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The economic impact of refugees in Swedish municipalities

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Abstract

This paper analyzes the impact of receiving refugees on municipal income, income inequality, and public finances. The empirical analysis compares Swedish municipalities between 2000 and 2018, a period with large and fluctuating waves of refugees, both across years and municipalities. This paper uses the variance within municipalities, i.e., fixed effects. The results show that an increase of the refugee population by one percentage point decreases income per capita by 3500 SEK and increases inequality by 0.32 points in the Gini coefficient. Alternatively, an increase in the refugee population share by one standard deviation of the within municipality variance decreases income per capita by 0.19 standard deviations and increases the Gini coefficient by 0.62 standard deviations. This effect is persistent over time but smaller for richer municipalities. The aggregated net effect on municipal public finances is positive, when including the effect on government grants, but negative if not included. This is true both on a five and a ten years horizon. Excluding government grants, the net revenue of receiving a refugee is negative 122 thousand SEK per year, the first ten years after arrival.

Keywords: Refugees, income, inequality, public finance, immigration

Contents

1. Introduction

Ever since humans evolved as a separate species from the chimpanzees' lineage of hominids, migration has been a constant factor in the history of mankind. Migration has since been both a major cause and consequence of famine, war, and technical innovations (McNeill 1984). In 1885 Ravenstein (1885) published their seminal paper "The laws of migration" examining migration in Great Britain. According to Greenwood and Hunt (2003), this is to be regarded as the beginning of migration as a research topic. In recent years, due to significant flows of refugees from low income to high-income nations, has the question of the economic consequences of, explicitly, refugee immigration surfaced. Ruist (2015) is the first paper to explicitly try and measure the impact on public finances of receiving refugees in Sweden. He finds that the net redistribution from natives to refugees is 70000 SEK per refugee per year. This paper aims to further fill the gap of knowledge concerning the economic impact of refugees—specifically, the relationship between refugees and income per capita, inequality, and public finances.

While few papers have examined the explicit effects of refugees on aggregate economic conditions, many papers have estimated the impact of immigration in general in different countries and situations. Among these, some papers have followed the method of Frankel and Romer (1999) using a gravity model to instrument the independent variable across countries. While Frankel and Romer (1999) only examine the effect of trade on income, subsequent papers also examine the effect of migration on income. Felbermayr, Hiller, and Sala (2010) follows this method and use a cross-section of countries. They find that an increase in the migration stock by 10 percent increases GDP per capita by 2.2 percent. They also find that trade and financial openness increases GDP per capita. Ortega and Peri (2014) follow the same approach, but use panel data from 1980 to 2000 and finds that an increase in the immigration population share by one percentage point increases GDP per capita by 6 percent. Aleksynska and Tritah (2015) use an even larger panel of countries spanning from 1960 to 2005. They also find that immigration has a significantly positive impact on income per capita. They also examine the impact on the composition of income per capita and finds that the major impact is through an increase in total factor productivity and in, for example, human capital and employment. Jaumotte et al. (2016) use a smaller sample of countries, specifically advanced economies. They also examine

the difference in the effect between high and low-skilled immigrants and examine the differences in the gains of immigration between different income groups. They find that high and low skill immigration increases income per capita and that the gains are shared over the whole income distribution. For further research on the topic of the economic impact of immigration as a whole, one can reference S. P. Kerr and W. R. Kerr (2011).

Card (2009) examine the relationship between the wage gap and immigration. They use US cross-sectional city-level data in the years 1980, 1990, 2000, and 2005/2006. They find, consistent with previous research, that immigration has a small effect on native wage inequality, but a larger effect on overall wage inequality, explained by the larger presence of immigrants in the tails of the skill distribution. However, the effect only explains around 5 percent of the overall rise in wage inequality. Hibbs and Hong (2015) examines the impact of immigration on income inequality using the Gini coefficient as the measure of inequality. They use US city level census data from 1990 and 2000. They find that increasing the immigration population by one percentage point, increases the Gini coefficient by 0.66 points. This explains 24 percent of the increase in income inequality. They also find that low skilled immigration has an insignificant effect on inequality.

This paper takes advantage of high-quality data on Swedish municipalities. The benefits of using Swedish municipalities are many. First, there are many, 290. Second, they are governed in the same manner defined in the constitution, by a council elected in local elections. Third, they are responsible for major areas such as primary education, elderly care, and emergency services, among many others. Fourth, they are allowed to tax their citizens earned income freely. In many regards, they can be seen as small states operating autonomously within a pre-specified framework. This makes them ideal for comparisons of different treatments. In the case of refugees, it is reasonable to assume that they prefer different states over others. Different states may also differ in their immigration policy, meaning that a cross-country comparison should suffer from potential endogeneity and omitted variable bias. For example, Ortega and Peri (2013) shows that immigration flows, in general, are highly responsive to the level of income per capita in the host country. Another problem with cross-country comparisons is both that the quality of the data may vary and that the data may be measured differently, resulting in measurement errors and resulting bias. They may also have different trends in explanatory variables, making fixed effects models unusable. Using municipal data should at least reduce, if not, remove these biases and also increase the number of observations greatly.

Even within a country, refugees should prefer some municipalities over others, for example, municipalities with many residents of the same nationality, or perhaps municipalities with a climate more similar to their original country. To correct for this, a fixed effects model will be used as the main model in this paper. While time-variant factors within municipalities could still pose a problem, it is assumed to be unlikely, since the trends in most variables should be similar in the same country. Variation in refugees overtime should also be regarded as relatively exogenous since any municipal policies should have a negligible effect on the size of global refugee flows. Still, an instrumental variable approach will be used to check the validity of this assumption. This can, however, only be used for a sub-sample of the years in the data. The closest paper in regards to question and method is Dahlberg, Edmark, and Lundqvist (2012). They examine the effect of refugee immigration on attitudes to redistribution. They use a conditional IV approach on Swedish municipal data, making use of a national refugee placement program between 1985 and 1994. They find that an increase in the refugee share of the population decreases support for redistribution. The validity of their method has, however, on several points, been questioned by Nekby and Pettersson-Lidbom (2017).

The results show that refugees per capita has a significantly negative effect on income per capita, the Gini coefficient, government grants per capita, tax revenue per capita, and net costs per capita. The effect is however, only large in the Gini coefficient and appears to explain 28 percent of the increase in inequality. Examining the effect over time, shows that all effects are consistent up to ten years following the arrival of a refugee. This suggests that time to integrate has little effect on the impact refugees have on the local economy. Examining the effect between municipalities of different income levels shows that the effect of refugee immigration on any of the dependent variables decreases with the municipality's income level. This suggests that refugees may better integrate in municipalities with higher income levels, possibly due to the natives' higher purchasing power. Using the variables in nominal terms suggests that the receiving of a single refugee results in municipal yearly net revenues of negative 122 thousand

SEK, excluding the effect on government grants.

2. Data and Methodolgy

2.1 Data

Data on the number of refugees in each municipality for each year is derived implicitly through the number of foreign-born residents and the share of foreign-born residents in need of protection and their relatives. The number of refugees received a given year is approximated by the refugee population difference between 31 of December the given year and 31 of December the previous year. Register data on the number of refugees received[1], and the number of refugees assigned through a refugee placement program are also gathered, to be used as robustness checks. Income is total earned income per municipality and year. Inequality is measured by the Gini coefficient using total earned income. Government grants are general government grants and net gains from the municipal equalization system. Tax revenue is total revenue from the local earned income tax. Net Costs is total expenditure minus any revenue from municipal activities.

All monetary variables are measured in 1000 SEK and converted to the 2018 price level using the consumer price index. The Gini coefficient is multiplied by 100 for ease of interpretation. All data is gathered from Statistics Sweden (SCB) except for register data for received refugees and assigned refugees, which is gathered from the Swedish migration board (Migrationsverket), for all municipalities between 2000 and 2018. The Gini coefficient is an exception being available only from 2007.

Table 2.1 presents summary statistics for the explanatory and the dependent variables. Both explanatory variables, refugees per capita and refugees received per capita, have large variances, with standard errors around the size of the mean. This should result in high statistical power and high precision of the estimates. Figure 2.1 and fig. 2.2 shows the proportion of refugees across Swedish municipalities in the year 2000 and 2018 respective. The proportion of refugees varies both across municipalities and time.

[1]Register data refers to the number of refugees received in a municipality covered by the ”Regulation on state compensation for contributions for certain foreigners” (SFS 1990:927) or ”State Compensation Regulations for Refugee Reception” (SFS 2010:1122) (my translations).

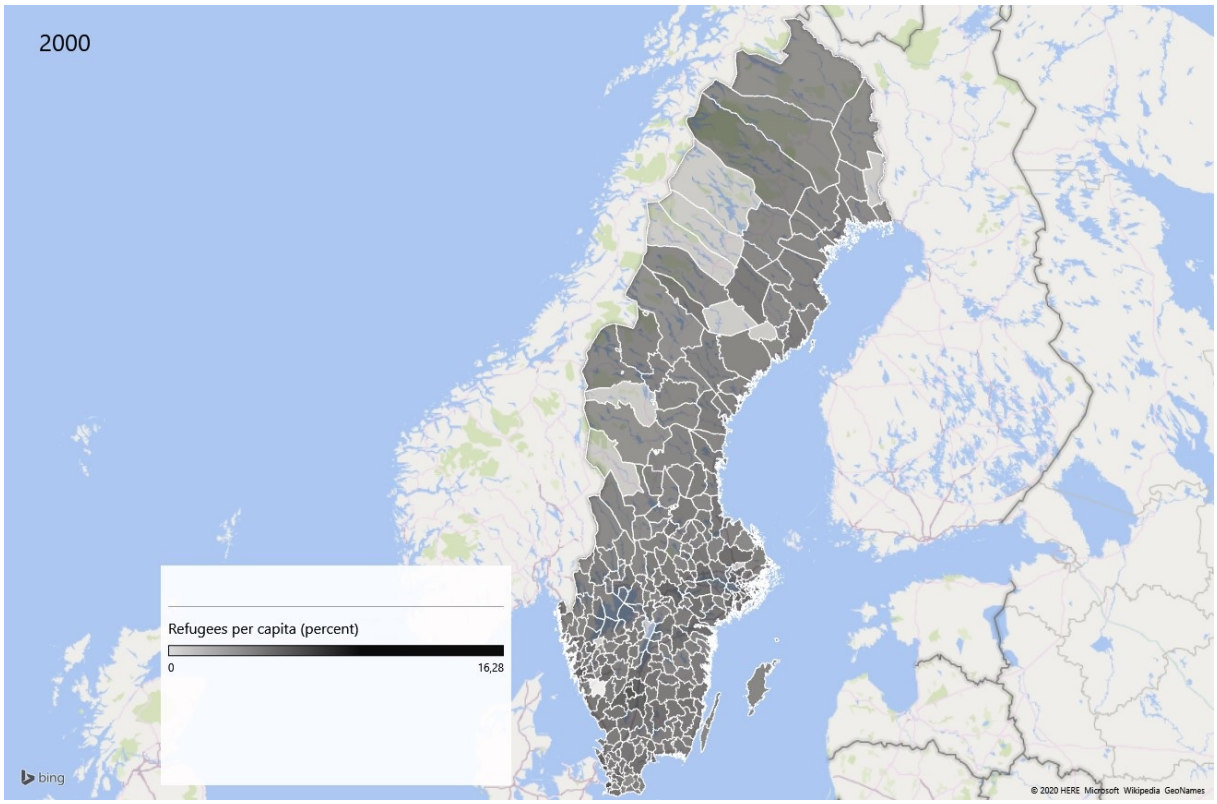

Figure 2.1: Refugees per capita, 2000

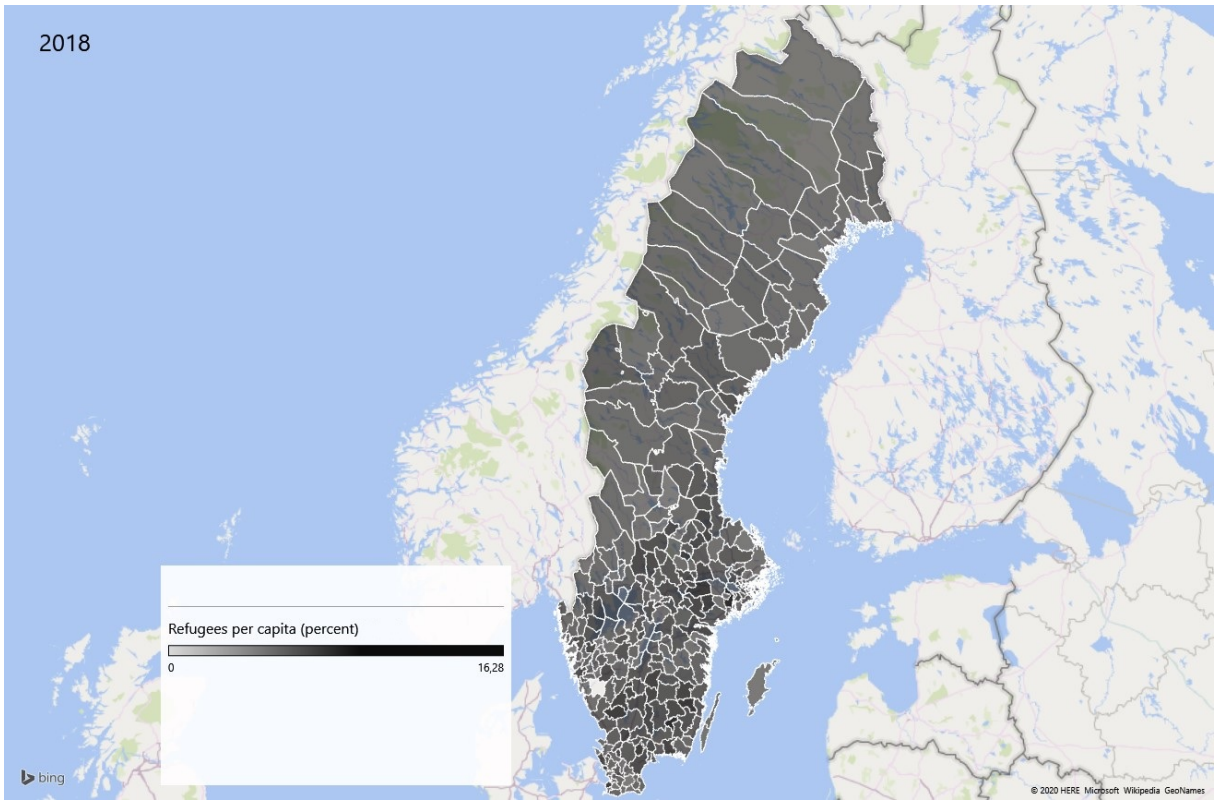

Figure 2.2: Refugees per capita, 2018

Table 2.1: Panel summary statistics

		Mean	Std. Dev.	Min	Max	N/n/T-bar
Refugees per capita	overall	2.97	2.39	0	16.3	5508
	between	.	1.82	.280	10.5	290
	within	.	1.54	-2.84	13.5	19.0
Refugees received per capita	overall	.253	.382	-2.00	3.56	5219
	between	.	.135	.0245	.865	290
	within	.	.357	-1.88	2.95	18.0
Income per capita	overall	181	34.5	114	414	5507
	between	.	19.4	148	324	290
	within	.	28.6	108	271	19.0
Gini	overall	32.2	3.16	25.6	52.8	3480
	between	.	3.06	27.3	51.6	290
	within	.	.808	27.4	35.4	12
Government grants per capita	overall	9.72	6.00	-16.1	34.2	5508
	between	.	5.37	-12.6	26.3	290
	within	.	2.70	.882	20.6	19.0
Tax revenue per capita	overall	35.0	6.58	0	68.0	5508
	between	.	2.99	27.0	54.1	290
	within	.	5.86	-3.57	50.8	10.0
Net costs per capita	overall	43.9	9.25	-43.9	83.0	5508
	between	.	4.48	30.9	60.3	290
	within	.	8.10	-43.6	68.7	19.0

2.2 Empirical approach

This paper will use three different models. The first is a fixed effects panel regression on the variable of interest measured in per capita terms using the share of refugees in the population as the independent variable. Consider the following econometric model:

$$Y_{mt} = \beta Refugeespercapita_{mt} + \theta_m + \lambda_t + \varepsilon_{mt} \tag{1}$$

Where Y denotes the variable of interest, specifically income, inequality, tax revenue, government grants, and public expenditure, all in per capita, for municipality m at year t. Refugees per capita denotes the share of refugees of the total population measured in percent, θ and λ are municipal and time fixed effects, and ε is an idiosyncratic error term.

The second model will instead use the number of refugees received, measured in per capita terms, and several of its lags, as the independent variable. Consider the following econometric model:

$$Y_{mt} = \beta_0 Refrecpercap_{mt} + \sum_{s=1}^{T} \beta_s Refrecpercap_{mt-s} + \theta_m + \lambda_t + \varepsilon_{mt} \tag{2}$$

Where Y denotes the variable of interest, specifically income, inequality, tax revenue, government grants and public expenditure, all in per capita, for municipality m at year t. Refrecpercap denotes the number of refugees received in municipality m at year t measured in percent of the total population, T denotes the number of lags included, θ and λ are municipal and time fixed effects and ε is an idiosyncratic error term.

There are two important differences between the first two models. First, they measure slightly different effects. The first estimate measures the effect of an increase in the share of refugees by one percentage unit; the second estimate measures the effect of an increase in the number of refugees, corresponding in size to one percent of the population. Hence the estimate of the second specification includes the effect that receiving refugees has on the number of natives in the municipalities, i.e., if natives move to other municipalities, unlike the first model. Second, while the lags of the share of refugees should have little effect on the variables of interest given the current share, the lags of the number of refugees received should. This implies that one can measure the effect that refugees have on the variables of interest over time, and hence estimate the long term impact.

The last model will use both the dependent and the independent variable and its lags in nominal terms. This allows one to aggregate the effect that receiving a refugee has on tax revenue and public expenditure over time, hence measuring the net revenue to the municipal public finances. An important note to make is that this estimate will not consistently measure the direct effect that a refugee has on any of the variables but instead the total effect, including the effect that the refugee has through other residents contributions to either revenue or costs. Consider the following econometric model:

$$Y_{mt} = \beta_0 Refrec_{mt} + \sum_{s=1}^{T} \beta_s Refrec_{mt-s} + \theta_m + \lambda_t + \varepsilon_{mt} \tag{3}$$

Where Y denotes the variable of interest, specifically, tax revenue, government grants, and public expenditure, for municipality m at year t. Refrec denotes the number of refugees received in municipality m at year t, T denotes the number of lags included, θ and λ are municipal and time fixed effects and ε is an idiosyncratic error term. The estimates are then aggregated in the following manner:

$$Z_{mt} = \beta_0 + \sum_{s=1}^{T} \beta_s \tag{4}$$

Where Z is the aggregated effect, a refugee has on either tax revenue, government grants, or public expenditure over T years. These estimates can then be combined to find the municipal net revenue of receiving a refugee.

To further validate the results, two different robustness checks will be performed.

First, a possible instrumental variable will be used. This instrument is the number of refugees assigned to a municipality a certain year from the refugee placement system, in place since 2016. According to the law (SFS 2016:38), the number of refugees is decided by the labor market characteristics and the number of refugees already received in the municipality. In other words, the variable itself is endogenous. However, following the method of Dahlberg, Edmark, and Lundqvist (2012), one can assume that controlling for the deciding variables, one is left with a quasi-random or arbitrary number of refugees placed in a certain municipality. This unexplained part of the placed refugees will, therefore, be used as the instrument for the number of refugees (received) in a given municipality. Since this system has only been in place since 2016, the instrument will only be used to check the robustness of the short term effects of immigration. However, if the short term effects are robust, one can assume that the long term effects are as well, since they are estimated in the same manner. Unlike Dahlberg, Edmark, and Lundqvist

(2012), the variables will not be adjusted by the population in the municipalities, since assigned refugees per capita is a bad proxy for refugees received per capita. Assigned refugees in nominal terms is, however, a good proxy for refugees received in nominal terms. This was one of the criticisms of Dahlberg, Edmark, and Lundqvist (2012) by Nekby and Pettersson-Lidbom (2017). Another practical difference is in the application of the method. While they use the deciding variables both in the first stage and in the reduced form, this paper will instead estimate the assigned refugees using the deciding variables, namely population, refugees, employment rate, and unemployment rate, and then use the residual together with the lag of refugees as the instrument for refugees in the given year.

Second, register data will be used instead of differenced data to measure the number of refugees received a specific year. The benefit of using such data is that the number of refugees received are refugees arriving in that year from abroad and not refugees moving from other municipalities that have already lived in Sweden for several years. The disadvantage is that such data may suffer from large measurement errors, resulting in an attenuation towards zero of the estimates.

3. Results

3.1 Refugees per capita

This section presents the results of the regressions of the first model. A simple OLS version is also presented, as is one including the lag of the independent variable. The second inclusion is to determine if the effect on the dependent variable is delayed or not. A specification, including covariates[1], is also presented. The results are presented in absolute terms and in standard deviations, where an increase of more than 0.5 standard deviations is regarded as a large effect and an effect smaller than 0.2 as small. A size in between is regarded as a medium-sized effect. The effect in standard deviations are presented both using between municipal variance and within municipal variance.

Table 3.1 presents the estimates of regressions using income per capita as the dependent variable. One can see that a one percentage point increase in the refugee population results in

[1]Covariates are: Population, tax rate, and proportion of municipal assembly seats controlled by left-wing parties.

a decrease of approximately 3500 SEK in all four specifications. An increase of one standard deviation of refugees per capita results in a decrease of income per capita by 0.33 standard deviations using the between variance and 0.19 using the within variance (table 2.1). In other words, refugee immigration seems to have a medium-sized effect on the difference in income per capita across municipalities. One can also see that the lag of the variable has no significant effect on income. Note that the inclusion of municipal fixed effects has barely any effect on the size or significance of the estimate.

Table 3.2 presents the regression results using the Gini coefficient, used as a measurement for inequality, as the dependent variable. An increase in the refugee population by one percentage point increases the Gini coefficient by approximately 0.32 points. The effect in standard deviations is 0.19 using the between variance and 0.62 using the within variance. Refugee immigration seems to have a large effect on inequality over time. Also, for the Gini coefficient, it seems that the inclusion of a lag or municipal fixed effects has little effect on the size of the estimate. Between 2018 and 2007, the average proportion of refugees increased from 2.29 percent to 5.96. Using the estimate of 0.32, this should correspond to an increase of the Gini coefficient by 1.17 points. This is considerable, considering that the Gini coefficient's average increased from 30.8 to 32.6 during the same period. Another interesting observation, not shown in table 3.2, is that the exclusion of yearly fixed effects has a negligible effect on the size of the coefficient, unlike the other dependent variables. It is not surprising, given that the Gini coefficient, unlike the other dependent variables, does not (and trivially can not) follow a stable growth path. In table A.1, these results are shown. Given the exclusion of yearly fixed effects and controls in this fixed effects, model, the adjusted R-square should show the proportion of the variance in the Gini coefficient over time explained by refugees per capita. The adjusted R-square in this model is 0.28, suggesting that refugee immigration explains 28 percent of the increase in the Gini coefficient.

Table 3.3, presents the regression results using government grants per capita as the dependent variable. The effect on government grants per capita is around 870 SEK. It is also clear that the larger part of the effect is lagged. This makes sense if one assumes that government grants are received post of receiving any refugees or if grants are simply delayed due to bureaucracy. The effect in standard deviations is 0.29 using the between variance and 0.50 using the within variance (table 2.1). Refugee immigration appears to have a medium-sized effect on government grants per capita both across municipalities and over time.

Table 3.4 presents the regression results using tax revenue per capita as the dependent variable. The estimates are fairly similar in all specifications, if one counts the sum of the lags. The estimates are all significant, and the size around 670 SEK. In standard deviations, the effect is 0.41 using the between variance and 0.18 using the within variance (table 2.1). Refugee immigration appears to have a medium-sized effect on tax revenue per capita across municipalities.

Table 3.5, presents the regression results using net costs per capita as the dependent variable. Part of the effect on net costs appears delayed. In the two first specifications, the size is around 250 SEK; however, in the two latter, including lags, the sum of the coefficients is around 360 SEK. In standard deviations, using the larger estimate, the effect is 0.15 using the between variance and 0.07 using the within variance (table 2.1). The effect of refugee immigration on net costs appears negligible.

In table 3.6 are results of regressions corresponding to column 2 in previous tables. The difference is that the estimates are divided into groups sorted by income per capita. This means that row 1 presents the estimates of the effects for the poorest group of municipalities, and row 3 the richest. It appears that the effect on all variables is decreasing with the income level of the municipality.

Table 3.1: Income per capita

	(1) OLS	(2) Fixed effects	(3) Fixed effects	(4) Fixed effects with covariates
Refugees	-3.376***	-3.401***	-3.642***	-3.477***
	(0.0603)	(0.0605)	(0.200)	(0.198)
L.Refugees			0.327	0.199
			(0.219)	(0.217)
Constant	139.4***	139.5***	145.3***	173.2***
	(1.161)	(0.242)	(0.241)	(4.161)
N	5507	5507	5218	5218

Note: All variables are specified in per capita terms and all specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.2: Gini

	(1) OLS	(2) Fixed effects	(3) Fixed effects	(4) Fixed effects with covariates
Refugees	0.314***	0.313***	0.326***	0.320***
	(0.00846)	(0.00850)	(0.0245)	(0.0244)
L.Refugees			-0.0153	-0.0179
			(0.0269)	(0.0267)
Constant	30.04***	30.05***	30.05***	28.70***
	(0.177)	(0.0307)	(0.0311)	(0.697)
N	3480	3480	3480	3480

Note: All variables are specified in per capita terms and all specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.3: Government grants per capita

	(1) OLS	(2) Fixed effects	(3) Fixed effects	(4) Fixed effects with covariates
Refugees	0.852***	0.867***	0.141*	0.0972
	(0.0199)	(0.0200)	(0.0647)	(0.0641)
L.Refugees			0.815***	0.839***
			(0.0709)	(0.0701)
Constant	4.931***	4.906***	4.896***	11.84***
	(0.325)	(0.0800)	(0.0780)	(1.344)
N	5508	5508	5218	5218

Note: All variables are specified in per capita terms and all specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.4: Tax revenue per capita

	(1) OLS	(2) Fixed effects	(3) Fixed effects	(4) Fixed effects with covariates
Refugees	-0.669***	-0.682***	-0.670***	-0.761***
	(0.0177)	(0.0180)	(0.0548)	(0.0483)
L.Refugees			0.0108	0.0952
			(0.0601)	(0.0529)
Constant	25.84***	25.86***	27.66***	-9.409***
	(0.187)	(0.0719)	(0.0661)	(1.013)
N	5508	5508	5218	5218

Note: All variables are specified in per capita terms and all specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.5: Net costs per capita

	(1) OLS	(2) Fixed effects	(3) Fixed effects	(4) Fixed effects with covariates
Refugees	0.189***	0.248***	-0.472***	-0.615***
	(0.0394)	(0.0409)	(0.138)	(0.136)
L.Refugees			0.832***	0.928***
			(0.152)	(0.149)
Constant	30.53***	30.43***	32.09***	9.928***
	(0.303)	(0.164)	(0.167)	(2.857)
N	5508	5508	5218	5218

Note: All variables are specified in per capita terms and all specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.6: Effects per income group

	(1) Income	(2) Gini	(3) Government grants	(4) Tax revenue	(5) Net costs
Low income	-3.229***	0.304***	0.817***	-0.662***	0.200***
	(0.0589)	(0.00871)	(0.0197)	(0.0168)	(0.0409)
Medium income	-2.572***	0.274***	0.624***	-0.537***	0.153**
	(0.0735)	(0.0113)	(0.0245)	(0.0209)	(0.0511)
High income	-1.481***	0.225***	0.306***	-0.445***	-0.169*
	(0.103)	(0.0165)	(0.0345)	(0.0294)	(0.0718)
Constant	137.5***	30.16***	5.477***	25.60***	30.81***
	(0.246)	(0.0353)	(0.0822)	(0.0701)	(0.171)
N	5507	3480	5507	5507	5507

Note: All variables are specified in per capita terms and all specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

3.2 Refugees received per capita

This section presents the results for the second model. In table 3.7 and table 3.8, one can see that the effect of receiving refugees in the past has similar effects as receiving refugees today on most of the variables of interest. The exception appears to be net costs where the estimates are insignificant or weakly significant for most lags; however, the size of the coefficients is the same. One could also argue that the effect on tax revenue is diminishing, only slightly, however. The interpretation of this is that up to at least ten years after a municipality received a certain number of refugees, the negative effects seem consistent, i.e., the effects appear permanent and not affected by the time they have had to integrate into society.

Table 3.7: Refugees received over five years

	(1) Income	(2) Gini	(3) Government grants	(4) Tax revenue	(5) Net costs
Same year	-2.458***	0.224***	-0.0356	-0.623***	-0.546**
	(0.192)	(0.0266)	(0.0688)	(0.0494)	(0.172)
One year	-2.605***	0.329***	0.636***	-0.597***	-0.0607
	(0.222)	(0.0305)	(0.0794)	(0.0570)	(0.199)
Two year	-2.572***	0.301***	0.929***	-0.646***	0.0918
	(0.230)	(0.0321)	(0.0824)	(0.0591)	(0.206)
Three years	-2.603***	0.299***	0.928***	-0.527***	0.494*
	(0.244)	(0.0338)	(0.0874)	(0.0627)	(0.219)
Four years	-2.225***	0.202***	0.764***	-0.476***	0.510*
	(0.274)	(0.0376)	(0.0980)	(0.0703)	(0.245)
Five years	-2.219***	0.160***	0.526***	-0.371***	0.410
	(0.307)	(0.0428)	(0.110)	(0.0789)	(0.275)
Constant	202.2***	28.06***	5.873***	-5.168***	12.63**
	(4.915)	(0.715)	(1.760)	(1.263)	(4.403)
N	3769	3480	3769	3769	3769

Note: All variables are specified in per capita terms and all specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.8: Refugees received over ten years

	(1) Income	(2) Gini	(3) Government grants	(4) Tax revenue	(5) Net costs
Same year	-2.227***	0.176***	0.0358	-0.570***	-0.392
	(0.160)	(0.0236)	(0.0715)	(0.0426)	(0.245)
One year	-2.301***	0.314***	0.588***	-0.498***	0.0354
	(0.180)	(0.0265)	(0.0805)	(0.0480)	(0.275)
Two year	-2.019***	0.267***	0.819***	-0.520***	-0.0309
	(0.190)	(0.0279)	(0.0846)	(0.0505)	(0.290)
Three years	-2.272***	0.225***	0.933***	-0.481***	0.631*
	(0.201)	(0.0296)	(0.0898)	(0.0535)	(0.307)
Four years	-2.263***	0.196***	0.952***	-0.470***	0.561
	(0.228)	(0.0335)	(0.102)	(0.0606)	(0.348)
Five years	-1.989***	0.131**	0.486***	-0.173*	0.587
	(0.273)	(0.0401)	(0.122)	(0.0725)	(0.417)
Six years	-2.166***	0.200***	0.933***	-0.285***	0.589
	(0.312)	(0.0459)	(0.139)	(0.0830)	(0.477)
Seven years	-2.321***	0.190***	0.878***	-0.349***	0.775
	(0.312)	(0.0460)	(0.140)	(0.0832)	(0.478)
Eight years	-2.105***	0.160***	0.687***	-0.261**	0.449
	(0.312)	(0.0459)	(0.139)	(0.0830)	(0.477)
Nine years	-1.906***	0.209***	0.376**	-0.257**	0.317
	(0.322)	(0.0474)	(0.144)	(0.0857)	(0.492)
Ten years	-2.520***	0.221***	0.638***	-0.371***	0.0116
	(0.321)	(0.0473)	(0.144)	(0.0855)	(0.491)
Constant	200.4***	32.41***	11.86***	-7.478***	27.88***
	(5.373)	(0.791)	(2.399)	(1.430)	(8.214)
N	2319	2319	2319	2319	2319

Note: All variables are specified in per capita terms and all specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

3.3 Public finances

This section will present the results of the third model. Table 3.9 and table 3.10 shows the results. As can be expected, the effect on both government grants, tax revenue, and net costs are positive in all models. Column 4 presents net revenue corresponding to the sum of government grants and tax revenue negated by net costs. Column 5 presents the same number but excluding government grants. In all models, the estimate in column 4 is positive, meaning a given municipality will better its own finances due to receiving refugees the following five and ten years, respectively. Looking at column 5, however, the effect is clearly negative. While column 4 can be relevant from the viewpoint of a single municipality, one must remember that government grants require funding as well, and is not available for must state-level governments. Even if refugees contribute to the state government income, for this effect to be considered positive, they would have to contribute more than they cost the state government. This seems unlikely considering that they do not on a municipal level. Column 5 is, therefore, the better proxy for the actual effect on public finances of receiving a refugee over these two time horizons. Dividing the estimated effect over ten years, results in an annual cost of 122 thousand SEK per refugee. One may notice that the effect on tax revenue is smaller over ten years than over five years. There are two potential explanations for this. By using more lags, the number of observations is reduced, and the time period is later on average, if the contribution to taxes has decreased over time, this could explain at least part of the decrease. Another explanation lies in the indirect effect that refugees have on natives. If natives move to other municipalities as a response to the influx of refugees, and that this effect is delayed a few years, this would also explain at least part of the decrease. The second explanation is more consistent with the pattern in net costs.

Table 3.9: Aggregated effects, over five years

	(1) Government grants	(2) Tax revenue	(3) Net costs	(4) Net revenue	(5) Net revenue w/o grants
Five years	686.7***	4503.6***	4737.5***	452.8***	-233.9***
	(38.74)	(112.4)	(83.17)	(35.09)	(58.75)
N	3770	3770	3770	3770	3770

Note: Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.10: Aggregated effects, over ten years

	(1) Government grants	(2) Tax revenue	(3) Net costs	(4) Net revenue	(5) Net revenue w/o grants
Ten years	1936.8***	3173.3***	4395.0***	715.1***	-1221.7***
	(129.1)	(277.9)	(197.9)	(105.3)	(170.1)
N	2320	2320	2320	2320	2320

Note: Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

3.4 Robustness tests

3.4.1 IV

In table 3.11 to table 3.14 the results of four different specifications are presented. The first column presents regression results using all available data—the second only data between the years 2013 and 2015, and the third between 2016 and 2018. The fourth presents the results of the IV-test. In principle, the results in the fourth column should be compared to the third column, since they use the same data. The purpose of the second column is to compare the third column to a time period closer to itself, and the first the compare all results to the overall estimated effect. As you can see in all four variables, the results of the iv are consistent with those of the regular fixed effects models in the same period. This suggests that the standard fixed effects model is able to correctly identify the effect of refugees on the dependent variables. Gini is excluded in the analysis since the effect of one refugee should vary between municipalities depending on the size of the population. Gini is therefore reasonable to include when using per capita variables, but not nominal variables, like in this analysis.

Table 3.11: IV test for income

	(1) All years	(2) 2013-2015	(3) 2016-2018	(4) IV
Refugees	2472.9***	2250.7***	1421.5***	1425.8***
	(23.89)	(102.0)	(32.91)	(33.87)
Constant	10822521.7***	2617342.6	5896566.9**	5883769.4**
	(1642958.8)	(4103747.3)	(2054233.5)	(2054405.3)
N	5507	870	870	870

Note: All specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.12: IV test for government grants

	(1) All years	(2) 2013-2015	(3) 2016-2018	(4) IV
Refugees	47.06***	-4.881	-52.83***	-44.21***
	(2.146)	(9.342)	(5.733)	(5.911)
Constant	298690.2***	553025.2	359154.7	333128.6
	(76648.7)	(375907.5)	(357855.0)	(358580.9)
N	5510	870	870	870

Note: All specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.13: IV test for tax revenue

	(1) All years	(2) 2013-2015	(3) 2016-2018	(4) IV
Refugees	445.2***	453.9***	263.8***	257.3***
	(4.049)	(21.35)	(5.553)	(5.722)
Constant	219123.2	-1166775.0	25877.9	45345.5
	(144647.7)	(859104.0)	(346637.4)	(347066.6)
N	5510	870	870	870

Note: All specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.14: IV test for net costs

	(1) All years	(2) 2013-2015	(3) 2016-2018	(4) IV
Refugees	443.2***	495.7***	368.5***	352.6***
	(2.902)	(25.21)	(14.65)	(15.09)
Constant	602998.8***	-414457.3	1183434.4	1231375.9
	(103656.6)	(1014276.9)	(914607.3)	(915601.9)
N	5510	870	870	870

Note: All specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

3.4.2 Register data

Table 3.15 and table 3.16 presents the results corresponding to those of table 3.7 and table 3.8 respectively, but using register data. Overall the effects are similar but slightly smaller. There is also a higher variation between the estimates of different years. In table 3.17 and table 3.18 results of regressions corresponding to those of table 3.9 and table 3.10 are presented. The pattern is the same. The effects are similar but slightly smaller. The explanation for this pattern should be that the register data of received refugees suffer from measurement errors to a greater extent than the differenced data, resulting in an attenuation towards zero of the estimates, further magnified by the inclusion of fixed effects in the models. In conclusion, they do not clearly reject the previous results.

Table 3.15: Refugees received over five years, register data

	(1) Income	(2) Gini	(3) Government grants	(4) Tax revenue	(5) Net costs
Same year	-1.771***	0.141***	0.159*	-0.393***	-0.226
	(0.220)	(0.0281)	(0.0724)	(0.0553)	(0.170)
One year	-1.456***	0.223***	0.165	-0.246***	0.161
	(0.271)	(0.0341)	(0.0894)	(0.0682)	(0.209)
Two year	-1.613***	0.209***	0.669***	-0.476***	-0.103
	(0.293)	(0.0366)	(0.0966)	(0.0738)	(0.226)
Three years	-2.040***	0.259***	0.947***	-0.419***	0.395
	(0.312)	(0.0388)	(0.103)	(0.0785)	(0.241)
Four years	-1.222***	0.0985*	0.286*	-0.175*	0.917***
	(0.351)	(0.0435)	(0.116)	(0.0882)	(0.271)
Five years	-3.189***	0.273***	0.951***	-0.585***	0.227
	(0.406)	(0.0515)	(0.134)	(0.102)	(0.313)
Constant	204.9***	27.92***	6.936***	-6.002***	11.26**
	(5.221)	(0.738)	(1.719)	(1.312)	(4.027)
N	4058	3480	4058	4058	4058

Note: All variables are specified in per capita terms and all specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.16: Refugees received over ten years, register data

	(1) Income	(2) Gini	(3) Government grants	(4) Tax revenue	(5) Net costs
Same year	-1.339***	0.0638*	0.149*	-0.335***	-0.327
	(0.184)	(0.0248)	(0.0737)	(0.0493)	(0.226)
One year	-1.250***	0.234***	0.119	-0.218***	0.173
	(0.218)	(0.0295)	(0.0876)	(0.0586)	(0.268)
Two year	-1.436***	0.200***	0.710***	-0.463***	-0.138
	(0.236)	(0.0319)	(0.0948)	(0.0634)	(0.290)
Three years	-1.652***	0.216***	0.936***	-0.350***	0.445
	(0.246)	(0.0332)	(0.0989)	(0.0661)	(0.303)
Four years	-0.822**	0.0446	0.271*	-0.0693	0.995**
	(0.274)	(0.0369)	(0.110)	(0.0735)	(0.336)
Five years	-2.157***	0.125**	0.715***	-0.335***	-0.0170
	(0.345)	(0.0466)	(0.139)	(0.0927)	(0.424)
Six years	-0.977*	0.102	0.677***	-0.225*	0.219
	(0.401)	(0.0541)	(0.161)	(0.108)	(0.493)
Seven years	-1.456**	0.209***	0.788***	-0.316**	0.0895
	(0.453)	(0.0612)	(0.182)	(0.122)	(0.557)
Eight years	-0.966	-0.0161	0.350	-0.0798	0.542
	(0.515)	(0.0696)	(0.207)	(0.138)	(0.633)
Nine years	-1.649**	0.000276	0.414	-0.215	0.853
	(0.550)	(0.0743)	(0.221)	(0.148)	(0.676)
Ten years	-0.911	-0.168*	0.219	-0.153	-0.875
	(0.540)	(0.0728)	(0.217)	(0.145)	(0.663)
Constant	203.6***	30.76***	9.915***	-6.422***	23.22**
	(5.744)	(0.775)	(2.306)	(1.542)	(7.061)
N	2608	2608	2608	2608	2608

Note: All variables are specified in per capita terms and all specifications includes yearly fixed effects. Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.17: Aggregated effects, over five years, register data

	(1) Government grants	(2) Tax revenue	(3) Net costs	(4) Net revenue	(5) Net revenue w/o grants
Five years	533.7***	5441.9***	5354.4***	621.3***	87.56
	(31.59)	(81.17)	(61.38)	(28.21)	(48.36)
N	4060	4060	4060	4060	4060

Note: Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3.18: Aggregated effects, over ten years, register data

	(1) Government grants	(2) Tax revenue	(3) Net costs	(4) Net revenue	(5) Net revenue w/o grants
Ten years	1369.9***	4052.8***	4832.6***	590.1***	-779.8***
	(99.18)	(176.7)	(134.4)	(84.57)	(137.5)
N	2610	2610	2610	2610	2610

Note: Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

4. Discussion

The purpose of this paper is to examine the relationship between refugees and income, income inequality and public finances in Swedish municipalities. The results show that the receiving of refugees has a negative impact on income per capita, inequality, and public finances. The effect can be considered large in the case of inequality over time. The effect on income per capita differs from previous studies that have studied the effect of immigration in general on a national level, where it has been shown to be positive. This is, however, not necessarily contradictory. Refugee immigration should differ from, for example, labor immigration in the manner that such immigration should trivially be better directed to where there is demand for their labor. Refugee immigration should either be directed to the closest country without conflict or at least the closest country with a political system acceptable compared to the country from which the refugees are fleeing from. They may also suffer from trauma or injuries sustained in the conflict of interest. The effect on inequality is, as previous research suggests, negative. It is, however, in size, half of the effect found in Hibbs and Hong (2015), but appears to explain about the same proportion of the variance. Hibbs and Hong (2015) finding that low-skilled immigration has a smaller (insignificant) effect on inequality may explain the differences in size, if refugees in Sweden are lower-skilled than immigrants in the US in general. The similarities in the explained variance, does not imply much, given that the number of immigrants/refugees differed in the two data sets. The annual net revenue of negative 122 thousand should be compared to the estimate of Ruist (2015) of negative 77 thousand SEK. The difference is that 122 thousand SEK is the net revenue on the municipal level and 77 thousand on a national level. The estimate of 77 thousand SEK also does not include potential indirect effects on the contribution of natives.

It was shown that the effect on all three aspects: income, inequality, and public finances, was decreasing with the income level in the receiving municipality. One reason may be that as income increases, demand for services that the refugees can offer increase as well. Alternatively, government actions to boost demand for such services, such as tax cuts or different tax incentives may work better in richer municipalities. The reason may merit further research. It was also shown that the effects in all aspects were consistent over time. One might expect that

a negative effect on income per capita will decrease as refugees find more and better jobs; such a tendency was not found; the same was the situation for the Gini coefficient. The consistency of the effect on government grants may suggest that the greater part of this effect is not due to short term compensation to municipalities for receiving refugees, but rather a part of the structure of the system of government grants. In other words, refugees likely affect the municipality permanently in a manner which automatically results in an increase in government grants.

The potential weakness of the instrumental variable approach is if the residual of the assigned refugees is biased and not random. While, labor characteristics and existing refugee population explains the greater part of the instrumental variable as expected, the residual may still be correlated with labor characteristics not controlled for or by other variables not stated. This would still only be a problem if those variables are correlated with any of the dependent variables. Considering the resemblance of the IV-estimates and the fixed effects-estimates, the bias incurred would also have to be very similar in both models. To further validate the results, one could use a synthetic control group approach. This approach was at first attempted with some promising results. They were, however, not stable enough. The obstacle was that the treatment is non-binary. The number of refugees received varies greatly within whatever you define as the treatment group. To retrieve the actual effect of either increasing the proportion of refugees, receiving a number proportional to the population, or of receiving a single refugee, one has to divide the estimated treatment effect by the average change in any of these explanatory variables for the treated municipalities in the given year. However, if the treatment varies in size much within the treatment group, dividing the estimated average treatment effect by the average treatment size will not yield the actual treatment effect per refugee. Hence, one is forced to choose a small bandwidth for the treatment size when choosing the treatment group, which results in less power and less external validity. When it comes to choosing the bandwidth for the control group, one is also faced with two considerations. Firstly, similar to the treatment bandwidth, too large bandwidth will result in biased results. Secondly, too small bandwidth may incur a violation of a necessary assumption of the synthetic control methodology. Namely, that the municipalities in the control pool differ from those in the treatment group to the extent that a linear combination of them resembling the treatment municipalities cannot be created. Due to the long computing time for each estimation, a systematic comparison of the implications of a variation of the bandwidth is difficult. With more time, one could potentially improve upon this method, and either further validate or possibly reject the results of this paper. This could merit

further research.

References

Aleksynska, Mariya and Ahmed Tritah (2015). "THE HETEROGENEITY OF IMMIGRANTS, HOST COUNTRIES' INCOME AND PRODUCTIVITY: A CHANNEL ACCOUNTING APPROACH". In: *Economic Inquiry* 53.1, pp. 150–172. DOI: 10.1111/ecin.12141. eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/ecin.12141. URL: https://onlinelibrary.wiley.com/doi/abs/10.1111/ecin.12141.

Card, David (May 2009). "Immigration and Inequality". In: *American Economic Review* 99.2, pp. 1–21. DOI: 10.1257/aer.99.2.1. URL: https://www.aeaweb.org/articles?id=10.1257/aer.99.2.1.

Dahlberg, Matz, Karin Edmark, and Heléne Lundqvist (2012). "Ethnic Diversity and Preferences for Redistribution". In: *Journal of Political Economy* 120.1, pp. 41–76. DOI: 10.1086/665800. eprint: https://doi.org/10.1086/665800. URL: https://doi.org/10.1086/665800.

Felbermayr, Gabriel J., Sanne Hiller, and Davide Sala (2010). "Does immigration boost per capita income?" In: *Economics Letters* 107.2, pp. 177–179. ISSN: 0165-1765. DOI: https://doi.org/10.1016/j.econlet.2010.01.017. URL: http://www.sciencedirect.com/science/article/pii/S0165176510000182.

Frankel, Jeffrey A. and David H. Romer (June 1999). "Does Trade Cause Growth?" In: *American Economic Review* 89.3, pp. 379–399. DOI: 10.1257/aer.89.3.379. URL: https://www.aeaweb.org/articles?id=10.1257/aer.89.3.379.

Greenwood, Michael J. and Gary L. Hunt (2003). "The Early History Of Migration Research". In: *International Regional Science Review* 26.1, pp. 3–37. DOI: 10.1177/0160017602238983. eprint: https://doi.org/10.1177/0160017602238983. URL: https://doi.org/10.1177/0160017602238983.

Hibbs, Brian and Gihoon Hong (2015). "An examination of the effect of immigration on income inequality: A Gini index approach". In: *Economics Bulletin* 35.1, pp. 650–656. URL: https://ideas.repec.org/a/ebl/ecbull/eb-14-00571.html.

Jaumotte, Florence et al. (2016). *Impact of migration on income levels in advance economies*. English. OCLC: 961163400. ISBN: 9781475545913. URL: http://www.imf.org/external/pubs/cat/longres.aspx?sk=44343.0 (visited on 05/11/2020).

Kerr, Sari Pekkala and William R Kerr (Jan. 2011). *Economic Impacts of Immigration: A Survey*. Working Paper 16736. National Bureau of Economic Research. DOI: 10.3386/w16736. URL: http://www.nber.org/papers/w16736.

McNeill, William H. (1984). "Human Migration in Historical Perspective". In: *Population and Development Review* 10.1, pp. 1–18. ISSN: 00987921, 17284457. URL: http://www.jstor.org/stable/1973159.

Nekby, Lena and Per Pettersson-Lidbom (2017). "Revisiting the Relationship between Ethnic Diversity and Preferences for Redistribution: Comment". In: *The Scandinavian Journal of Economics* 119.2, pp. 268–287. DOI: 10.1111/sjoe.12209. eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/sjoe.12209. URL: https://onlinelibrary.wiley.com/doi/abs/10.1111/sjoe.12209.

Ortega, Francesc and Giovanni Peri (Jan. 2013). "The effect of income and immigration policies on international migration". In: *Migration Studies* 1.1, pp. 47–74. ISSN: 2049-5838. DOI: 10.1093/migration/mns004. eprint: https://academic.oup.com/migration/article-pdf/1/1/47/17170128/mns004.pdf. URL: https://doi.org/10.1093/migration/mns004.

Ortega, Francesc and Giovanni Peri (2014). "Openness and income: The roles of trade and migration". In: *Journal of International Economics* 92.2, pp. 231–251. ISSN: 0022-1996. DOI: https://doi.org/10.1016/j.jinteco.2013.11.008. URL: http://www.sciencedirect.com/science/article/pii/S0022199613001268.

Ravenstein, E. G. (1885). "The Laws of Migration". In: *Journal of the Statistical Society of London* 48.2, pp. 167–235. ISSN: 09595341. URL: http://www.jstor.org/stable/2979181.

Ruist, Joakim (Feb. 2015). *Refugee immigration and public finances in Sweden*. Working Papers in Economics 613. University of Gothenburg, Department of Economics. URL: https://ideas.repec.org/p/hhs/gunwpe/0613.html.

SFS (2016:38). *Lag om mottagande av vissa nyanlända invandrare för bosättning*. URL: http://rkrattsbaser.gov.se/sfst?bet=2016:38.

SFS (1990:927). *Förordning om statlig ersättning för flyktingmottagande m.m.* URL: http://rkrattsbaser.gov.se/sfst?bet=1990:927.

SFS (2010:1122). *Förordning om statlig ersättning för insatser för vissa utlänningar*. URL: http://rkrattsbaser.gov.se/sfst?bet=2010:1122.

A. Appendix

Table A.1: Gini, w/o yearly fixed effects

	(1) Gini
Refugees	0.315***
	(0.00778)
Constant	31.08***
	(0.0304)
N	3480
adj. R^2	0.280

Note: Standard errors are reported in parentheses and significance is denoted by * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.