Estimating the wage premia of refugee immigrants: Lessons from Sweden

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Motivation for the study

- In recent years, the world's attention has been drawn to the plight of refugees and economic migrants.
- A major concern for the receiving country is the ability of these individuals to become well-integrated in their new society and become productive members of the workforce.
- We analyze wage income differences between refugee immigrants in Sweden and native workers in the skill-biased technological change framework, using a matched sample of longitudinal data drawn from the entire Swedish labor force over more than a decade.

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Review of literature

- Researchers have found that refugee immigrants (RIs) tend to concentrate in low paid jobs (Colic-Peisker and Tilbury, *J.Ref.Stud.*, 2006)
- RIs tend to earn lower wages than observationally equivalent natives (Dustman, Glitz, Vogel, *EER*, 2010; Dustman, Frattini, Preston, *REStud*, 2012; Llull, *JHR*, 2017)
- These differences tend to abate over time (Connor, *J.Ref.Stud.*, 2010)
- RIs often face discrimination in seeking better-paying jobs in the labor market (Grand and Szulkin, *Labour*, 2002)
- RIs, compared to other immigrants, usually have a worse starting point but better development in the longer term (Chin and Cortes, *Handbook of Migration*, 2015)

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- We seek to shed light on refugees' wage performance by analyzing the impact of occupational sorting on the wage gap between RIs and native workers.
- We adopt the occupational classification scheme of skill-biased technical change of Autor, Levy, Murnane (*QJE*, 2003) and Acemoglu and Autor (*Handbook of Labor Economics*, 2011) to compare wages of RIs and matched native workers.
- These authors have noted increasing wage gaps between routine and non-routine tasks, and between cognitive and manual work.
- When combined with low occupational mobility, occupational sorting could have significant economic consequences for RIs' labor market integration.

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Description of the data

The data are provided by Statistics Sweden and contain extensive information on all individuals born between 1954–1980, linked to the firms where they are employed.

We distinguish between three refugee groups:

1. Those from European countries, arriving 1990–1996
2. Those from non-European countries during those years
3. Those arriving 1980–1989 from any country

In the empirical analysis, we focus on labor market outcomes for these three refugee cohorts over the years 2011–2015.

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We create two cohorts of native workers. The first cohort contains randomly selected native-born workers of the same age, with the sample size chosen to provide a manageable subsample. Non-refugee immigrants are excluded from this sample.

In order to compare the wage earnings of refugee workers with those of native-born workers, we define a second cohort of native-born workers who are matched with refugees on a set of similar characteristics.

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Coarsened Exact Matching

As a methodological innovation, we have altered our original empirical strategy in which this matched cohort was produced by propensity score matching (PSM). Instead, this cohort is formed by applying the Coarsened Exact Matching (CEM) method (Blackwell, Iacus, King, Porro, *Stata Journal* 2009) as an alternative, taking account of the vigorous critiques in King and Nielsen (*Political Analysis*, 2019) of the PSM technique.

In the CEM method, categorical variables are matched exactly for native-born and all cohorts of refugee workers. Continuous variables are coarsened, or binned, into a categorical form. Matches are defined by individuals occupying the same bin.

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In our application, we applied CEM to birth year, gender, marital status, 6 categories of education, children 0-3 years old, children 4-6 years old, and 5 regional categories. Only birth year was coarsened in the process.

After matching, the following empirical analysis is executed on the original data. The coarsened or binned data are only used for the purpose of matching.

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The CEM method creates strata for each combination of the 'coarsened' variables. In our application, 19,235 strata were defined, and 6,810 of those strata contained individuals in both the native-born and refugee categories. In summary:

Table: Coarsened Exact Matching (CEM) for native and refugee individuals

Refugee	0	1
All	2,544,665	94,754
Matched	94,136	94,136
Unmatched	2,450,529	618

The sample size of almost 100,000 individuals was then used to generate the first cohort of randomly selected native-born workers of similar size.

Work histories for these five groups of workers produced panel data with the following characteristics:

Table: Employment, 2011–2015

		natives	matched natives	European refugees	non-European refugees	pre-1990 refugees
full year employed	%	70.4	68.4	67.8	53.3	58.4
worker-years	obs	466,712	466,026	176,522	148,862	136,375

Occupational task categories

Following Acemoglu and Autor (*Handbook of Labor Economics*, 2011), we classify a worker's occupational task category as:

1. cognitive, non-routine tasks: professionals, managers, technicians
2. cognitive, routine tasks: office and admin support, sales
3. manual, non-routine: personal care, food service, cleaning
4. manual, routine (production, craft, repair, laborers

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Descriptive measures

The following table illustrates the distribution of workers from each of the matched cohorts across the four categories of occupational tasks.

Table: Descriptive statistics, 2011–2015

	matched natives	European refugees	non-European refugees	pre-1990 refugees
cognitive non-routine	0.47	0.21	0.25	0.31
cognitive routine	0.17	0.10	0.10	0.12
manual non-routine	0.32	0.53	0.58	0.49
manual routine	0.04	0.16	0.07	0.08
Normalized annual earnings	1.19	0.95	0.95	1.01
Experience, years	18.4	13.7	12.7	14.9
Female	0.44	0.50	0.40	0.41
Age	47.3	46.4	46.6	48.1

Notes: shares of workers in each occupational task category. Annual earnings normalized by median wage earnings for that year.

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Almost half of native workers are employed with cognitive, non-routine tasks, and an additional 17% are employed with cognitive routine tasks. The equivalent figures for European refugees are 21% and 10%, respectively.

Most non-European refugees (58%) work with manual, non-routine tasks, compared to 32% of matched natives. This pattern also holds for pre-1990 refugees.

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Recentered Influence Function quantile regressions

We analyze refugee immigrants' wage distribution, compared to that of native workers, using recentered influence function (RIF) quantile regressions. They were developed by Firpo, Fortin, Lemieux (*Econometrica* 2009) and implemented by Rios-Avila (*Stata Journal* 2020) as `rifhdreg`.

RIFs analyze the impact of changes in the distribution of explanatory variables on the unconditional distribution of the outcome variables, rather than on a single measure. The partial effects on unconditional quantiles of the outcome variable may differ considerably across the wage distribution, our outcome variable.

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We model the normalized annual wage earnings of individual i at time t as a linear function of their task group category, work experience, and several individual characteristics as well as fixed effects for region, industry, and year. This model is estimated with both OLS regression and RIF quantile regression, and separately for women and men.

A substantial wage premium appears for non-routine cognitive tasks, with a smaller wage premium for routine cognitive tasks. The full-sample estimates show a significant, positive wage premium for both European and non-European refugee immigrants vs. native workers. Separate estimates by gender show that the positive overall outcome is driven by female workers.

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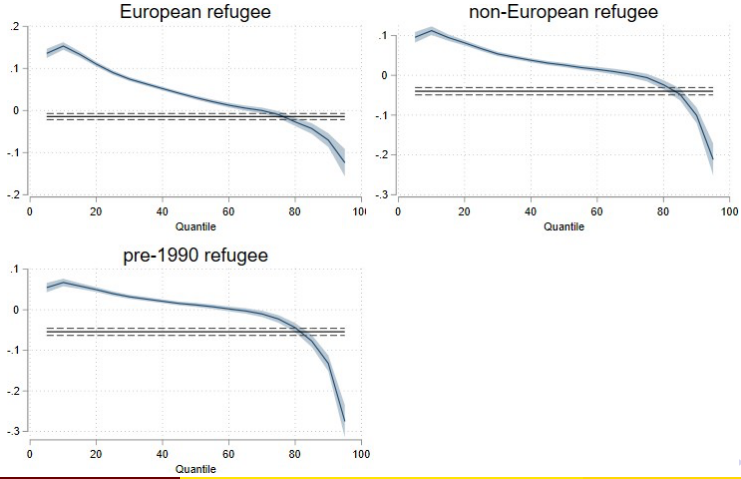
In the following figure, the RIF quantile estimates show the wage premium for each category of refugee immigrants versus that of native workers. The horizontal lines are OLS estimates, which suggest that native Swedes have higher wages than refugees on average. However, the RIF estimates provide a more nuanced picture, as refugees have higehr full-year salaries across the wage distribution from the lowest quantiles through the median quantile. Overperformance is greatest for European refugees arriving in the 1990s, with higher wages up to the 70th quantile, and non-European refugees from the 1990s, up to the 65th quantile.

Figure: Wage distributions, refugees vs. natves

Figure 1. RIF Quantile Regression Plots of Population Group Dummies in the Wage Earnings Equation, Sample Period 2011–2015



Generalized Oaxaca–Blinder decomposition

As Rios-Avila proposes, RIFs can also be used to generalize the Oaxaca–Blinder distribution for analyzing differences in outcome distributions across groups. This is implemented by his `oaxaca_rif` routine, which depends on Jann's `oaxaca` routine (*Stata Journal* 2008).

We perform a Oaxaca–Blinder wage decomposition (Oaxaca *International Economic Review*, 1973; Blinder, *J. Human Resources*, 1973) to examine whether wage differences can be explained with different characteristics of native and refugee workers, or whether unexplained differences exist which could suggest wage discrimination, or differentials in unobserved ability.

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We apply the so-called two-fold decomposition, which is defined as:

$$R = \underbrace{[E(X_A) - E(X_B)]'\beta^*}_{\text{explained part}} + \underbrace{E(X_A)'(\beta_A - \beta^*) + E(X_B)'(\beta^* - \beta_B)}_{\text{unexplained part}} \quad (1)$$

where R is the difference in wage earnings between the groups and β^* has been estimated for a reference group: in our case for the matched natives. In our model we have $\beta_A = \beta^*$, so the second term disappears. The first term shows that differences in characteristics (endowments) explain wage differences, while differences in coefficients imply unexplained wage differences.

The following table presents the two-fold OB decomposition based on the RIF quantile regressions for the 50th quantile (median) for the overall occupational task groups as well as the separate task groups. Matched natives are the reference group in the upper part of the table. The OB decomposition examines how much of the observed differences in wage earnings between matched natives and refugees can be explained by their observed characteristics.

In each case, the differences between refugee immigrants and matched native workers is positive, with a larger explained component (reflecting differences in endowments) and a significant negative unexplained component, reflecting differences in coefficients.

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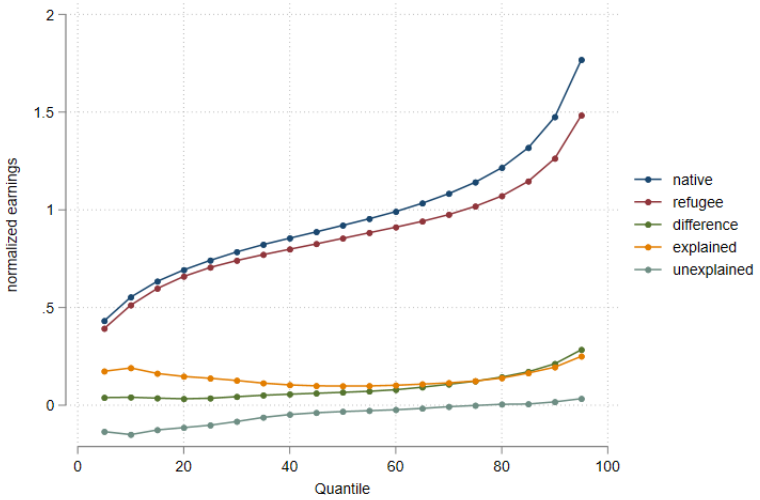
Table: Two-fold Oaxaca–Blinder RIF(q50) decomposition, overall and by occupational task group

	All	non-rout cogn	routine cogn	non-rout man	rout man
matched natives	1.064***	1.311***	0.980***	0.892***	1.050***
	[0.001]	[0.002]	[0.001]	[0.001]	[0.002]
refugees	0.924***	1.126***	0.944***	0.836***	0.993***
	[0.001]	[0.002]	[0.002]	[0.001]	[0.001]
difference	0.140***	0.185***	0.036***	0.056***	0.057***
	[0.001]	[0.002]	[0.002]	[0.001]	[0.003]
explained	0.151***	0.195***	0.084***	0.104***	0.075***
	[0.001]	[0.003]	[0.002]	[0.001]	[0.004]
unexplained	-0.011***	-0.010***	-0.047***	-0.048***	-0.018***
	[0.001]	[0.003]	[0.003]	[0.002]	[0.004]
# matched natives	302,828	141,695	50,675	96,059	14,399
# refugees	256,867	64,538	27,214	136,496	28,619

Figure: Oaxaca–Blinder quantile decomposition based on full sample, 2011–2015



The figure illustrates that the difference between natives (blue) and refugees (red) widens at the higher quantiles of the wage distribution.

For brevity, I do not present similar decompositions for the male and female subsamples, but note that wage differences between natives and refugee are more pronounced for men. For the highest-earning non-routine cognitive occupations, the observed wage differnces are around 6% for women, but 24% for men. This much larger differential is almost all explained by endowments.

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Multinomial logit

The multinomial logit (MNL) model determines the impact of variables on the probability of observing each of four alternative outcomes of each characteristic. For worker i in group j at time t, the probability of membership in the alternative task category k is conditional on regressors $\mathbf{x}_{it}$, $\mathbf{q}_{it}$ and $\mathbf{z}_{it}$:

$$Pr[y_{i,t} = k] = \Psi(\gamma_0 + \gamma_1 m_{it} + \gamma_2 x_{it} + \gamma_3 q_{it} + \gamma_4 z_{it} + \epsilon_{it}), \quad k=1,\ldots,4 \tag{2}$$

where γ_1 captures the effects of group (randomly selected natives, matched natives, European refugees, non-European refugees and pre-1990 refugees), while γ_2 denotes effects of individual characteristics, γ_3 the effects of firm characteristics, γ_4 the impacts of regional characteristics, and ϵ_{it} is an idiosyncratic error term.

The following table presents key average marginal effects (AMEs) from the multinomial logit estimation specified by Equation 2. Controlling for individuals' characteristics, firm size, industry and region, we find that refugees are significantly less likely to work with cognitive non-routine tasks than are matched natives. Refugees are more likely to work with manual tasks. As expected, workers living in cities or metropolitan regions and those with more experience and education have a higher propensity to be employed in well-paid cognitive non-routine occupations.

Table: Marginal probability of being employed in occupational task category k, MNL model

	(1) non-rout cogn	(2) routine cogn	(3) non-routine man	(4) routine man
European refugee	-0.178***	-0.067***	0.128***	0.117***
	[0.002]	[0.001]	[0.002]	[0.001]
non-European refugee	-0.200***	-0.065***	0.202***	0.063***
	[0.002]	[0.001]	[0.002]	[0.001]
before 1990 refugee	-0.135***	-0.050***	0.123***	0.062***
	[0.002]	[0.001]	[0.002]	[0.001]
female	-0.007***	0.061***	0.030***	-0.083***
	[0.001]	[0.001]	[0.001]	[0.001]
Observations	561,702			

Policy implications

Our findings have important policy implications with respect to both income inequality and economic efficiency. Occupational sorting is accompanied by increasing wage differentials for high-skilled and low-skilled workers while occupational mobility is limited. This may counteract the long-run process of narrowing wage gaps due to reduced differences in work experience.

As many companies in developed economies face difficulties in recruiting competent and qualified personnel, refugee workers may have unexploited skill potentials that could be used to reduce the shortage of skilled labor in Sweden and other advanced economies that are facing the demographic challenges of an increasing ratio of pensioners to workers.

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