	-0.103***	-0.161***
	(0.008)	(0.006)	(0.010)	(0.009)
Occupation dummies	yes	yes	yes	yes
Age interval dummies	yes	yes	yes	yes
Age at migration interval dummies	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Sector dummies	yes	yes	yes	yes
Observations	2,563,342	8,285,844	2,013,166	2,386,070
Unique individual	359,260	1,087,520	282,922	360,984

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, *p<0.1

Table 6: Wages, Females by education, random effect estimation (group specific coefficient)

	(1)	(2)	(3)	(4)
VARIABLES	Less	High school	Some college	College
Obs-Exp				
Swedish	0.021***	0.014***	0.023***	0.023***
	(0.000)	(0.000)	(0.000)	(0.000)
Second Generation	0.021***	0.015***	0.021***	0.027***
	(0.001)	(0.001)	(0.001)	(0.001)
Western Immigrant	0.022***	0.022***	0.027***	0.034***
	(0.001)	(0.000)	(0.001)	(0.001)
Non-Western Immigrant	0.025***	0.022***	0.026***	0.035***
	(0.001)	(0.001)	(0.001)	(0.001)
Obs-Exp^/100				
Swedish	-0.035***	0.000	-0.011***	-0.011***
	(0.002)	(0.001)	(0.001)	(0.001)
Second Generation	-0.025***	0.003*	-0.002	-0.019***
	(0.004)	(0.002)	(0.004)	(0.003)
Western Immigrant	-0.044***	-0.031***	-0.032***	-0.054***
	(0.002)	(0.001)	(0.003)	(0.003)
Non-Western Immigrant	-0.045***	-0.027***	-0.026***	-0.055***
	(0.003)	(0.003)	(0.005)	(0.004)
Years of Edu				
Swedish	0.080***	0.050***	-0.018***	0.057***
	(0.002)	(0.001)	(0.001)	(0.001)
Second Generation	0.040***	0.041***	-0.007*	0.059***
	(0.007)	(0.002)	(0.004)	(0.002)
Western Immigrant	0.022***	0.026***	0.007	0.048***
	(0.003)	(0.001)	(0.004)	(0.002)
Non-Western Immigrant	0.012***	0.014***	0.011**	0.044***
	(0.004)	(0.002)	(0.005)	(0.002)
Self-employment				
Swedish	-0.007**	-0.035***	-0.090***	-0.130***
	(0.003)	(0.002)	(0.003)	(0.003)

Second Generation	-0.010	-0.048***	-0.092***	-0.145***
	(0.011)	(0.005)	(0.009)	(0.007)
Western Immigrant	0.004	-0.036***	-0.086***	-0.128***
	(0.011)	(0.006)	(0.011)	(0.007)
Non-Western Immigrant	-0.011	-0.025***	-0.065***	-0.095***
	(0.014)	(0.010)	(0.015)	(0.012)
Occupation dummies	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Sector dummies	yes	yes	yes	yes
Observations	999,171	3,914,262	1,100,909	1,593,352
Unique individual	168,566	628,443	202,500	311,001

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, *p<0.1

Among males, we see very similar wage returns to observed experience across educational status for natives, with no or negligible differences for the second-generation. For males with less than high school education, we see fairly low returns across groups with lower returns for immigrants (2.7 for non-western and 2.8. for western) than for natives and second generation (both 3.4). For males with a high school education, we see a similar trend, with lower returns among immigrants than natives. For this group, the lowest returns are for western immigrants (2.5), followed by non-western immigrants (3.0), and higher and very similar returns for natives (3.2) and second generation (3.3). A similar pattern is found for males with some college, with the lowest returns among western immigrants (3.5) and non-western immigrants (4.0), and highest returns among second generation (5.1) and natives (5.0). For each group, the college educated achieve highest wage returns to observed experience, with the greatest returns for natives (6.6), followed by non-western immigrants (4.8) and western immigrants (4.0). Interestingly, we find that the gap in returns to observed experience widens significantly as males get more educated. Return on experience is still higher than return on education for non-western immigrants in different educational levels.

When it comes to returns to self-employment, the second-generation consistently achieves the poorest returns, and non-western immigrants consistently achieve the least negative

returns – this holds for males regardless of educational status. As males become more educated, their returns to self-employment worsen. Also, in contrast to the trend for returns to education, we find that returns to self-employment actually worsen at higher levels of education, and this holds across groups. The gap in returns to self-employment is greatest for males with some college (2.9), followed by males with college degrees (2.0), and lower for those with high school (1.2) or less than high school education (0.8).

Table 6 contains the same random effect estimations on wages for females. Among females with less than high school education, immigrants have higher observed returns to experience than natives. Non-western immigrants have the highest returns (2.5), followed by western immigrants (2.2), and natives and second generation (both 2.1). Similarly, among females with high school education, immigrants have higher returns to observed experience (2.2) than natives, among which returns are marginally higher for second generation (1.5) than all natives (1.4). For females with some college, the highest returns are again for immigrants, marginally higher for western immigrants (2.7) than non-western immigrants (2.2), and somewhat lower for natives (2.3) and lowest for second generation (2.1). Among college educated females, returns are highest for immigrants again, marginally higher for non-western (3.5) immigrants than western immigrants (3.4), followed by second generation (2.7) and then all natives (2.3). Returns to observed experience improve as female become more educated. It is worth pointing out that as women become more educated, wage returns to observed experience tend to increase, with the exception of wages for females with a high school degree. For this group, returns to observed experience are actually lower than those with less than a high school degree for natives (1.4 compared to 2.1) and for second generation (1.5 compared to 2.1). In addition, the gap between highest and lowest returns to observed experience tends to get larger at

higher levels of education: 0.4 for less than high school education and 0.8 for high school education, and 0.6 for those with some college, and 1.2 for college degree.

A noteworthy observation is that returns to education drops for females with less than college education, but jumps significantly once females have achieved a college education. This holds for all groups. It is also worth noting that, among non-western immigrants, return on experience is higher than return on education for all education levels except for the highest education level.

Finally, we estimate the wage equation for only those immigrants with latest education in Sweden, reported in Table 7. Our earlier estimations, in Table 4, was not restricted to latest education in Sweden. For male employees with latest education in Sweden, the returns on experience and education increase, and interestingly, the return on experience is just as high as native and second generation workers. However, the return on education is still significantly lower than return on experience for non-western immigrant males. For female employees with latest education in Sweden, return on labor market experience is similar as before for both groups, but return on education is higher and similar for both western and non-western immigrant females.

Table 7 Wages, Immigrant Male and Female with Swedish education, pooled OLS and random effects estimations

	(1)	(2)	(3)	(4)
VARIABLES	Pooled -male	Pooled-female	RE-male	RE-female
Obs-Exp				
Western Immigrant	0.033***	0.021***	0.038***	0.028***
	(0.000)	(0.001)	(0.001)	(0.001)
Non-Western Immigrant	0.041***	0.023***	0.044***	0.025***
	(0.001)	(0.001)	(0.001)	(0.001)
Obs-Exp^/100				
Western Immigrant	-0.045***	-0.017***	-0.065***	-0.038***
	(0.002)	(0.002)	(0.002)	(0.002)
Non-Western Immigrant	-0.077***	-0.027***	-0.079***	-0.025***
	(0.002)	(0.003)	(0.003)	(0.004)
Years of Edu				
Western Immigrant	0.034***	0.030***	0.042***	0.035***
	(0.000)	(0.000)	(0.001)	(0.001)
Non-Western Immigrant	0.028***	0.029***	0.034***	0.034***
	(0.000)	0.021***	(0.001)	(0.001)
Self-employment				
Western Immigrant	-0.184***	-0.111***	-0.124***	-0.101***
	(0.003)	(0.005)	(0.005)	(0.008)
Non-Western Immigrant	-0.147***	-0.055***	-0.114***	-0.064***
	(0.005)	(0.008)	(0.007)	(0.010)
Occupation dummies	yes	yes	yes	yes
Age interval dummies	yes	yes	yes	yes
Age at migration interval dummies	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Sector dummies	yes	yes	yes	yes
Observations	275,234	442,435	275,234	442,435
R-squared	0.336	0.388		
Unique individual	56,072	74,283	56,072	74,283

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, *p<0.1

4.2. Robustness check

As a robustness check, we also run our estimations using a sample of employees aged 16-65. We also run a second robustness check using individuals born after 1960, whose labor market experience can be observed fully. Results are similar to our main findings, and can be found in Appendix D. Our main findings are based on individuals employed in the private sector.

As an additional robustness check, we also run estimations for both private and public sector employees simultaneously and find robust results (not reported).

5. Discussion

We find distinct and significant patterns in the wage outcomes of immigrants, second generation, and natives. Our analysis shows that these patterns differ among males and females, as well as by region; further, our findings reveal significant variation in returns to education and experience among immigrants, second generation, and natives. Several of our findings can be useful for policymakers considering how to improve labor market participation and wage outcomes of immigrants.

Our study generates insights for policymakers interested in boosting labor market outcomes among immigrants. While returns to observed experience are lower for immigrant males than second generation and natives, returns to observed experience are actually higher for immigrant females than the other groups. This indicates that female immigrants may be better able to leverage professional experience than male immigrants. With an eye toward more rapid results, our findings suggest that targeting supportive work experience opportunities may be especially promising for female immigrants because of higher returns to observed experience. However, when it comes to returns to education, we find that for both males and females, returns are highest for natives and lowest for immigrants. In addition, among male and female immigrants, returns to education are lowest for non-western immigrants. When compared against each other, returns to observed experience are lower than returns to education for all groups, male and female, except non-western immigrants; for non-western immigrants, male and female, returns to observed experience are higher than returns to education. These results are meaningful

for several reasons. When it comes to female immigrants specifically, policymakers may be tempted to focus on professional development opportunities than on education. However, this is not a long-term solution because returns to education for female immigrants should still be addressed. The underlying reasons why returns to education are consistently low among immigrants overall, both male and female, is an important concern and target for policy. This could be related to some sociocultural questions, since we also find lowest returns to education among non-western immigrants for both males and females. Related to this, policy-makers could consider programs which address specific types of immigrants. Since returns to observed experience are higher than returns to education for non-western male and female immigrants, this indicates there may be gains from programs which support employment opportunities specifically for non-western immigrants, e.g. internships, apprenticeships, work-study certification type programs, etc. Also, we find that the largest gap in returns to education are between natives and non-western immigrants, for both males and females. This gap is more than double for males than females, suggesting policymakers should pay special attention to enhancing educational programs for non-western male immigrants, who have a hard time capturing their wage potential.

Our findings related to the second generation are also of policy interest, given that the second generation is expanding in Sweden (Nordin and Rooth, 2007) and many other receiving countries. Previous research suggests that "Swedish-specific" human capital passed from at least one Swedish-born parent can matter for the annual income of the second generation (Rooth and Ekberg, 2003). Returns to observed experience among second generation and natives, for both males and females, are not substantially different across educational status. In some cases, for example for males with some college, the second generation achieves slightly higher returns to

observed experience than natives. However, returns to education between the second generation and natives vary at different levels of educational status. For males and females, the second generation has notably lower returns on education than natives at lower levels of education; however, for males and females with a college degree, the second generation achieves slightly higher returns on education than natives. This indicates there may be a slight lag in educational systems before college, but that the second generation which attend college are able to leverage wage gains through their education. The findings overall suggest policy efforts aimed at boosting second generation economic outcomes could target lower levels of education, where our findings points to differences. Further research could help policymakers with economic integration, by disentangling reasons for different human capital between the second generation and natives, as well as between groups in the second generation (Nordin and Rooth, 2007).

Our findings on geographic location indicate, not surprisingly, that there are advantages to agglomeration for employees living in metro regions. Interestingly, female immigrants seem to benefit more than male immigrants, perhaps due to the industrial profile of metro regions. Non-western immigrants, males and females, tend to have the lowest returns to living in metro regions. The tendency of new migrants to concentrate in metro regions (SCB, 2008) suggests programs aimed at male immigrants could be beneficial, as well as programs aimed at non-western immigrants. These programs may be especially cost-efficient for Swedish policymakers, because agglomeration can cut costs of implementation related to information sharing and reaching intended participations in the programs.

A key limitation when interpreting our findings is that we are unable to distinguish between economic and refugee immigrants. This is very difficult to capture empirically, limited in part by data sensitivity and data availability, so knowledge on the economic impact of refugee

immigration by itself is limited (see Chung, 2010). However, this is a highly policy-relevant question. Even studies which focus on migrants from conflict areas or with special status have to make assumptions due to data limitations. For example, Orrenius and Zavodny (2015) studied the labor market effects of immigrants who received temporary protected status (TPS) in the US, a provision for unauthorized immigrants already in the US whose countries were in crisis[15]. They compared immigrants from El Salvador who likely benefited from a 2001 TPS program with those after 2001, who could not use the program. They also assumed that migrants from El Salvador who were eligible for TPS would have used it, but could not empirically verify for each individual, and compared against migrants from Mexico (who were not eligible). They did not examine immigrants who arrived as refugees to start with, but their findings provided cues related to refugee immigrants because political instability in El Salvador was protracted and long-term.

While previous research has examined other distinctions among immigrant groups like the kind of visa (e.g. Hunt, 2011, accounted for visa type at entry, but did not include refugee status), the difference between economic and refugee immigrants remains largely unstudied (Cortes, 2004). Several questions are especially relevant here. First, what is the nature, and extent of, differences in human capital among immigrants based on initial immigration status? In other words, do economic immigrants tend to be better educated or more skilled than refugee immigrants? Intuitively, this should be the case since economic immigrants, even those who originally arrive on temporary work permits, fulfill labor needs in the receiver countries, whereas refugee immigrants may represent a more general slice of the population of sender countries. In addition, how do these differences translate into wages, but also into educational achievement and occupational selection, over time? In her study of immigrant and refugee immigrants in the

[15] This can include non-political crises, e.g, the Ebola epidemic (see Orrenius and Zavodny, 2015).

United States, Cortes (2004) found that refugee immigrants outperform other immigrants over time, despite more disadvantages in the short-term. This suggests deeper investigation on refugee immigrants as a group itself, and in comparison with other immigrants, is necessary.

Available data on immigrants in receiving countries does not allow for systematic examination of differences in the effects of home country human capital versus human capital acquired in the receiving country. Limited previous research shows lower returns to foreign human capital, both for foreign versus US labor market experience (Akee and Yuksel, 2008) and for foreign versus Canadian education (Ferrer and Riddell, 2008; Schaafsma and Sweetman, 2001). Accounting for home country human capital can be especially challenging for refugees, especially during mass flows, because it is extremely difficult for international organizations and receiving country agencies to process and manage large numbers of people. When it becomes possible to collect information on home country human capital of refugees, it would be informative particularly because it would shed light on the challenge of skill transferability. In turn, this could help minimize productivity losses from imperfect skill transferability, e.g. if skilled refugees with nursing degrees from their home countries are working in low skill jobs in receiving countries. Knowing more about the extent and size of imperfect skill transferability can help policymakers more quickly and more effectively design policies which can help bridge the gap, which can in some professions result from regulations about certifications, apprenticeships/internships, and degree requirements.

6. Conclusion

We investigate the trend and determinants of wages among immigrants, as compared to natives, for the years 2001-2012 in Sweden. We consider economically active employees aged

25-65, and we examined how four groups – natives, second generation, western immigrants, and non-western immigrants - fared in terms of wages. We focus specifically on human capital, measured both as education and labor market experience, and we also investigated returns to self-employment.

Our findings show significant disparities in wages between immigrants versus natives across almost all groups and occupations, as well as poorer outcomes for females overall. We consider four groups – natives, second generation which have at least one foreign-born parent, western immigrants, and non-western immigrants. Our findings show significant differences in the wage outcomes of these groups, not only across gender but also across level of education (less than high school, high school, less than college, college). We also find that the returns to observed labor market experience and to education differ significantly for each of our groups by gender and by education.

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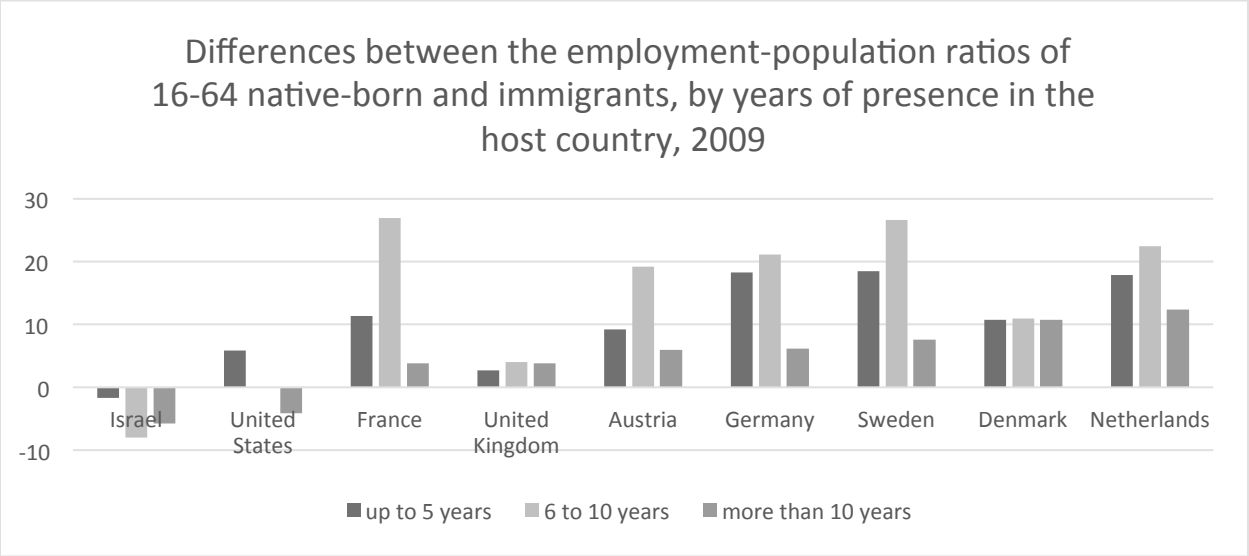
APPENDIX A:

Native-immigrant employment-population ratios in Sweden and other receiving countries



Sources: International Migration Outlook (OECD, 2011); EU Labour Force Survey, 2009; US CPS March Supplement, 2009; Israel CBS Labour Force Surveys (Analysis by Myers-JDC-Brookdale Institute), 2009 (15-64 years); Information on data for Israel: http://dx.doi.org/10.1787/888932315602

APPENDIX B:

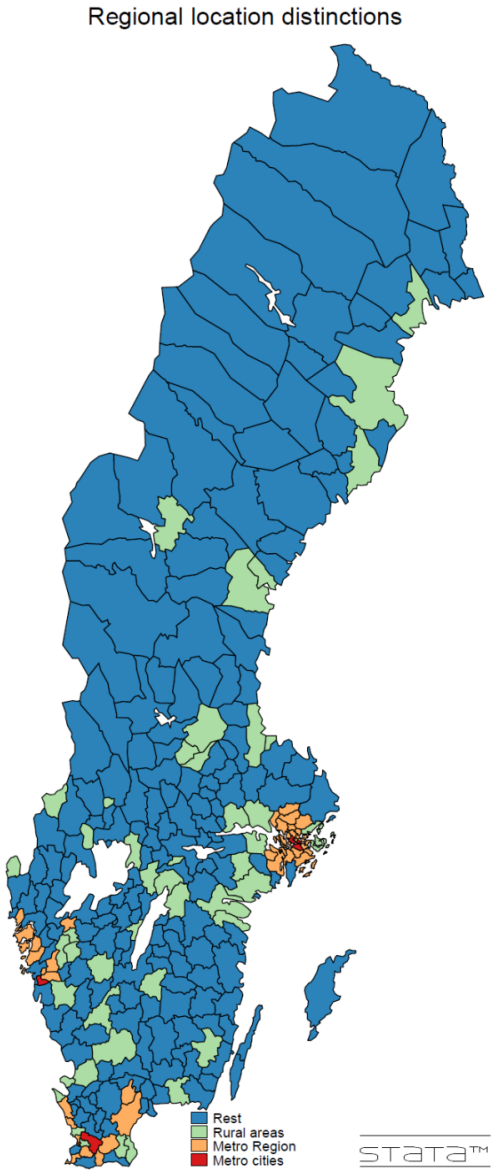
Swedish Standard Classification of Occupations (SSYK) - One digit level

1	Legislators, senior officials and managers
2	Professionals
3	Technicians and associate professionals
4	Clerks
5	Service workers and shop sales workers
6	Skilled agricultural and fishery workers
7	Craft and related trades workers
8	Plant and machine operators and assemblers
9	Elementary occupations
0	Armed forces (omitted in this study)

Source: http://www.scb.se/Grupp/Hitta_statistik/Forsta_Statistik/Klassifikationer/_Dokument/In-English.docx

APPENDIX C:

Metro regions



APPENDIX D: *Robustness checks*

Table A1: Summary statistics for male fulltime equivalent private sector employees- born after 1960

	(1)	(2)	(3)	(4)
	Natives	Second Generation	Western Immigrants	Non-Western Immigrants
	mean/sd	mean/sd	mean/sd	mean/sd
Log wage	12.59	12.57	12.51	12.39
	0.36	0.37	0.37	0.36
Age 25-34	0.42	0.44	0.37	0.46
	0.49	0.50	0.48	0.50
Age 35-44	0.46	0.45	0.50	0.43
	0.50	0.50	0.50	0.49
Age 45-54	0.11	0.10	0.14	0.12
	0.32	0.31	0.34	0.32
Obs-Exp	15.12	14.44	10.44	8.50
	6.07	6.17	6.57	5.58
Edu years	12.20	12.12	12.26	12.03
	2.01	2.02	2.42	2.55
Managers	0.08	0.08	0.06	0.04
	0.28	0.27	0.23	0.19
Professionals	0.15	0.15	0.13	0.11
	0.36	0.36	0.34	0.31
Technicians &	0.20	0.20	0.13	0.10
associate professionals	0.40	0.40	0.34	0.30
Clerks	0.05	0.06	0.06	0.08
	0.22	0.24	0.24	0.27
Service shop sales	0.07	0.08	0.07	0.16
	0.25	0.28	0.26	0.37
Skilled agricultural and	0.01	0.01	0.01	0.00
fishery workers	0.10	0.08	0.09	0.06
Craft and related	0.20	0.18	0.18	0.11
trades workers	0.40	0.39	0.39	0.31
Plant and machine	0.19	0.19	0.27	0.24
operators and assemblers	0.40	0.39	0.44	0.42
Elementary	0.03	0.04	0.08	0.17
	0.18	0.20	0.28	0.37
Self-employed	0.06	0.06	0.04	0.03
	0.24	0.23	0.19	0.18
Swedish Edu	-	-	0.32	0.37
	-	-	0.47	0.48
Age at migration	-	-	20.10	20.28
	-	-	11.25	10.52
Age at migration<16			0.33	0.31
			0.47	0.46
Age at migration 16-30			0.49	0.54
			0.50	0.50
Age at migration 31-45			0.17	0.15
			0.37	0.35
Age at migration >45			0.01	0.00
			0.08	0.06
Metro Cities	0.17	0.24	0.25	0.36
	0.37	0.42	0.44	0.48

Metro Regions	0.18	0.25	0.24	0.29
	0.39	0.43	0.42	0.45
Urban areas	0.30	0.26	0.25	0.23
	0.46	0.44	0.43	0.42
Rest	0.35	0.25	0.26	0.12
	0.48	0.43	0.44	0.32
Observations	7,286,577	1,058,769	622,178	446,809

Table A2: Summary statistics for female fulltime equivalent private sector employees- born after 1960

	(1)	(2)	(3)	(4)
	Natives	Second Generation	Western Immigrants	Non-Western Immigrants
	mean/sd	mean/sd	mean/sd	mean/sd
Log wage	12.39	12.39	12.35	12.28

	0.35	0.35	0.34	0.33
Age 25-34	0.41	0.44	0.34	0.43
	0.49	0.50	0.48	0.49
Age 35-44	0.47	0.45	0.51	0.45
	0.50	0.50	0.50	0.50
Age 45-54	0.12	0.11	0.15	0.12
	0.32	0.31	0.35	0.33
Obs-Exp	14.86	14.21	10.30	8.63
	6.11	6.20	6.55	5.55
Edu years	12.71	12.55	12.69	12.15
	2.02	2.03	2.51	2.67
Managers	0.06	0.05	0.04	0.03
	0.23	0.23	0.19	0.16
Professionals	0.19	0.17	0.16	0.11
	0.39	0.38	0.36	0.32
Technicians &	0.24	0.23	0.18	0.14
associate professionals	0.43	0.42	0.38	0.35
Clerks	0.18	0.19	0.14	0.11
	0.38	0.39	0.35	0.31
Service shop sales	0.20	0.21	0.20	0.32
	0.40	0.41	0.40	0.47
Skilled agricultural and	0.01	0.01	0.01	0.00
fishery workers	0.08	0.07	0.07	0.05
Craft and related	0.02	0.02	0.02	0.01
trades workers	0.13	0.13	0.15	0.12
Plant and machine	0.06	0.07	0.12	0.08
operators and assemblers	0.24	0.25	0.33	0.27
Elementary	0.04	0.05	0.14	0.20
	0.20	0.22	0.34	0.40
Self-employed	0.03	0.03	0.02	0.02
	0.17	0.16	0.15	0.14
Swedish Edu	.	.	0.33	0.38
	.	.	0.47	0.49
Age at migration	.	.	20.08	19.18
	.	.	10.64	11.37
Age at migration<16	0.00	0.00	0.30	0.34
	0.00	0.00	0.46	0.47
Age at migration 16-30	0.00	0.00	0.55	0.51
	0.00	0.00	0.50	0.50
Age at migration 31-45	0.00	0.00	0.14	0.15
	0.00	0.00	0.35	0.35
Age at migration >45	1.00	1.00	0.00	0.00
	0.00	0.00	0.07	0.06
Metro Cities	0.22	0.29	0.29	0.36
	0.42	0.46	0.45	0.48
Metro Regions	0.22	0.28	0.27	0.31
	0.41	0.45	0.44	0.46
Urban areas	0.28	0.23	0.22	0.20
	0.45	0.42	0.41	0.40
Rest	0.28	0.20	0.22	0.12
	0.45	0.40	0.42	0.33
Observations	3,599,568	564,076	361,007	260,969

Table A3: Wages, Male and Female, born after 1960, pooled OLS and random effects estimations

	(1)	(2)	(3)	(4)
VARIABLES	Pooled -male	Pooled-female	RE-male	RE-female
Obs-Exp				
Swedish	0.033***	0.009***	0.038***	0.011***
	(0.000)	(0.000)	(0.000)	(0.000)
Second Generation	0.034***	0.011***	0.039***	0.014***
	(0.000)	(0.000)	(0.000)	(0.000)
Western Immigrant	0.029***	0.024***	0.033***	0.025***
	(0.000)	(0.000)	(0.000)	(0.000)
Non-Western Immigrant	0.037***	0.027***	0.038***	0.027***
	(0.000)	(0.000)	(0.000)	(0.000)
Obs-Exp^/100				
Swedish	-0.048***	0.021***	-0.055***	0.022***
	(0.000)	(0.000)	(0.000)	(0.001)
Second Generation	-0.048***	0.015***	-0.059***	0.012***
	(0.001)	(0.001)	(0.001)	(0.001)
Western Immigrant	-0.044***	-0.036***	-0.050***	-0.029***
	(0.001)	(0.001)	(0.001)	(0.002)
Non-Western Immigrant	-0.078***	-0.049***	-0.071***	-0.037***
	(0.001)	(0.002)	(0.002)	(0.002)
Years of Edu				
Swedish	0.038***	0.030***	0.051***	0.039***
	(0.000)	(0.000)	(0.000)	(0.000)
Second Generation	0.035***	0.026***	0.046***	0.034***
	(0.000)	(0.000)	(0.000)	(0.000)
Western Immigrant	0.025***	0.017***	0.037***	0.025***
	(0.000)	(0.000)	(0.000)	(0.000)
Non-Western Immigrant	0.016***	0.014***	0.022***	0.019***
	(0.000)	(0.000)	(0.000)	(0.000)
Self-employment				
Swedish	-0.126***	-0.061***	-0.101***	-0.071***
	(0.001)	(0.001)	(0.001)	(0.002)
Second Generation	-0.134***	-0.062***	-0.108***	-0.076***
	(0.002)	(0.003)	(0.003)	(0.004)
Western Immigrant	-0.162***	-0.081***	-0.116***	-0.078***
	(0.003)	(0.004)	(0.004)	(0.006)
Non-Western Immigrant	-0.123***	-0.058***	-0.095***	-0.051***
	(0.003)	(0.005)	(0.005)	(0.007)
Occupation dummies	yes	yes	yes	yes
Age group dummies	yes	yes	yes	yes
Age at migration group dummies	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Sector dummies	yes	yes	yes	yes
Observations	9,193,915	4,686,878	9,193,915	4,686,878
R-squared	0.39	0.344		
Unique individual	1,253,249	828,080	1,253,249	828,080

Table A4: Wages, Males by education, born after 1960, random effect estimation

	(1)	(5)	(6)	(7)
VARIABLES	Less	high school	Some College	College
Obs-Exp				
Swedish	0.027***	0.026***	0.045***	0.059***
	(0.000)	(0.000)	(0.000)	(0.000)
Second Generation	0.029***	0.030***	0.047***	0.061***
	(0.001)	(0.000)	(0.001)	(0.001)
Western Immigrant	0.027***	0.026***	0.038***	0.047***
	(0.001)	(0.000)	(0.001)	(0.001)
Non-Western Immigrant	0.029***	0.032***	0.044***	0.054***
	(0.001)	(0.001)	(0.001)	(0.001)
Obs-Exp^/100				
Swedish	-0.033***	-0.024***	-0.053***	-0.103***
	(0.001)	(0.001)	(0.001)	(0.001)
Second Generation	-0.039***	-0.034***	-0.062***	-0.112***
	(0.003)	(0.001)	(0.003)	(0.003)
Western Immigrant	-0.044***	-0.033***	-0.050***	-0.088***
	(0.003)	(0.001)	(0.004)	(0.004)
Non-Western Immigrant	-0.054***	-0.052***	-0.074***	-0.107***
	(0.003)	(0.002)	(0.005)	(0.005)
Years of Edu				
Swedish	0.062***	0.077***	0.003*	0.052***
	(0.006)	(0.001)	(0.002)	(0.001)
Second Generation	0.068***	0.065***	0.011**	0.051***
	(0.013)	(0.002)	(0.004)	(0.002)
Western Immigrant	0.025***	0.032***	0.017***	0.040***
	(0.005)	(0.001)	(0.005)	(0.002)
Non-Western Immigrant	0.019***	0.018***	0.021***	0.044***
	(0.004)	(0.002)	(0.004)	(0.002)
Self-employment				
Swedish	-0.052***	-0.079***	-0.126***	-0.166***
	(0.003)	(0.001)	(0.002)	(0.002)
Second Generation	-0.049***	-0.084***	-0.138***	-0.182***
	(0.007)	(0.003)	(0.007)	(0.007)
Western Immigrant	-0.048***	-0.088***	-0.127***	-0.185***
	(0.009)	(0.005)	(0.011)	(0.009)
Non-Western Immigrant	-0.016*	-0.080***	-0.114***	-0.168***
	(0.010)	(0.007)	(0.012)	(0.011)
Occupation dummies	yes	yes	yes	yes
Age group dummies	yes	yes	yes	yes
Age at migration group dummies	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Sector dummies	yes	yes	yes	yes
Observations	936,431	5,341,328	1,292,676	1,623,480
Unique individual	138,355	708,977	191,416	254,101

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, *p<0.1

Table A5: Wages, Females by education, born after 1960, random effect estimation

	(1)	(2)	(3)	(4)
VARIABLES	Less	High school	Some college	College
Obs-Exp				
Swedish	0.013***	0.005***	0.012***	0.013***
	(0.001)	(0.000)	(0.000)	(0.000)
Second Generation	0.014***	0.009***	0.014***	0.020***
	(0.001)	(0.001)	(0.001)	(0.001)
Western Immigrant	0.022***	0.021***	0.023***	0.032***
	(0.001)	(0.001)	(0.001)	(0.001)
Non-Western Immigrant	0.026***	0.022***	0.025***	0.036***
	(0.001)	(0.001)	(0.001)	(0.001)
Obs-Exp^/100				
Swedish	0.001	0.035***	0.034***	0.032***
	(0.002)	(0.001)	(0.002)	(0.001)
Second Generation	0.001	0.024***	0.026***	0.011***
	(0.005)	(0.002)	(0.004)	(0.004)
Western Immigrant	-0.032***	-0.017***	-0.009**	-0.037***
	(0.004)	(0.002)	(0.004)	(0.004)
Non-Western Immigrant	-0.044***	-0.023***	-0.017***	-0.054***
	(0.004)	(0.003)	(0.006)	(0.006)
Years of Edu				
Swedish	0.034***	0.039***	-0.009***	0.057***
	(0.012)	(0.001)	(0.002)	(0.001)
Second Generation	-0.012	0.036***	-0.007*	0.057***
	(0.019)	(0.002)	(0.004)	(0.002)
Western Immigrant	0.006	0.022***	0.011**	0.043***
	(0.005)	(0.002)	(0.005)	(0.002)
Non-Western Immigrant	0.009**	0.014***	0.013***	0.040***
	(0.004)	(0.002)	(0.005)	(0.003)
Self-employment				
Swedish	-0.014**	-0.038***	-0.099***	-0.131***
	(0.007)	(0.002)	(0.004)	(0.004)
Second Generation	-0.011	-0.043***	-0.100***	-0.143***
	(0.015)	(0.006)	(0.011)	(0.009)
Western Immigrant	0.006	-0.042***	-0.085***	-0.136***
	(0.021)	(0.009)	(0.018)	(0.010)
Non-Western Immigrant	-0.009	-0.019*	-0.062***	-0.104***
	(0.016)	(0.011)	(0.017)	(0.014)
Occupation dummies	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes
Sector dummies	yes	yes	yes	yes
Observations	336,812	2,442,919	706,193	1,200,954
Unique individual	64,811	414,702	140,932	244,746

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, *p<0.1

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