Master of Philosophy

Economic Effects of Labor Migration

A Romanian Case Study

Øystein H. S. Rembar

October 14, 2015

Department of Economics
University of Oslo

Preface

I would like to thank my supervisor, Professor Karen Helene Ulltveit-Moe, for inspiring comments during the writing of this thesis. The project has received financial support from the Centre for the Study of Equality, Social Organization and Performance (ESOP)[1] and the Municipality of Skien's School Grant (Skien skolelegat). For this I am thankful. ESOP also provided me with an office space as well as innumerable cups of coffee and tea, without which I am not sure this thesis would have seen the light of day.

[1]Department of Economics, University of Oslo

Executive Summary

The thesis aims to analyse the impacts of labor migration on the Romanian economy. It is motivated by the large-scale exodus of people that has taken place from the country over the past 20-25 years. It places itself within the larger body of migration literature, most of which assesses the impacts of *im*migration on receiving countries. Defining the independent variable of the analysis as net migration stocks as shares of the overall population (a variable which takes on negative values in cases of net out-migration), we are able to utilize the standard theoretical framework applied in the literature. Specifically, we consider three models; one with roots in labor economics ("the labor model"), a Heckscher-Ohlin model and a Ricardo-Viner model. All models use labor and capital as factor inputs, and labor is assumed to be homogenous. The Ricardo-Viner and the Heckscher-Ohlin models assume that two goods are produced; one labor intensive and one capital intensive. We argue that the labor and Ricardo-Viner models are suitable for short-term analysis, whereas the Heckscher-Ohlin - given its assumption of perfectly elastic capital transfers between the two production sectors - yields better predictions for the long term. Different implications of the three models are discussed at some length, and for the labor and Heckscher-Ohlin models we solve for equilibrium outcomes and migration's expected impact on these.

The predicted effect of labor migration differs somewhat between the models. The labor model focuses on the short-term effect on wages, and finds that these are expected to decrease with positive migration changes. The Ricardo-Viner model emphasizes the adjustments of structural variables (such as the relative sizes of the two production sectors) in the short term. It finds that both sectors will benefit from inward migration. Over the long term, the Heckscher-Ohlin model predicts that factor prices will be unaffected by endowment changes, and that it is the labor intensive sector that will benefit from immigration, whereas the capital intensive sector will go into decline. The thesis also discusses some mechanisms that could reasonably be expected to influence the findings of the empirical analysis that are not incorporated in the formal models. Examples of this include endogenous labor market participation choices of natives and factor intensity changes in the production sectors.

A general problem in analyzing Romanian labor migration is lack of quality data. Ideally, our empirical analysis would have included the education and work experience levels of migrants as well as non-migrants, in order to see e.g. if Romania is experiencing "brain drain" (as claimed by some), and how the skill attainment of migrants is predicted to affect the economic variables of the models. To my knowledge, the thesis utilizes all relevant county-level data that are freely available. The empirical analysis considers net

migration's effect on five dependent variables (four of which are separated by production sector), specifically earnings, employment, net investments, turnover revenue and gross value added (GVA). Since there could be some simultaneous causality between these variables and net migration shares, we introduce three instruments. These are historical migration shares, the size of minority populations and foreign wage levels. The instruments are tested and mostly found to be exogenous and relevant, with the exception of foreign wages. The empirical analysis also considers the possibility that observations could be correlated accross panels; a concern which is tested and generally found to be justified. Cross-panel correlation robust (CPCR) regressions are therefore included in the analysis.

Overall, we find that the estimated effects are broadly in line with HO theory, indicating that one year is sufficient time for the structural variables to adapt (at least partly) to migration shocks. This finding appears to be most robust in the case of investments, where the relevant regression specifications all yield positive migration effects in the labor intensive sector and negative effects in the capital intensive sector. Also for the employment and turnover variables are the CPCR findings convincingly in line with the HO model. Results are less clear-cut for gross value added, something which could be due to the exclusion of several industries in the GVA observations. The effect on earnings might be zero (as predicted by HO theory), but estimates vary and I argue that trustworthy instruments for this variable are lacking.

Contents

"The problem is not people leaving, that outflow already happened a few years back. [...] In Romania we can clearly see the negative effects of the emigration of highly qualified labor, in particular doctors and engineers. It has started to be a problem for us."

– Romanian Labor Minister, Mariana Campeanu (Financial Times, January 2014)

"The reality that a part of Romanian peoples decide to find more work outside of Romania is something helping us very much - maintaining the unemployment at a reasonable rate."

– Romanian President Traian Basescu (The Telegraph, September 2014)

1 Introduction

Since the fall of Communism in 1989, emigration has been an pervasive feature of Romanian society (Ban 2012). During the 1990s, many sought to escape the intrinsic poverty and chaos that plagued the country. Migration was limited by strict visa regulations in Western countries for most Romanians, and only a few ethnic minorities were generally allowed to emigrate. Still, many Romanians saw illegal migration as a way of improving their living standards, and emigration rates increased. The development was further strengthened by the visa liberalization that was introduced with the Schengen area in 2002 (Potot 2008). This culture of emigration has continued until today, and the number of people involved in the emigratory process is now estimated at between 2 and 3.5 million (IOM 2015, Naterstad 2012: 191-192). In a population of approximately 20 million, one could reasonably expect this large-scale exodus to have had an impact on the Romanian economy.

This thesis aims to estimate some of these effects, in particular the impact on earnings and production structure. It proposes three models to adress this issue; one from the field of labor economics and two from international trade theory.[2] The models are fairly similar in most technical respects, but they assume different time horizons. All models have labor and capital as the two factors of production, and they assume the same constant elasticity of substitution (CES) production functions. Depending on what we find in the empirical analysis, we will hopefully be able to say which model is more suited to analyze Romanian migration data, and thereby whether the migration effects have stabilized over the short or long term. We will solve for equilibrium outcomes of

[2]The distinction between typical labor economics models and international trade models is based on the article by Gaston & Nelson (2011), where labor models are characterized by production of one good using more factors, and international trade models by both several goods as well as several factors of production.

the short-term labor economics model and the long-term Heckscher-Ohlin (HO) model, whereas the short-term Ricardo-Viner (R-V) model will be treated descriptively.

The thesis will begin with a short introduction to some key historical developments in Romania since the revolution of 1989. Following this, a discussion of typical migration profiles will be given, for the most part based on surveys and papers written on the subject. A recurring feature of these analyses is that data on Romanian migration is lacking or of low quality, so estimates and implications can differ quite a lot between papers. Following this section, we will present some central findings from the vast body of migration literature, after which we formally introduce the three theoretical models. We will solve for general equilibrium outcomes and the implied effects of migration on employment, turnover revenue, gross value added and investments in the labor and capital intensive sectors, as well as earnings. An underlying assumption of the analysis is that migrants and non-migrants are essentially the same sort of people. The thesis will therefore use net migration as the independent variable of interest; i.e. the sum of net internal as well as net external migration. Even though the thesis is motivated by the large out-migration Romania has experienced over the past 15-20 years, I argue that using net migration gives us more accurate estimates of the actual net effects of migration than gross external emigration does. In Sections 4 and 5 the dataset used in the analysis will be presented, as well as implications of the theory for the empirical specifications. The final two sections present and discuss the results of the regression analysis and conclude. Stata has been used in the regressions, and all statistical data in the thesis have been collected from the Romanian National Institute of Statistics (INS), Eurostat and the OECD.

1.1 The Romanian Context

The fall of Communism in December 1989 heralded the beginning of a new era in Romanian history. The country embarked on a painful transition process towards liberal democracy, something which necessitated major restructuring of an economy that under Communist rule had been biased in favor of inefficient labor-intensive heavy industries. The former regime had decreed away unemployment by propping up factories with redundant labor, and workers would receive payment regardless of vocational performance (Naterstad 2012: 151). Following the revolution, international competition as well as the political instability that plagued the country in the first half of the 1990s caused GDP to fall sharply, inflation to get out of hand and unemployment to rise, especially in heavy industries (Calcagno *et al.* 2006). Between 1990 and 1992, GDP measured at constant prices fell by 23.5 percent, and although reliable statistics on unemployment are lacking, layoffs were massive. This is to a large extent reflected in the changing composition of employment, as showed in Figure 1. Over the course of the 1990s, the share of workers employed in the industrial sector fell considerably, while the share working in the primary sector (mostly agriculture) rose by an almost equal amount. Romanian authorities in 2001 even started to recruit workers to go abroad in order to deal with the severe labor market situation during this time (Stan 2001).

The restitution of expropriated land and the industrial layoffs led to an increase in urban-rural migration, where recently unemployed industrial workers would migrate back to the farms of their parents or grandparents (Sandu 2005b). In addition to this internal migration, an ethnic transnational migration process was taking place in the 1990s. Large numbers of people belonging to Romania's historically important minorities - in particular Germans, Hungarians and Jews - left for the lands of their ancestors. During Communist rule, emigration from Romania had been virtually impossible, as the regime had both a desire for strong population growth as well as a fear of information on the poor Romanian living conditions getting out to foreign news agencies and governments (Ban 2012, Naterstad 2012: 63).[3] After the revolution Romanians were allowed to leave the country, but since most Western governments imposed heavy restrictions on the entering of Romanian nationals onto their territories, movement was still limited (Stan & Erne 2014). However, it is likely that actual migration levels in the 1990s and 2000s were larger than they appear in official statistics, as many Romanians became illegal immigrants in Western Europe and elsewhere. This shadow migration is likely to have continued until today, with emigrants either working without a permit or overstaying the stipulated period of validity of a legally obtained permit (Elrick & Ciobanu 2009).

Overall, emigration of Romanian workers over the past fifteen years has been quite significant. Some analysts estimate the number of Romanians working abroad to amount to more than 3.5 million people, a very large figure in a population of around 20 million and a workforce of about half that size (IOM 2015). Spain and Italy are by far the most important destinations for Romanian emigrants, with estimates suggesting approximately 1 million Romanians staying in each of these countries. This naturally brings us to the next section of the thesis, where we will try to get a clearer impression of exactly who these migrants are.

1.2 Migration Profiles

Few - if any - comprehensive quantitative studies have been performed on the effects of Romanian labor migration, a fact which is likely due to some severe shortcomings in available and trustworthy data (OECD 2013, Baldwin-Edwards 2008). To begin with, the

[3] However, there were incidents where members of ethnic minorities would be "sold" to other countries in order to boost government revenue.

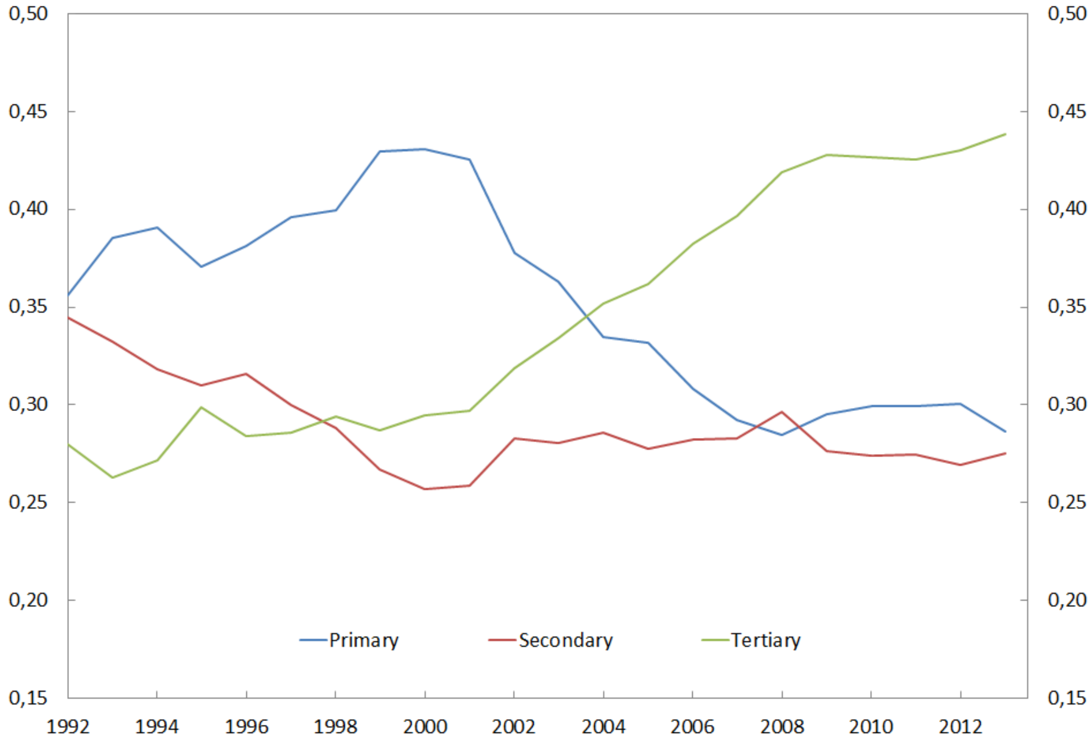


Figure 1: Civilian employment in the primary, secondary and tertiary sectors. 1992-2013. Sources: INS and own computations

actual number of migrants is highly uncertain, not to mention their typical occupations or educational attainment levels. This alone makes it difficult to assess the impacts of emigration. Some official data exist on permanent migrants, but statistics have only since recently (2012) been collected on temporary migration. Temporary migrants are assumed to constitute the largest group of Romanian emigrants, and Baldwin-Edwards (2008) estimate their numbers at somewhere between six hundred thousand and one million in the mid-2000s. Since this type of migration is circulatory, not all of these people lived outside Romania at the same time, so the actual number of migrants staying abroad at any one point would be below that figure.

Sandu (2005a) uses a community census carried out in almost all of Romania's 12,700 villages in December 2001 to investigate some features of the country's circular migration. He finds that the villages of migrants are characterized by high levels of youth unemployment, relatively high levels of education and a significant presence of religious or ethnic minorities.[4] Around one fifth of Romanian villages fall into this category, and these villages represent in total three fourths of circular emigration over the period 1990-2001. Over approximately the same period (1992-2002), Stan (2009) finds that 62% of

[4]As will be further explained later in the thesis, his finding that minorities are of significance to migration leads us to consider this as a possible instrument in the regression analysis.

migrants were of reproductive age (between 20 and 40 years old). This could prove a challenge to Romanian birth rates, since migration typically lowers the likelihood of becoming a parent. Furthermore, Stan finds that the share of secondary education (high school or vocational training) is much higher (77%) than in the overall population (45%). This is consistent with the findings of Baldwin-Edwards (2008) in his comparison of three surveys conducted at the beginning of the 2000s. He concludes that (illegal) temporary migrants typically are male (71%), have secondary education (57%) and are in the 15-44 age group. Also, unemployed persons (14%) and ethnic Hungarians (14%) are overrepresented.[5] Vasile (2014) on the other hand, finds that unemployed persons represented only 2% of all working aged emigrants in 2010. 85% were employed upon departure, and the remaining 13% were outside of the labor market. According to her, this could be reason to worry that emigration is leading to "brain drain" and that unemployment is not reduced through emigration.

A 2014 paper by Boboc *et al.* finds that the educational profile of Romanian emigrants has a saddle shape, where both people with above average as well as people with below average levels of education are overrepresented. This stands in contrast to the findings above, where secondary education is typical among emigrants. It could well be that the educational profile has changed during the ten years separating the Boboc *et al.* survey and the Baldwin-Edwards group of surveys. A 2002 Eurobarometer survey cited in Krieger (2004) found that as many as 18.6% of students in Romania and Bulgaria (combined) were generally inclined to emigrate. This was the highest share in any EU accession country, and higher than the shares of other groups within Romania and Bulgaria. This could support the proposition that the educational attainment level of emigrants rose during the 2000s as these students graduated. When performing a regression analysis on data collected in a survey conducted in June 2012, Boboc *et al.* find that being male, young and having little education has a positive and significant effect on the likelihood of emigrating. It should be noted however, that this survey is based only on a sample of 500 individuals working in small and medium-sized enterprises (SMEs), while also excluding the agricultural sector, something which could bias the estimates.

Baldwin-Edwards identifies six categories of Romanian emigrants. In a rough order of magnitude, they are:

1. Circular migration with illegal employment
2. Temporary legal migration
3. Permanent migration to OECD countries

[5] The numbers in parentheses are from the survey conducted by the Romanian CURS polling institute, one of the three surveys investigated by Baldwin-Edwards.

4. Circular migration between Germany and Romania (with legal employment)[6]
5. Trafficked migrants for prostitution or labor services
6. Romanian asylum seekers

As mentioned above, Baldwin-Edwards estimates the first group to amount to approximately 600,000-1,000,000 people (a number which most likely has increased since the writing of his article). Referring to a 2004 study, the second group (temporary legal emigration) is estimated at approximately 40,000 persons in 2002 and almost 70,000 in 2003. The numbers are calculated by summing up work permits that were issued to Romanians at foreign embassies in Bucharest during those two years. It is interesting to note that the number of permits increased considerably after visa liberalization was introduced with the Schengen area in 2002. The third group (permanent migration) has decreased since the period of ethnic migration in the 1990s. At the time of the writing of his article, this group consisted of around 10,000 people annually. Baldwin-Edwards also notes that the educational attainment of the permanent emigrants rose during the 1990s, and that the exodus of ethnic Germans in particular may have constituted a “brain drain” for Romania. Aggregating numbers of permanently emigrated Romanians over the period 1990-2003 yields a total population loss of approximately 250,000 people. This is however not subtracting for return migration, which the OECD estimates amounted to 66,500 people over the period 1996-2002 (Baldwin-Edwards 2008). The three remaining types of emigration (number 4 to 6) are smaller in size. Romania has had significant problems with human trafficking, but this hardly amounts to a population loss that in itself should have a great impact on the economy. The number of Romanian asylum seekers were large during the first years following the revolution (they peaked at 116,000 in 1992), but they diminished quickly, and many - if not most - applications were rejected (Baldwin-Edwards 2008).

A report on working conditions in Romania finds that higher wages abroad is the most important reason why Romanians wish to emigrate (Ciutacu & Chivu 2007). The report is based on findings in the European Working Conditions Survey conducted in 2005 for a range of European countries, as well as official data from the National Institute of Statistics (INS). It notes that Romanian workers have among the longest working hours in Europe, and that 51% worked more than 40 hours per week. 61% of Romanian workers believed career advancement opportunities were limited, compared to an EU25 average of 45%. The survey also indicated that the Romanian labor force could be overqualified, with as many as 44% of workers thinking they could take on more demanding tasks. Furthermore, almost half of the workforce stated that they face health or safety risks at

[6] It is not clear from the paper why the circular, legal migration with Germany is separated from the usual type of temporary and legal migration.

work, almost double the share in EU25. Overall, it is perhaps not very surprising that many Romanians view emigration as a way to enhance their living standards, given the poor working conditions the domestic labor market has to offer.

2 Related Migration Literature

Much has been written on the effect of migration on wages and economic structure. Card (2007) finds that immigration has increased the wage gap between low- and high-skilled labor in US cities, and that the average national wage has risen slightly as a result of immigration. Friedberg & Hunt (1995) provide an overview of empirical research on immigration, and conclude that the evidence indicates that wage effects are small. A much discussed claim is that immigration of foreigners can lead to emigration of natives; i.e. that the native population moves away when immigrants arrive. This would offset the actual (negative) effect of immigration on wages in studies only using immigration levels as the independent variable. Card (2001) finds that the level of native displacement in US cities over the period 1985-90 was low, and that immigration did lead to population increases.[7] He also finds that increases in the relative size of a population skill group leads to lower employment rates within that group, and that skill-specific relative wages seem to have fallen a little (although this latter result is sensitive to choice of instrumental variables (IV) specification). Card concludes that his study is consistent with the existing literature on immigration, since wage effects are found to be limited. Gonzales & Ortega (2011) investigate the economic effects of immigration to Spain over the 2000-2006 period, and they too find that native wage effects within skill groups are small. Interestingly, they also conclude that immigration has led to within-industry adaptation in factor intensities; specifically, an increased supply of low-skilled labor has caused sectors to use this factor more intensively. Standard Heckscher-Ohlin (HO) theory (as will be further explained below) predicts that adaptation will happen on the extensive margin, and that sectors that use a factor intensively will increase their output, but not that the intensity with which the factor is used will change. On the contrary, factor intensities are usually assumed to be constant within an industry, hence excluding the possibility of so-called factor reversals.[8] They show that almost 9 of 10 unskilled immigrants become employed and, using an accounting method, that 60% of this rise in employment is facilitated by changes in factor intensities, 7% by output increases, and 22% by both factor intensity changes and output increases. Hanson and Slaughter (2002) utilize a similar technique for US states. They find that labor supply shocks are absorbed both through nation-wide

[7] An obvious advantage of using total net migration numbers (as is done in this thesis) is that any such displacement effect will be internalized in the data.

[8] The concept of factor reversals implies that industries can change their relative factor intensity, e.g. go from being labor intensive to being capital intensive.

factor intensity changes as well as output changes, with output changes playing the larger role in their case. The baseline HO model introduced below does not take account of the possibility that factor intensities might change. However, this could obviously still have some important implications for the interpretation of empirical findings, and should be borne in mind when analyzing the regression results.

Lewis (2013) presents a review of different models that attempt to explain the common finding that wage effects of migration appear to be zero. Among the factors he considers are capital-skill complementarity, multiple production sectors and that producers have free choice of technology. If capital and skilled labor are complements, increased supply of skilled labor will lead to an increase in capital supply. This would contribute to raising the overall marginal product of labor, hence mitigating the negative wage effects from an influx of labor.[9] The HO model presented below is an example of a model with multiple production sectors, and it is shown there that no wage effects take place following a migration shock - all adaptation from the changed labor supply happens on the output margin. If producers are free to choose among a set of production functions (or they are able to set the relative sizes of factor intensities), they will choose to become more labor intensive following a positive labor supply shock.[10] All these effects will diminish the impact of a migration shock on wages. Both models presented below exhibit a degree of capital-labor complementarity (although not specifically for skilled as opposed to unskilled labor), and the HO and Ricardo-Viner models present two-good economies.

In a much-cited article, Borjas (2003) argues that skill levels among workers cannot fully be described by education alone, so he introduces work experience as a separate component of skill attainment. Using data from US censuses and population surveys for the period 1960-2001, he finds that this analytical setup indicates that wages within skill cells have fallen as a result of immigration; i.e. that native workers with any given education-experience mix will experience wage decreases with large-scale immigration of persons belonging to the same skill cell. This finding also holds when complementarity between skill levels is taken into account.[11] Unfortunately, detailed data on education and work experience is scarce in the case of Romania, so my analysis has not been able to take account of such effects. However, Borjas' findings imply that the *average* (economy-wide) wage has fallen, so strictly speaking, his result should not be dependent upon separation of skill levels into education and experience groups, nor even the inclusion of skill as an

[9] Or more precisely, it would raise the marginal product of skilled labor, and to the extent that skilled and unskilled labor are substitutes, also the "overall" marginal product of labor.

[10] This is then in effect the same as the within-industry adaptation in factor intensities that was described above.

[11] Such complementarity would imply that wages of highly skilled workers may rise following an increase in the supply of low-skilled workers (and vice versa).

explanatory variable. Ottaviano & Peri (2012) expand the analysis of Borjas by taking into account perceived differences between natives and migrants. They find that immigration has had a small positive effect on average native US wages, whereas the effect on the wages of other immigrants has been strongly negative. They attribute this to the lack of substitutability between natives and immigrants. Immigration causes natives to become relatively more scarce, thus increasing their wages, while other immigrants become more abundant and therefore less paid. In my analysis, migrants and non-migrants are assumed to be perfectly substitutable. For a sending country like Romania this might be less of a limiting assumption than it is for a receiving country like the United States. Since levels of immigration from abroad are quite small in Romania, it is foreign emigration and native internal migration that make up the bulk of the migration data. In this context, both of these groups must be similar to the non-migrating population, since all of them are native Romanians. However, the point of Ottaviano & Peri about the importance of estimating total wage effects by also taking into account how *relative* supplies of different labor groups change with migration is very much relevant. Lack of data prevents us from testing these effects directly, but we can still expect some of them to show up in the aggregated findings on earnings and production structure, and this point should be borne in mind when interpreting these results. In analyzing Norwegian data, Bratsberg *et al.* (2014) too find that natives and immigrants are not perfect substitutes, and that immigrant wage responses are more negative than the national average when new migrants arrive. They also point to the importance of considering possible native labor attrition; i.e. that certain groups of the native labor force could respond to immigration by moving out of the labor market. With emigration, we should think that this effect would go in the opposite direction, so that labor market participation rates increase.

3 Theoretical Framework

This section presents the three models used in assessing the impacts of labor migration from Romania. There are two key differences between these models. The most apparent one is that of dimensionality; while the first model (the "labor model") presents a one good economy with two factors of production, the second model (the "HO model")assumes two goods and two factors. The third model (the "R-V model") assumes two goods and three factors of production (two of which are specific to each sector). The second difference is slightly more subtle and concerns that of temporality. The labor model assumes a fixed capital supply and does not allow for structural changes to take place following a migration shock. This model can therefore be regarded as relevant for the short term. The HO model also includes the effects on production structure as well as capital supply changes, and is therefore more apt at analyzing long-term effects of migration. The R-V model is like the labor model applicable to short-term analysis. This results from the fact that two of the factors are immobile between the sectors.

As we will see, the two differences (dimensionality and temporality) cause the models to yield alternative predictions as to what will happen to wages when factor resources are altered. It is implied by the labor economics and the R-V models that wages will rise as a result of emigration, while the HO model predicts that no changes in factor prices will take place. Instead, the effects of emigration are completely absorbed by changes in the composition of output, with capital intensive industries expanding at the expense of labor intensive industries. The short-term models do not allow for such structural adjustments to take place, since capital supply is assumed to be inelastic in the short run. The labor model will therefore be used to analyse the short-term effect on wages, the R-V model the effect on structural variables in the short run and the HO model will be used to explain long-term changes in factor allocations between the labor intensive and the capital intensive sectors. We will see that the structural predictions of the Ricardo-Viner model for the short run differ from those of the Heckscher-Ohlin model for the long run. The version of the labor model presented in this thesis is in large part based on Dustmann *et al.* (2013), whereas our HO specification is an adaptation of the labor model to the 2×2 framework. The exposition of the R-V model will be intuitive and not rely on mathematics.

3.1 Labor Economics Model

The one good in this model economy is assumed to be produced by the following production function, characterized by constant elasticity of substitution (CES) as well as constant returns to scale (CRS):

$$y = [\gamma L^s + (1-\gamma)K^s]^{1/s} \tag{1}$$

Here L is input of labor, K is input of capital, γ is the relative share of labor's production and $s \in (-\infty, 1)$ represents the elasticity of substitution between capital and labor.[12] The price of the good is set to 1, so y represents the (real) value of production. The good is traded internationally, and we assume that the world market is able to absorb all production from the home country without adjustments in the price of the good. In other words, it is not necessary to specify a demand function for the good, and domestic equilibrium allocations will be determined by the producer optimization problem, subject to domestic factor market clearing constraints. We have that labor supply is characterized as

$$N = N^0(1+m), \tag{2}$$

[12]Technically speaking, the substitution elasticity is defined as r, where $r = \frac{1}{1-s}$, $r \in (0, \infty)$

where N denotes total labor supply, N^0 is the initial population before migration and m measures the share of net migration in the initial labor force (i.e. $m = \frac{N^1}{N^0}$, where N^1 is the number of immigrants minus the number of emigrants). We assume that all markets clear, so that $N = L$. This is clearly an unrealistic feature of both this model and the HO model, in particular since it implies that everyone works and that everyone is equally productive. However, due to limitations in data on Romanian workers and migrants, such an assumption is necessary and hopefully not too damaging to the realism of the models' implications. By taking first derivatives of y with respect to L and K and setting these equal to wages (w) and price of capital (ρ), we obtain the following first order conditions:

$$w = \gamma\left[\gamma + (1-\gamma)\left(\frac{K}{L}\right)^s\right]^{\frac{1}{s}-1} \tag{3}$$

$$\rho = \left[\gamma + (1-\gamma)\left(\frac{K}{L}\right)^s\right]^{\frac{1}{s}-1}(1-\gamma)\left(\frac{K}{L}\right)^{s-1} \tag{4}$$

Taking logarithms yields that

$$\ln w = \ln\gamma + \left(\frac{1}{s}-1\right)\ln\left[\gamma + (1-\gamma)\left(\frac{K}{L}\right)^s\right] \tag{5}$$

$$\ln\rho = \ln(1+\gamma) + \left(\frac{1}{s}-1\right)\ln\left[\gamma + (1-\gamma)\left(\frac{K}{L}\right)^s\right] + (s-1)\ln\left(\frac{K}{L}\right) \tag{6}$$

Furthermore, since we are interested in the effect of changes in net migration, we derive (5) and (6) with respect to the net migration share m:

$$\frac{\partial \ln w}{\partial m} = (1-\psi)(1-s)\left[\frac{d\ln K}{dm} - \frac{d\ln L}{dm}\right] \tag{7}$$

$$\frac{\partial \ln \rho}{\partial m} = -\psi(1-s)\left[\frac{d\ln K}{dm} - \frac{d\ln L}{dm}\right], \tag{8}$$

where $\psi \in [0,1]$ denotes labor's share in production $\frac{\gamma L^s}{\gamma L^s + (1-\gamma)K^s}$, and $(1-\psi)$ the share of capital. We now assume that capital supply is fixed, so that $K = \bar{K}$ and $\frac{d\ln K}{dm} = 0$. Calculating $\frac{d\ln L}{dm}$ from (2) yields the following expressions for factor price changes following a migration shock:

$$\frac{\partial \ln w}{\partial m} = -(1-\psi)(1-s)\frac{1}{1+m} \leq 0 \tag{9}$$

$$\frac{\partial \ln \rho}{\partial m} = \psi(1-s)\frac{1}{1+m} \geq 0 \tag{10}$$

Both these expressions will be zero if labor and capital are perfect substitutes ($s \to 1$). The intuition behind this is that each part of the labor increase in this case is equivalent to a similarly sized increase in capital, causing the relative shares of production befalling each factor to remain constant.[13] (9) will also be zero if capital is not used in production (so that $\psi = 1$). This is because γ in this case must equal one (as long as we rule out corner solutions to the producer's optimization problem), in which case the production function simplifies to $y = L$, causing the marginal product of labor (and hence wages) to always equal one. Similarly, (10) will be zero if labor is not used ($\psi = 0$). Both of these cases ($s \to 1$ and/or $\psi = 1$) seem rather implausible. Therefore, we expect to find that a positive change in net migration shares leads to a decrease in wages in the short run.

As is done in Dustmann *et al.* (2013, 2015), it is possible to allow capital to adjust in this model. It could be that it is reasonable to expect some such adjustment to take place also in the short run. If we let short-term capital supply be defined as $K^{STS} = \kappa\rho^{\phi}$, where $\phi \in [0, \infty)$ is the supply elasticity, we have that the following must hold:

$$\frac{d\ln K}{dm} = \frac{\partial \ln K}{\partial \ln \rho}\frac{d\ln \rho}{dm} = \phi\frac{d\ln \rho}{dm}$$

Inserting this into (7) and (8) and combining the two equations yields the following alternative expressions for the effect of migration on factor prices:

$$\frac{\partial \ln w}{\partial m} = -\frac{(1-\psi)(1-s)}{1+\psi\phi(1-s)}\frac{1}{1+m} \leq 0 \tag{9'}$$

$$\frac{\partial \ln \rho}{\partial m} = \frac{\psi(1-s)}{1+\psi\phi(1-s)}\frac{1}{1+m} \geq 0 \tag{10'}$$

From this we see that the quicker capital supply responds to price changes (i.e. the larger ϕ is), the smaller will these price changes be. In the extreme, if capital is perfectly elastic, both factor prices will be constant following an increase in the supply of labor. To get an intuition of what happens in this process, it can be instructive to follow the chain of causality. Both w and ρ are directly affected by a labor supply increase, since such an increase changes the angle of the expansion path in an isocost-isoquant diagram (holding capital levels constant). Since there is a change in ρ, capital supply will also change, leading to the establishment of a new equilibrium in the capital market. The new (increased) equilibrium quantity of supplied capital will then cause yet another change in the angle of the expansion path, this time in the opposite direction from before. This shift causes wages to increase. If capital is perfectly elastic in supply, ρ will be given *ex ante* (since the capital supply curve in this instance is horizontal). Assuming that labor and capital

[13] Formally, for $s \to 1$, $y = \gamma L + (1-\gamma)K$. Then the marginal product of labor (and hence wages) will equal γ for all levels of K and L. We also have that $\rho = 1 - \gamma$. Under constant returns to scale (CRS) there will be no profits, so all income from production will befall the two factors. The shares going to each will always be constant and given by γ and $1 - \gamma$.

are at least somewhat complementary (i.e. the isocost line has some curvature because $s < 1$), any labor supply increase will cause *both* an increase in ρ (due to higher capital demand) as well as a fall in wages. Given this complementarity and that equilibrium ρ is constant when $\phi \to \infty$, wages will necessarily also have to be constant. For this to happen, capital supply must increase in exact parallel to labor supply, so that the angle of the expansion path remains unchanged.

Given that this is a short-term model, it is probably unrealistic to assume that capital supply will be able to adapt sufficiently quickly for w and ρ to remain unchanged. In sum we have three factors that we expect will determine the short-term effects of labor supply changes on factor prices. A high degree of substitutability between the factors, an "extreme" value of γ (either close to zero or one) and an elastic capital supply will help diminish the effects. It can be noted on capital supply that in real life, this can increase through two channels. It can be transferred from other places (other domestic regions or foreign countries), or it can be produced through investments. It is not specified in this model where the capital comes from; it is simply assumed that ϕ captures the average ease with which new capital materializes in the economy in the short run. In a longer time perspective, it would be reasonable to expect all arbitrage opportunities to be exhausted, leading long-run capital prices to converge across regions between which there is at least some possibility of capital transfer, and capital producers to be able to perfectly match the long-run demand for capital from goods producers. In this respect it is therefore possible to think of the long-run capital supply curve as being horizontal. The HO model in the following section describes an economy where capital supply from the standpoint of each individual sector is *as if* perfectly elastic. An increasing economy-wide capital supply function is defined (similar to K^{STS}), but we will see that arbitrage opportunities between the sectors in the marginal payoff of capital causes this overall supply to be redundant in explaining the development of long-term factor prices.

3.2 Heckscher-Ohlin Model

In this model, two goods are produced using capital and labor. The two CES production functions can be identified as:

$$y_1 = [\gamma_1 L_1^s + (1 - \gamma_1) K_1^s]^{\frac{1}{s}} \tag{11}$$

$$y_2 = [\gamma_2 L_2^s + (1 - \gamma_2) K_2^s]^{\frac{1}{s}} \tag{12}$$

where L_i is input of labor in sector i, K_i is input of capital, γ_i is the relative share of labor's productivity and $s \in (-\infty, 1)$ represents the elasticity of substitution between capital and labor.[14] Also here we assume that world markets are able to absorb all production from the home country, leading domestic equilibrium allocations to be determined by the supply side of the model in addition to the exogenously given world market goods prices p_1 and p_2. Labor supply is given by

$$N = N^0(1+m), \tag{13}$$

where N denotes total labor supply, N^0 is the initial population before migration, and m measures the share of net migration in the initial labor force (i.e. $m = \frac{N_1^1+N_2^1}{N^0}$, where N_1^1 and N_2^1 are the net supplies of migrants in sector 1 and sector 2, each given by the number of immigrants minus the number of emigrants in the sector). Capital supply is given by

$$K^{LTS} = \lambda \rho^\theta, \tag{14}$$

where ρ is the rental price of capital and θ is the long-term capital supply elasticity. We assume that all markets clear, so that $N = L_1 + L_2$ and $K^{LTS} = K_1 + K_2$. By setting the first derivatives of y_1 and y_2 with respect to each factor of production equal to real wages ($\frac{w}{p_i}$) and per-unit real price of capital ($\frac{\rho}{p_i}$), we obtain the following set of first-order conditions:

$$\frac{w}{p_1} = \gamma_1 \left[\gamma_1 + (1-\gamma_1)\left(\frac{K_1}{L_1}\right)^s \right]^{\frac{1}{s}-1} \tag{15}$$

$$\frac{w}{p_2} = \gamma_2 \left[\gamma_2 + (1-\gamma_2)\left(\frac{K_2}{L_2}\right)^s \right]^{\frac{1}{s}-1} \tag{16}$$

$$\frac{\rho}{p_1} = \left[\gamma_1 + (1-\gamma_1)\left(\frac{K_1}{L_1}\right)^s \right]^{\frac{1}{s}-1} (1-\gamma_1)\left(\frac{K_1}{L_1}\right)^{s-1} \tag{17}$$

$$\frac{\rho}{p_2} = \left[\gamma_2 + (1-\gamma_2)\left(\frac{K_2}{L_2}\right)^s \right]^{\frac{1}{s}-1} (1-\gamma_2)\left(\frac{K_2}{L_2}\right)^{s-1} \tag{18}$$

By rearranging (15), we have that

$$K_1 = \left[\frac{\left(\frac{w}{p_1\gamma_1}\right)^{\frac{s}{1-s}} - \gamma_1}{1-\gamma_1} \right]^{\frac{1}{s}} L_1$$

Furthermore, let

$$g_i(w) \equiv \left[\frac{\left(\frac{w}{p_i\gamma_i}\right)^{\frac{s}{1-s}} - \gamma_i}{1-\gamma_i} \right]^{\frac{1}{s}}$$

By inserting for the resource constraints and $K_1 = g_1(w)L_1$, we have that (16) can be written as

$$\frac{w}{p_2} = \gamma_2 \left[\gamma_2 + (1-\gamma_2)\left(\frac{\lambda\rho^\theta - g_1(w)L_1}{N - L_1}\right)^s \right]^{\frac{1}{s}-1}$$

[14] As above, the substitution elasticity is actually defined as r, where $r = \frac{1}{1-s}$, $r \in (0, \infty)$

Rearranging yields the following expression for L_1:

$$L_1 = \frac{g_2(w)N - \lambda\rho^\theta}{g_2(w) - g_1(w)}, \tag{19}$$

which in turn implies that

$$L_2 = \frac{g_1(w)N - \lambda\rho^\theta}{g_1(w) - g_2(w)} \tag{20}$$

Using that $K_1 = g_1(w)L_1$ and that $K_2 = \lambda\rho^\theta - K_1$, we then have the following expressions for capital:

$$K_1 = \frac{g_1(w)g_2(w)N - g_1(w)\lambda\rho^\theta}{g_2(w) - g_1(w)} \tag{21}$$

$$K_2 = \frac{g_1(w)g_2(w)N - g_2(w)\lambda\rho^\theta}{g_1(w) - g_2(w)} \tag{22}$$

From this we see that $g_i = \frac{K_i}{L_i}$, i.e. the ratio of capital to labor in sector i. Inserting the factor expressions in (19)-(22) (which now only depend on w, ρ, world market goods prices and the endowment of labor) into (18), we get

$$\frac{\rho}{p_2} = (1-\gamma_2)\left[\gamma_2 + (1-\gamma_2)\left(\frac{g_1(w)g_2(w)N - g_2(w)\lambda\rho^\theta}{g_1(w)N - \lambda\rho^\theta}\right)^s\right]^{\frac{1}{s}-1}\left(\frac{g_1(w)g_2(w)N - g_2(w)\lambda\rho^\theta}{g_1(w)N - \lambda\rho^\theta}\right)^{s-1}$$

$$\rho = p_2(1-\gamma_2)\left[\frac{\gamma_2}{(g_2(w))^s} + 1 - \gamma_2\right]^{\frac{1}{s}-1}$$

$$\rho = \frac{(1-\gamma_2)^{\frac{1}{s}} w p_2}{\left[w^{\frac{s}{1-s}} - p_2^{\frac{s}{1-s}}\gamma_2^{\frac{1}{1-s}}\right]^{\frac{1}{s}-1}} \tag{23}$$

By the symmetry of this model, performing a similar rearrangement of (17) will yield that

$$\rho = \frac{(1-\gamma_1)^{\frac{1}{s}} w p_1}{\left[w^{\frac{s}{1-s}} - p_1^{\frac{s}{1-s}}\gamma_1^{\frac{1}{1-s}}\right]^{\frac{1}{s}-1}} \tag{24}$$

Combining these two expressions for ρ gives the following expression for the equilibrium wage:

$$w = \left[\frac{\left((1-\gamma_2)\gamma_1\right)^{\frac{1}{1-s}} - \left((1-\gamma_1)\gamma_2\right)^{\frac{1}{1-s}}}{(1-\gamma_2)^{\frac{1}{1-s}} p_1^{\frac{s}{s-1}} - (1-\gamma_1)^{\frac{1}{1-s}} p_2^{\frac{s}{s-1}}}\right]^{\frac{1}{s}-1} \tag{25}$$

Here we see that the equilibrium wage does not depend on factor endowments. Hence, the labor model prediction that wages will rise as a result of emigration is not apparent here. Inserting for w in the expressions for $g_1(w)$ and $g_2(w)$ yields that

$$g_1 = \left(\frac{1-\gamma_1}{\gamma_1}\right)^{\frac{1}{1-s}} \left[\frac{(\gamma_1 p_1^s)^{\frac{1}{1-s}} - (\gamma_2 p_2^s)^{\frac{1}{1-s}}}{\left((1-\gamma_2)p_2^s\right)^{\frac{1}{1-s}} - \left((1-\gamma_1)p_1^s\right)^{\frac{1}{1-s}}}\right]^{\frac{1}{s}} \tag{26}$$

$$g_2 = \left(\frac{1-\gamma_2}{\gamma_2}\right)^{\frac{1}{1-s}} \left[\frac{(\gamma_1 p_1^s)^{\frac{1}{1-s}} - (\gamma_2 p_2^s)^{\frac{1}{1-s}}}{\left((1-\gamma_2)p_2^s\right)^{\frac{1}{1-s}} - \left((1-\gamma_1)p_1^s\right)^{\frac{1}{1-s}}}\right]^{\frac{1}{s}} \tag{27}$$

From these expressions we have that the ratio of capital to labor in each sector is constant and independent of factor endowments for a given set of prices p_i. Furthermore, we have that the price of capital can be expressed as

$$\rho = \left[\frac{\left((1-\gamma_2)\gamma_1\right)^{\frac{1}{1-s}} - \left((1-\gamma_1)\gamma_2\right)^{\frac{1}{1-s}}}{\gamma_1^{\frac{1}{1-s}} p_2^{\frac{s}{s-1}} - \gamma_2^{\frac{1}{1-s}} p_1^{\frac{s}{s-1}}}\right]^{\frac{1}{s}-1}, \tag{28}$$

which also is independent of factor endowments. Generally, CRS implies that there is no *direct* influence of factor endowments on relative factor use (g_1 and g_2), since the only variables that directly affect these relative uses are the factor prices. However, often (such as in the short-term model above) one will have that factor endowments influence factor prices, which creates an indirect link between relative factor use and endowments. In this 2×2 HO model however, a change in endowments is not expected to influence factor prices, thus breaking this indirect link. We have that a general property of these models is that when the number of factors exceeds the number of goods (which is the case in the labor model above), factor prices will not be independent of endowments (Gaston & Nelson 2011). If the number of factors is equal to or below the number of goods, factor prices will be unaffected by endowment changes, making the so-called *factor price insensitivity* (FPI) theorem hold (Leamer 1995). To summarize, in this 2×2 model, factor prices are determined only by the exogenously given goods prices. This causes relative factor use to also be determined by goods prices alone (through the factor prices). It follows from CRS that relative factor use would be independent of factor endowments in a direct sense, but not that endowments are not able to influence relative factor use through the indirect link going via factor prices.

To see how factor use varies with the stock of migrants, we insert for equilibrium values $g_i(w) = g_i$ in equations (19)-(22) and take first derivatives with respect to m:

$$\frac{dL_1}{dm} = \frac{g_2}{g_2 - g_1} N^0 \tag{29}$$

$$\frac{dL_2}{dm} = \frac{g_1}{g_1 - g_2} N^0 \tag{30}$$

$$\frac{dK_1}{dm} = \frac{g_1 g_2}{g_2 - g_1} N^0 \tag{31}$$

$$\frac{dK_2}{dm} = \frac{g_1 g_2}{g_1 - g_2} N^0 \tag{32}$$

From this we see that the labor intensive sector (i.e. the sector with the lowest value of g_i) will expand its use of both labor and capital with increased immigration. The capital intensive sector will contract when capital and labor are transferred from this sector to the labor intensive sector. To explicitly state the effects of migration on output composition, we insert for equilibrium values of L_1, L_2, K_1 and K_2 in the production functions and derive with respect to m:

$$\frac{dy_1}{dm} = \left[\gamma_1 L_1^s + (1-\gamma_1) K_1^s\right]^{\frac{1}{s}} \frac{g_2}{g_2 N - \lambda \rho^\theta} N^0 = \frac{y_1}{L_1} \frac{dL_1}{dm} \tag{33}$$

$$\frac{dy_2}{dm} = \left[\gamma_2 L_2^s + (1-\gamma_2) K_2^s\right]^{\frac{1}{s}} \frac{g_1}{g_1 N - \lambda \rho^\theta} N^0 = \frac{y_2}{L_2} \frac{dL_2}{dm} \tag{34}$$

From this we can conclude that output in each sector will change proportionately with the change in labor input (by a factor of production per worker). Intuitively, this makes sense, since the capital-labor ratio in each sector is predicted to remain constant during the migratory transition, so that (given constant returns to scale) each worker added to (subtracted from) the expanding (contracting) sector will increase (decrease) production by the same amount.

The prediction that the sector that uses a factor intensively will expand when the access to that factor increases (at the expense of the other sector) is called the Rybczynski theorem (Feenstra 2004: 18-21). To gain an intuitive understanding of what happens when labor endowments increase, imagine that the economy goes through the following steps whenever a new immigrant arrives:

1. The immigrant will *always* choose to start working in the labor intensive sector. If she joins the capital intensive sector the labor supply in this sector will increase by a larger factor than if she had started working in the labor intensive sector, leading to a larger drop in wages. Knowing this, she chooses the labor intensive sector, and the return on her labor drops only a little.

2. The moment she starts working, the labor intensive sector will increase its demand for capital. This is due to the assumption that labor and capital are at least somewhat complementary. This leads the return to capital in this sector to increase above the economy-wide equilibrium price ρ, creating an opportunity for arbitrage from moving capital from the capital intensive to the labor intensive sector.

3. For every unit of capital that is transferred from the capital intensive to the labor

intensive sector, the capital intensive sector also wishes to rid itself of a less-than-unity portion of labor. The labor intensive sector is able to absorb this portion of labor as long as a less-than-unity "portion of the portion" of capital is transferred with it. Thus, the sizes of these portions of capital and labor that are transferred from the capital intensive to the labor intensive sector will diminish as the process goes on. In the end, a new equilibrium will stabilize where the labor intensive sector has absorbed both the immigrant as well as a small amount of labor and a slightly larger amount of capital from the capital intensive sector. The transfer of capital from the capital intensive sector causes the return on labor to increase back to the equilibrium wage in the labor intensive sector. Once the transitory process is complete, factor prices and relative factor proportions within each sector will be unchanged.

A reasonable question to ask now could be why relative factor use is not held constant through increased supply (i.e. production) of capital, but instead through transfer between the sectors. The answer to this lies in the mathematical setup of the model, and in real life it could be that the excess return to capital in the labor intensive sector stemming from immigration might cause *both* a transfer of capital from the other sector as well as an increase in overall supply. In this model however, all adaptation takes place simultaneously, leaving no room for the market price of capital ρ to adjust. Therefore, in the model, overall capital supply will be fixed. Still, it is important to note that for the individual sectors, capital supply is not really constant. Supply of capital to the labor intensive sector does increase when immigration occurs, and it does diminish in the capital intensive sector. These sector endowment changes occur because of changing returns to capital in the sectors. This is similar to what happens in the labor model, only there the equilibrium price of capital changes, causing supply to increase.[15] In the HO model, temporary changes in the return on capital in a sector causes the supply to that sector to change (while the economy-wide supply remains constant). Capital supply given by transfers to or from the other sector is *perfectly elastic*, thus causing a similar effect that would be predicted by the labor model had $\phi \to \infty$. Recall that if capital supply in the labor model had been perfectly elastic, w and ρ would also there have been unaffected by a change in the labor endowment. The HO model gives us a tool to analyse long-term effects, since it implicitly allows capital supply for each individual sector to be perfectly elastic, also without requiring that we have an infinitely large capital supply elasticity.

Table 1 shows a hypothetical scenario for what would happen to the key variables in the HO model upon a decrease in labor N. In this scenario it is assumed that sector 1 is labor intensive ($\gamma_1 = 0.8$) and sector 2 capital intensive ($\gamma_2 = 0.3$). p_1 is set to 0.90 and p_2

[15] Although as noted above, we should not think that capital supply manages to change that much in the short term.

Table 1: Effects of a hypothetical labor force decrease in the Heckscher-Ohlin model

	N	$K = \lambda\rho^\theta$	g_1	g_2	L_1	L_2	K_1	K_2	y_1	y_2	w	ρ
	1800	1800	0.237	1.77	903	897	214	1586	664	1332	0.51	0.63
	1700	1800	0.237	1.77	787	913	186	1614	579	1355	0.51	0.63
	1600	1800	0.237	1.77	672	928	159	1641	494	1378	0.51	0.63
	1500	1800	0.237	1.77	556	944	132	1668	409	1401	0.51	0.63
Δ	-300	-	-	-	-346	46	-82	82	-255	69	-	-
$\Delta\%$	-16.7	-	-	-	-38.4	5.17	-38.4	5.17	-38.4	5.17	-	-

to 1.10. Furthermore, we assume an elasticity of substitution between capital and labor of approximately 0.9, so that $s = -0.11$.[16] The long-term supply elasiticity of capital θ is set to 0.9 (indicating that a non-temporary 1 percent increase in the price of capital would lead to a 0.9 percent increase in long-term capital supply) and the parameter λ is set to around 2,712. A decrease of 16.7% (from $N = 1800$ to $N = 1500$) leads to a 38.4% decrease in L_1, K_1 and y_1, and an increase in L_2, K_2 and y_2 of 5.2%. We have that all other variables are unchanged, including the long-term supply of capital. Relative factor proportions within each sector are unchanged, and we have that the transfer of capital from sector 1 to sector 2 (expressed by $\Delta K_2 = 82$) has to be 1.77 times the size of the transfer of labor ($\Delta L_2 = 46$) for these ratios to remain constant.[17] GDP (i.e. the price vector multiplied by the production vector) is not shown in Table 1, but it decreases by 7.4%. GDP per capita (calculated by assuming that the number of citizens equals N) actually increases by 11.1%, since the population falls faster than the production value. This is of course a highly stylized scenario, where parameters have been guessed at rather than estimated, but it could still provide some insight into the transition process that occurs when labor resources are withdrawn from the economy.

3.3 Ricardo-Viner Model

Before we move on to the empirical part of the thesis, a quick note could be made on the Ricardo-Viner (R-V) model. This is in effect a combination of the labor and HO models. The R-V model has the same temporal outlook as the labor model (short-term), meaning that capital supply is fixed.[18] From the HO model the R-V model has that more than one good is produced. In a 3×2 R-V model, two goods are produced using three factors. One

[16] A substitution elasticity of 1 would make the CES production functions simplify to the Cobb-Douglas form.

[17] Incidentally, we see that the number 1.77 corresponds to the ratio of capital to labor in sector 2. Similarly, we must have that the transfer of capital from sector 1 must be 0.237 (= g_1) times the size of sector 1's loss of labor.

[18] For simplicity, in the R-V model we assume that overall capital supply is completely locked; i.e. the short-term elasticity of capital supply ϕ is zero.

factor is mobile between the sectors, whereas the two others are immobile (i.e. specific to each sector). In our context, labor will be the mobile factor, and capital the immobile in both sectors.[19] Forcing capital to be immobile between the sectors preserves the short-term outlook of the model.

Consider now the effect of labor emigration. An emigrant will necessarily choose to leave from the labor intensive sector.[20] This causes the return to capital in the labor intensive sector to fall below the economy-wide capital price ρ. In the HO model, this induces capital to move from the labor intensive to the capital intensive sector (while also bringing some labor with it). Here however, capital is assumed to be immobile, so all adaptation has to happen with labor movements. We have that the return to labor in the labor intensive sector is above the economy-wide wage, incentivizing labor to move to this sector from the capital intensive sector. This transfer of labor causes the return to labor to fall in the labor intensive sector and to rise in the capital intensive sector. Similarly, the return to capital will rise in the labor intensive sector and fall in the capital intensive sector. The labor transfer stops when factor returns are equal across sectors. The new wage will be above and the new capital price below their respective pre-migration levels.

In sum we have that the Ricardo-Viner model predicts that wages will rise and the capital price will fall from emigration (as in the labor model). Like the HO model, it predicts that the labor intensive sector will shrink when workers emigrate. However, this labor sector decline will be smaller in the R-V model, since here labor is transferred from (and not to) the capital intensive sector following emigration. Also, the R-V model predicts that the capital intensive sector will shrink, which is the opposite of what the HO model predicts. Therefore, if we in the empirical analysis find that wages have risen and that both sectors employ fewer people and have decreased their production as a result of emigration, the theory indicates that the structural variables of the economy have not yet fully adapted to the migration shock, and that the findings are valid for the short term. If we find that wage effects from emigration are approximately zero, and that the labor intensive sector has declined and the capital intensive sector has expanded, the theory indicates that the structural variables have had sufficient time to adapt, and that the results are

[19]It might seem a bit confusing to say that we have *three* factors of production, and that these are labor and capital. However, capital is in effect two factors (one for each sector), since the capital of sector 1 cannot be utilized by sector 2, and vice versa.

[20]To see this, bear in mind that the return to labor rises more in the capital intensive sector when a worker leaves this sector than is the case in the labor intensive sector. If a worker were to emigrate to abroad from the capital intensive sector, workers in the labor intensive sector would have an incentive to move to the capital intensive sector. Exactly one worker would then move from the labor intensive to the capital intensive sector, raising the return to labor in the capital intensive sector back to the pre-migration level. The labor intensive sector will then always be the sector that ends up losing the amount of labor that emigrates abroad.

representative for the long term.[21]

4 Data

4.1 The Independent Variable: Net Migration Shares

A general problem in analyzing Romanian migration is, as discussed above, lack of quality data. The most reliable starting point is probably the nationwide population and housing censuses carried out about every ten years. The last census was held over twelve days in October 2011. These censuses are more or less the only data sources available that directly measure migration from Romania. According to the 2011 census, there were a little more than 1.1 million temporary and permanent emigrants from Romania. This number is in the lower range of most estimates made, but - as pointed out above - even though the total number of Romanians involved in emigration might be in excess of three million, it is unlikely that all of these people live abroad at the same time. According to the census, 65% of the emigrants had moved permanently from Romania, a share which might seem surprisingly high, given the often made claim that most migration from Romania is circular. Again, this could be explained by the fact that the census measures migration only over those twelve days in October 2011, and not over the whole year. It is unknown to what extent circular migrants work during the periods they stay in Romania and whether these people then actually represent lost labor to the Romanian economy. Since other more detailed sources are lacking, 1.1 million is used as the number of emigrants living in foreign countries for the year 2011.

We are not only interested in external emigration; the key variable is *net migration* levels in Romanian counties. The reason for this is twofold. Firstly, an underlying assumption in the theory is that emigrants and immigrants are essentially the same. Therefore, excluding immigration would contribute to weakening the link between theory and empirics. Secondly, a native replacement effect could occur with emigration; i.e. that people move from elsewhere in Romania (or from abroad) to counties that experience large out-migration.[22] If only data on external emigration is used in the analysis, one could argue that the estimated emigration effect on the dependent variables could perhaps be a little misleading. The regression coefficients would in this instance not measure the effect of a *net* unit's change in emigration, but instead the effect of the gross change, i.e. the share of the emigration unit which is not compensated for by replacement immigration. Using net migration could therefore give us "cleaner" and more easily interpretable coefficient

[21] For a more detailed exposition of the R-V model, the reader is referred to Dixit & Norman (1980: 38-43) and Feenstra (2004: 72-75).

[22] This would be the emigration equivalent of the immigration displacement effect discussed in e.g. Borjas *et al.* (1996)

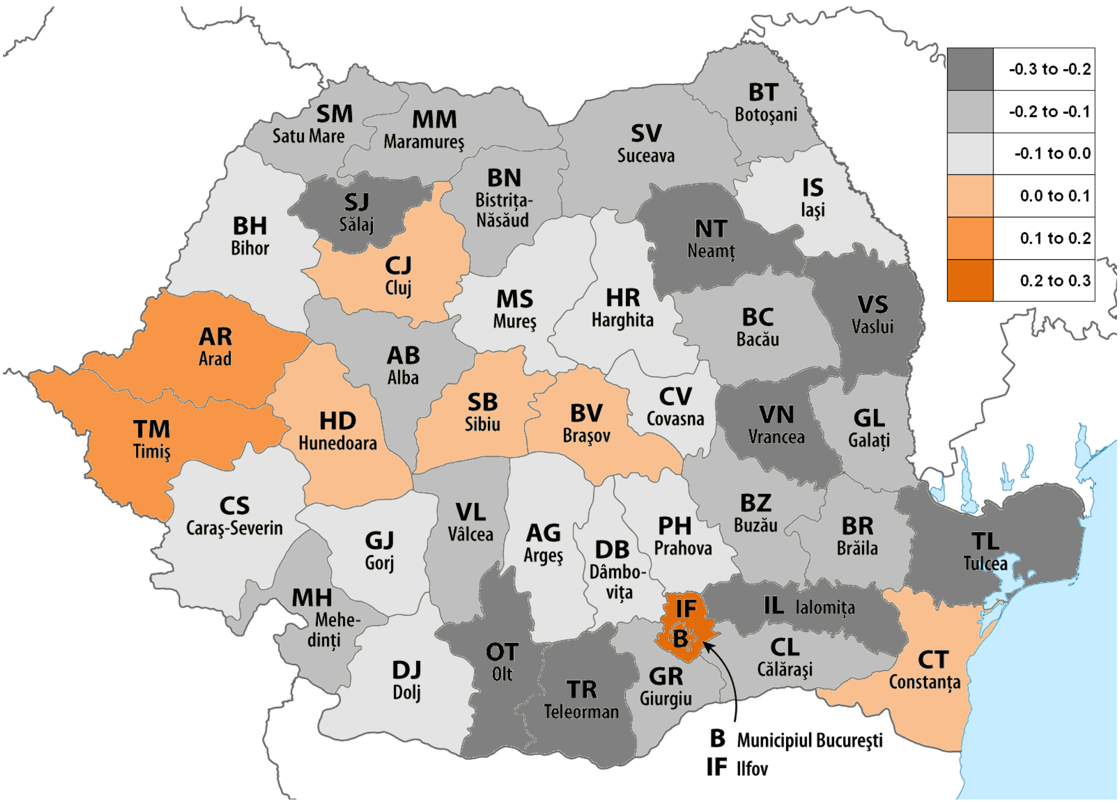


Figure 2: Romanian counties by share of net migration stock in total population. Sources: INS, Eurostat and own computations

estimates in case of native replacement (or displacement) migration.

The 2011 census also contains information on last county of residence for people living in Romania, something which should be a good measure of internal net migration. In addition, the census counted the number of people whose last place of residence was abroad, providing a measure of external immigration. Combining these numbers of external and internal migration yields the stock of net migration in each Romanian county in 2011. On average, Romanian counties had a migration deficit of almost 22,700, and the net migration stock for the whole country was at more than 950,000 emigrants. It is of course questionable whether emigrants, immigrants and non-migrating Romanian citizens should be counted as equal in an economic sense - it is for instance not necessarily given that they have the same levels of productivity and human capital. However, due to lack of data, such a simplification is necessary. Looking at the data, there are huge disparities between Romanian counties in terms of net migration. Some counties, such as the relatively wealthy and urbanized Bucharest and Timis counties have high levels of immigration (net migration stocks of 500,000 and 120,000, respectively), whereas impoverished regions in the east and south of the country have high migration deficits. This is apparent in Figure 2, which measures net migration stock as a share of total population in each region in 2013. The relatively affluent provinces of Western and Central Romania (largely overlapping with the historical region of Transylvania) often have positive stocks, whereas Moldavia in the east and Wallachia in the south are characterized by high levels of out-migration. This supports the assumption made in many gravity models of migration that wage and development differentials are decisive causes of migratory flows (Molho 1986, Anderson 2011).

Eurostat has calculated net migration flows in Romanian counties for the period 2000-2013 based on population changes that cannot be explained by birth or death rates. This is therefore not a direct measure of migration, but instead an estimate calculated by subtracting the size of the population as it would be if net migration were zero from the actual (measured) population size. This number incorporates both internal and external net migration, and has in combination with the net migration stock in 2011 been used to calculate migration stocks for the years 2000-2013. The independent variable of the regressions that will be run is m_{rt}, which is the net migration stock as a share of the population in county r in year t.

Given that death rates among emigrants are low, the estimated shares m will not be far from the actual shares of net migration in Romanian counties in this period. Note however that there in principle will be a positive bias in the net migration numbers in the years before 2011 and a negative bias in the years after 2011.[23] These biases will be larger the further away in time one comes from 2011. Emigrants that died before 2011 will not be counted as belonging to the migration stock in the years they were alive after 2000, and emigrants that died after 2011 will be counted as belonging to the stock in years when they were actually dead. A similar argument could be made (although with signs going in the opposite direction) concerning emigrants that were born abroad. However, at least two reasons can be thought of why this last point is not a very serious reason for concern. Firstly, it is debatable whether the children of emigrants should be counted as emigrants at all. Secondly, since emigration from Romania was practically non-existent before 1989 and only really started to pick up after 2000, most of these children must have been very young during the 2000-2013 period, and should therefore not be regarded as lost labor to the Romanian economy.[24] In sum, some of the birth and death biases could cancel each other out, but it is likely that for most of the years in the period of interest (certainly at the beginning of the period) there will be a slight underestimation of the number of emigrants. This, in combination with the lack of information on temporary emigrants that were staying at home in Romania during the time of the 2011 census, could cause

[23]By positive it is meant that the number of emigrants is underestimated and by negative it is meant that it is overestimated.

[24]The oldest child could presumably be 24 years of age in 2013, and then only if his/her parents moved abroad directly after the revolution in December 1989 and gave birth by the end of the year.

estimated effects of migration share changes to be too large. However, the sign of the effects (including if there are no effects so that regression coefficients should be zero), will be correct even with this bias in the data.

4.2 Dependent and Control Variables

This thesis will consider the effects of migration on the following five variables: earnings, employment, net investment, turnover revenue and gross value added. The latter four have been separated by sector; either labor or capital intensive. The variables correspond roughly to w, L_1, L_2, ΔK_1, ΔK_2, p_1y_1 and p_2y_2 from the models in the theory section. ΔK_1 and ΔK_2 were not explicitly defined in the theory part, since the models considered there are not dynamic. However, it would be reasonable to assume that migration has a similar effect on capital defined as a stock variable as it has on capital defined as a flow variable (i.e. net investments). There would be a higher degree of cohesion between empirics and theory if the regression had been run as the effect of migration on capital levels, but the necessary data on this does unfortunately not exist. Therefore, net investment is used.

Below will be given a summary of each of the data variables, all of which are separated by years and counties. The variables separated by sector are summed aggregates of the main categories of the International Standard Industrial Classification (ISIC). To decide whether an ISIC industry is labor or capital intensive, the number of hours worked in that industry has been divided by its use of capital (measured in volumes). The factor data have been found in OECD's STAN database for the years 2000-2011. Unfortunately, data are only available for seven Northern and Central European countries (Czech Republic, Denmark, Finland, Germany, the Netherlands, Norway and Sweden), which might cause some Romanian ISIC sectors to be misspecified. For example could technology differences across countries lead the same sector to have different factor intensities in different countries (Harrigan 1997). However, it has proven difficult to find other authoritative sources that are able to formally distinguish between the Romanian sectors, so the STAN data have been used. There is some variability between the countries in the labor intensity of each sector, but the rankings of the sectors are mostly consistent. The overall labor intensity of an industry has been calculated by taking averages over the sample period for each country, and then calculating a cross-country average from the period averages for each industry. An industry is characterized as labor intensive if it has an above-average level of labor intensity, whereas it is capital intensive if its level is below the sectoral average. The result of this computation is shown in Figure 3, where the average is represented by the dashed horizontal line. The industries in the left part of the figure are counted as labor intensive, whereas the industries on the right are counted as capital intensive. The divide

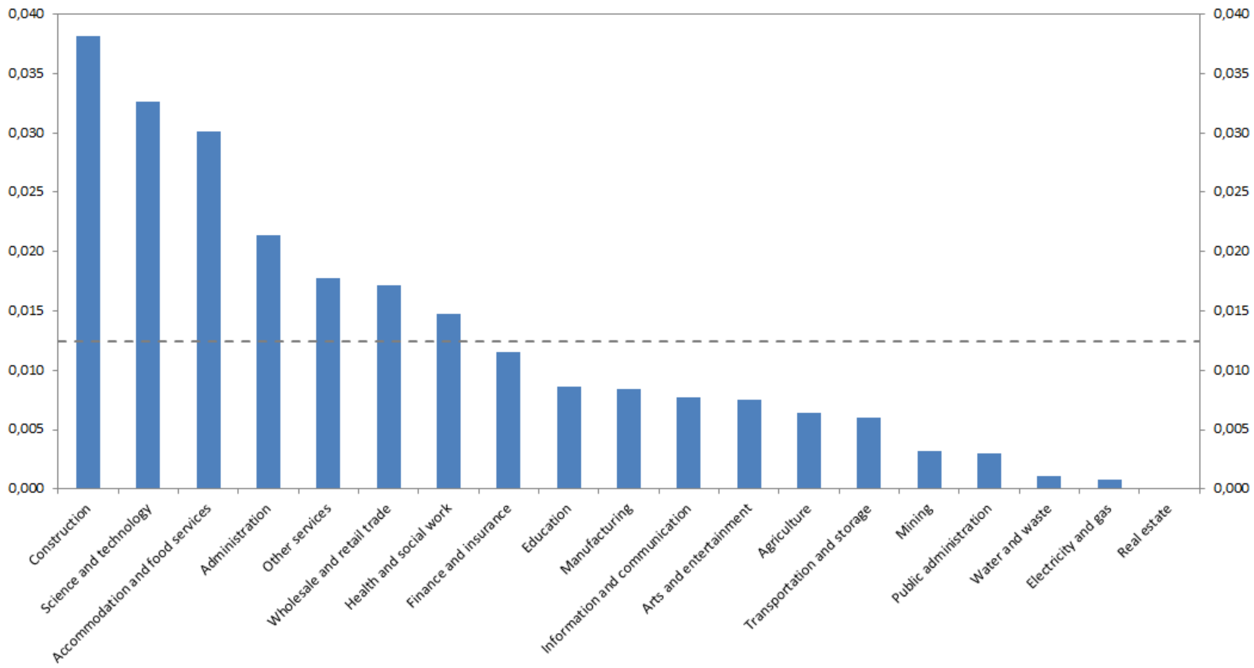


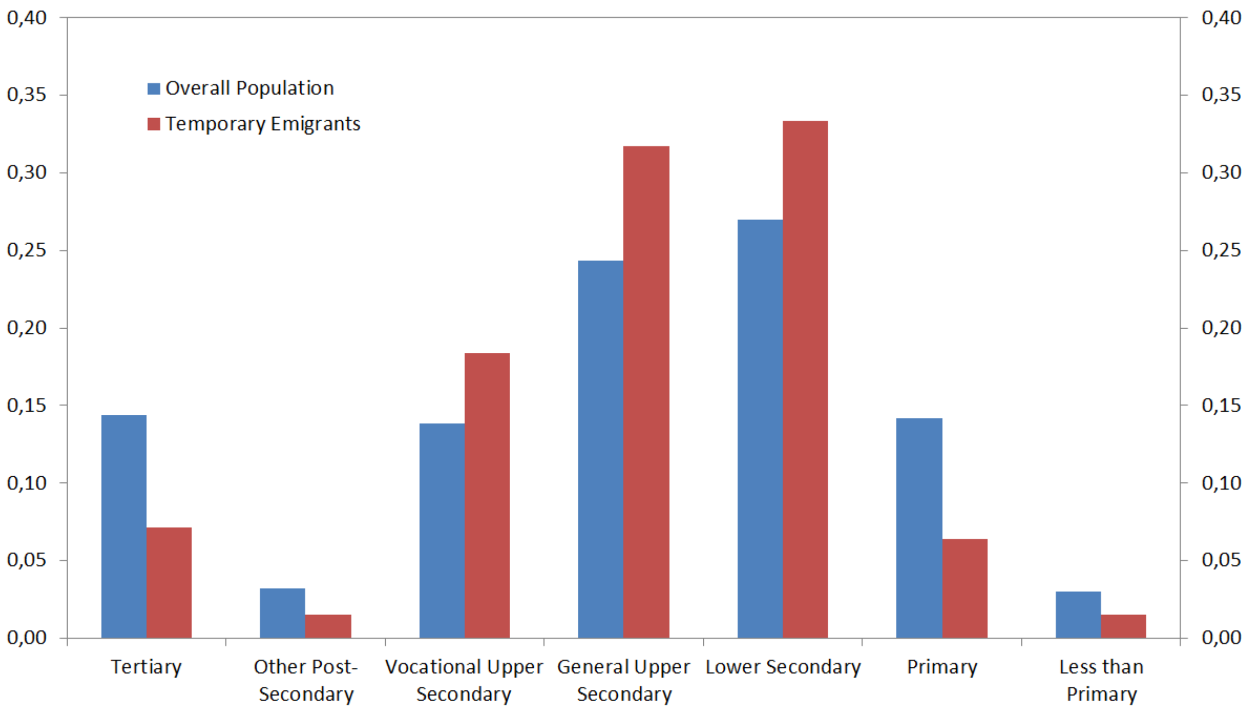
Figure 3: Labor intensities measured as labor over capital use in the Czech Republic, Denmark, Finland, Germany, the Netherlands, Norway and Sweden. Average across the period 2000-2011 and across countries. Broken line represents average across the ISIC sectors. Sources: OECD STAN Database and own computations

between the two sectors then goes between health and social work (labor intensive) and finance and insurance (capital intensive). In the following will be given a brief explanation of each of the five variable types (earnings, employment, revenue, GVA and investments) in addition to the control variables applied in the regression analysis.

Earnings: This variable is from the labor cost survey, performed annually by the Romanian National Institute of Statistics (INS) on a sample of 26,000 enterprises and public institutions. Net earnings consitute payments (i.e. wages, bonuses, etc.) to workers, net of taxes and social insurance contributions. It is measured in current Romanian lei (RON). The variable relevant for this analysis is real earnings, so the earnings series from the labor cost survey has been adjusted for inflation using the Harmonized Index of Consumer Prices (HICP) from Eurostat. Since data on inflation is not available for individual counties, all county earnings series have been adjusted by the same HICP time series. Earnings data have been collected for the period 2000-2013 across all Romanian counties.

Labor - L_1 and L_2: Data on employment by sector is collected from the annual labor cost surveys of INS. Here labor and capital intensive industries are separated by the computation described above. Note that employment numbers include both public and private sector employees, in addition to self-employed people. Unlike the turnover revenue, gross value added and investment data these series are therefore not restricted to the

Figure 4: Education levels among temporary emigrants and in the overall population above 10 years of age in 2011 census. Shares of totals. Sources: INS and own computations



private sector. The unit measurement is thousands of persons and the data availability period is 2008-2013.

Turnover revenue - p_1y_1 **and** p_2y_2**:** Turnover revenue measures all income from sales of goods and services for companies in the ISIC sectors, net of value added tax. Data are available for the period 2008-2013 for all Romanian counties. However, for agriculture data separated by counties are unavailable, so this sector has been excluded. An important point to note here is that this is turnover revenue only for the private sector, as no comparable revenue data are available for the Romanian public sector. The unit measure is GDP deflated million RON (using 2010 as the base year).

Gross Value Added - p_1y_1 **and** p_2y_2**:** An alternative - and perhaps more suitable - real-world approximation of p_1y_1 and p_2y_2 is gross value added (GVA). This data series is based on the turnover revenue series, but here taxes, subsidies and expenditures for intermediate goods used in production have been subtracted. It therefore measures the actual value the factors contribute with in production. In the production functions specified in the theoretical section, taxes and intermediate goods are left out, hence assuming that each worker and unit of capital directly produces a finalized consumer good, without any intermediate steps being required in between. The GVA series is therefore probably a better proxy of p_1y_1 and p_2y_2. However, there is no such thing as a free lunch, and the

GVA series (from Eurostat) have the drawback of lacking data for eight ISIC sectors.[25] This series contains data for all years in the period 2000-2012 for all Romanian counties. It has been adjusted with Eurostat's implicit GDP deflator.

Net investments - ΔK_1 and ΔK_2: Like the turnover revenue series, these data have been found in the INS annual business survey. Therefore, these are net investments for private businesses only. The data are for the years 2008 to 2013 for all Romanian counties, measured in GDP deflated million RON.

Control variables: In addition to the left-hand side variables and m, several control variables have been used in the regression analysis. These include GDP per capita, unemployment rates, population densities, urbanization, share of women in the population, age composition and education levels. The GDP variable (from INS) is measured on county level and has been inflation adjusted with a GDP deflator (from Eurostat). The unemployment rate is from INS and is measured as an annual average percentage on county level. The population density is from Eurostat and is measured as population per square kilometer in each county. The data on urbanization and share of women are from INS, and are measured as shares of urban and female populations to total population. There are two age composition variables; one that measures the share of young people (below 25 years of age) in the total population and one that measures the share of elderly (above 64 years). Both are from the INS.

Education is controlled for by including a measure of bachelor degrees completed per capita in each county. There are two possible criticisms to this variable; one being that data from Tulcea county are unavailable, and the other (possibly more important) that the number of graduations does not necessarily reflect the number of graduates living in the county. Counties that host the biggest universities in Romania, such as Bucharest, Iasi and Cluj, have a disproportionately large number of graduates, since many students move there from other parts of the country, and upon graduation go back to their home county or elsewhere. Unfortunately, there exist no other publicly available data series that more closely reflects education levels in Romanian counties over the period of interest. The population census of 2011 measured education types for both temporary emigrants and the overall population at the county level. The national averages for these two variables are shown in Figure 4. As we can see from the figure, emigrants are overrepresented in

[25] Strictly speaking, the data are not lacking, but Eurostat's grouping of some categories make it impossible to distinguish whether they are labor or capital intensive according to my specification above. The excluded sectors are wholesale and retail trade (G), transportation and storage (H), accommodation and food services (I), public administration (O), education (P), health and social work (Q), arts and entertainment (R) and other services (S) (ISIC codes in parentheses). Four of these belong in the labor intensive sector (G, I, Q and S) and four in the capital intensive (H, O, P and R).

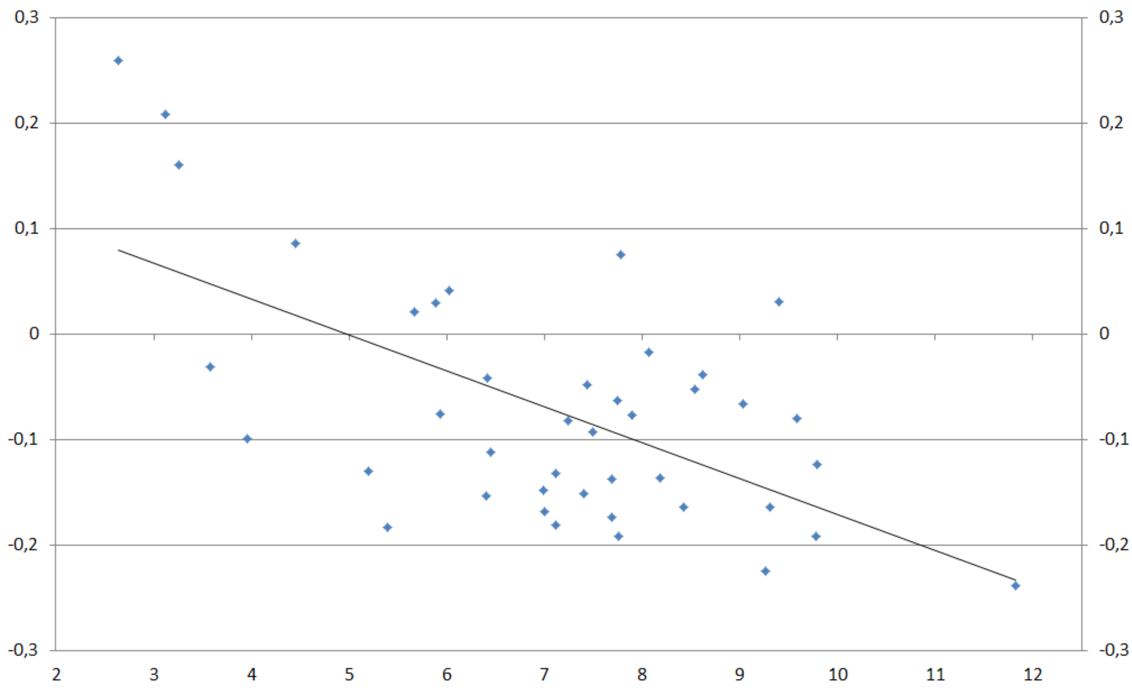


Figure 5: Unemployment rate (horizontal axis) and net migration stock (vertical axis). Average 2000-2013. Each point represents a Romanian county. Sources: INS and own computations

the intermediate educational groups and underrepresented in the lower and higher ends of the educational scale. Although these data do provide some insight into the educational distribution of emigrants compared to the general population, they cannot be used in the regression analysis applied in this thesis, since they only contain observations for one point in time. In addition, the survey only covered the educational attainment levels of *temporary* emigrants, thus excluding permanent emigrants as well as immigrants and internal migrants.

4.3 Instrumental Variables Regression

In several of the regression specifications there might be a problem with simultaneous causality. For instance, wage changes are just as likely (or perhaps even more likely) to influence migration decisions as migration is likely to influence wages. Turnover revenue faces a similar challenge, and also possibly L_1, L_2, ΔK_1 and ΔK_2.[26] Therefore, in the regression of the variables there has been used an instrumental variables (IV) approach. Three possible instruments for migration have been considered; historical migration (m_{t-4}), share of minorities in the county population and a measure of wages in emigration destination countries.

[26]See for instance Greenwood (1975) for a survey of determinants of internal migration in the United States. He finds that real wages play an important role in determining migration patterns.

Historical migration (m_{t-4}) is defined as the migration share some periods back (here four years have been chosen). This approach has successfully been applied in much of the migration literature according to Dustmann *et. al* (2015), as historical migration is assumed to be uncorrelated with most present day variables except migration itself.[27]

Share of minorities in the overall population ($mino$) is chosen as an instrument because Sandu (2005b) finds that living in an ethnically diverse community has a significant effect on the likelihood of becoming a temporary emigrant abroad. In all but two counties[28] are ethnic Romanians the majority according to the population and housing censuses of 1992, 2002 and 2011. The variable is then measured for the three census years as the ratio of persons belonging to ethnic minorities to the total population in each county. Annual observations for the series have been created by linear interpolation between these three data points. This construction method of course raises legitimate criticism against the use of this variable as an instrument, since most of the observations have not actually been observed.

The wage instrument (w^*) is a weighted average of the wage levels in the five most important destination countries for Romanian emigrants. These countries are Italy, Spain, Germany, the United Kingdom and France, and according to the 2011 population and housing census these five countries hosted 82.6% of all Romanian emigrants at the time. The annual wage level in all five countries is measured in 2014 constant US dollars for the period 2000-2013. The wage level in each country is multiplied by the share of 2011 emigration to that country. To create the instrument, these weighted wage levels are then summed up. The logarithm of this sum is the instrument. The emigration shares are calculated on the county level, which leads to different observations for each county and each year in the sample period. A possible critique of this instrument is that the share of emigration to each country is not adjusted during the period of interest. This is due to lack of reliable and comparable data for emigrant flows from Romania to the countries over this time span. In addition, w^* is expected to be correlated only with external emigration, and not immigration or internal migration. This would cause it to be correlated only with a portion of the net migration share m (which we recall includes all forms of migration). This could make w^* less suitable as an instrument.

[27]Still, a possible concern is that migration in m_{t-4} affects wages in the same period, w_{t-4}, and that this variable is autocorrelated with present-day wages. w_{t-4} would then constitute a link through which correlation between the instrument and the dependent variables persists (as long as these variables are correlated with wages).

[28]Harghita and Covasna, where Hungarian is the biggest ethnicity.

Table 2: Summary of data values. Averages calculated for groups of counties, separated by the size of their period average net migration shares $\bar{m}_r$. Sources: INS, Eurostat and own computations

Variable	Unit	Sector int.	Small $\bar{m}^a$	Medium $\bar{m}^b$	Large $\bar{m}^c$
Left hand side variables:					
Monthly earnings	Constant RON	-	694	742	810
Turnover revenue	M constant RON	Labor	4,017	6,137	24,650
Turnover revenue	M constant RON	Capital	4,086	6,156	22,999
Gross value added	M constant RON	Labor	500	839	2,638
Gross value added	M constant RON	Capital	3,114	4,021	9,027
Employment	1000 persons	Labor	37.6	51.0	116.7
Employment	1000 persons	Capital	111.5	121.5	168.7
Net investments	M constant RON	Labor	147	232	1,273
Net investments	M constant RON	Capital	428	671	2,153
Right hand side variables:					
GDP per capita	Constant RON	-	14,911	16,541	26,601
Unemployment	Percent	-	8.0	7.4	5.9
Urbanization	Percent	-	43.1	48.6	62.4
Graduations	Per 1000 capita	-	0.88	3.37	8.05
Below 25 years	Percent	-	31.9	31.8	29.8
Above 64 years	Percent	-	15.1	14.2	13.7
Share of women	Percent	-	50.6	50.8	51.4
Share of minorities	Percent	-	5.9	11.2	11.9

[a] Average net migration shares below -13.7% (below 33rd percentile)
[b] Average net migration shares between -13.7% and -0.5% (33rd-67th percentile)
[c] Average net migration shares above -0.5% (above 67th percentile)

4.4 Data Summary

Table 2 summarizes the data variables as averages across both years and groups of counties. Counties have been grouped according to their respective sizes of net migration shares, m. It is clear from the table that there is a strong link between high emigration levels and poverty. Counties with small net migration shares (in Table 2 defined as having an m within the 33rd percentile, i.e. below -13.7%) have lower earnings and GDP per capita levels, fewer graduations and higher unemployment rates than the two other groups. In addition, there appears to be a slightly negative association between m and shares of young and elderly people. The table also indicates a positive link between the shares of women and minorities and m. This could contradict Sandu's (2005b) finding that there is a positive correlation between emigration rates and ethnic diversity. However, Sandu does not consider internal migration or immigration, so this divergence could be explained if counties with large minority groups also have high immigration rates. Investments, GVA, employment and turnover revenue (in both sectors) are higher in counties with larger net migration shares. Table 2 also shows that even though turnover revenue is approximately equal for both sectors, GVA is considerably smaller in the labor intensive sector. In addition, investments and employment in the capital intensive sector far exceed the corresponding variables for the labor intensive sector. This indicates that the industries included in the capital intensive sector represent a larger share of production than those in the labor intensive sector. However, not all industries are included in all variables, so it could be that the general impression of the relative size of the sectors had been different if more data had been available.[29] For most of the variables, there appears to be a larger difference between the middle and large m groups than between the middle and small m groups. An explanation for this could very well be the Bucharest/Ilfov region, that in many respects stands out both in terms of positive immigration, income and degree of urbanization. Indeed, there is not really any other city like Bucharest in Romania, with its population of nearly 2 million (10% of the country's population) and a GDP per capita that is 46% higher than that of Ilfov, the county with the second highest value of this variable. This contributes to pulling the highest m group away from the middle and lower groups. A variable for which this divide is not visible is the share of minorities, and here both Bucharest and Ilfov have fairly low values (2.6% and 4.4%, respectively).

Table 3 displays the correlations between the independent variables used in the regression analysis. As indicated above, we have that there is a strong positive correlation between immigration and GDP per capita levels, graduations, urbanization and the share of women. There is also a negative correlation between young, elderly and foreign wages and migration. There is a very strong link between current migration and historical migration, with a correlation coefficient of 0.99. Migration's correlation with minorities is much smaller, but also positive (indicating that counties with a large share of minorities typically experience net inward migration). The correlation between population density and urbanization is perhaps weaker than one might expect (with a coefficient of 0.47), indicating that it is worth including both these variables in the regression analysis. There does not appear to be any perfect collinearity between the variables, with the possible exception of current and historical migration. The close link between these two variables should not pose a problem however, since historical migration is only used in the first stage of IV regressions using m as the dependent variable, and collinearity between a dependent

[29] Such as data for the public sector in the investment and turnover series, or the eight missing ISIC industries in the GVA variable. The employment variable is the only one in which all industries are included (except for personnel of the military and intelligence services).

Table 3: Correlations between Independent Variables

	m	GDP	Unempl.	Urban	Density	Women	Grad.	<25	>64	w^*	$mino$	m_{t-4}
m	1.00											
GDP/capita	0.76	1.00										
Unempl.	-0.38	-0.57	1.00									
Urban	0.61	0.59	-0.17	1.00								
Pop. Dens.	0.52	0.49	-0.26	0.47	1.00							
Women	0.74	0.69	-0.46	0.54	0.64	1.00						
Graduations	0.60	0.66	-0.30	0.65	0.30	0.48	1.00					
<25	-0.28	-0.63	0.39	-0.33	-0.19	-0.57	-0.36	1.00				
>64	-0.32	-0.17	0.03	-0.36	-0.07	0.17	-0.31	-0.49	1.00			
w^*	-0.31	-0.21	0.10	-0.14	-0.06	-0.11	-0.08	-0.02	0.23	1.00		
$mino$	0.11	0.12	-0.26	0.10	-0.18	0.08	0.11	0.04	-0.28	-0.48	1.00	
m_{t-4}	0.99	0.85	-0.49	0.69	0.54	0.76	0.62	-0.41	-0.33	-0.32	0.10	1.00

All variables are annual observations measured at county level. m is the net migration share. The GDP variable is the logarithm of county GDP per capita. Unempl. is the annual county unemployment rate. Urban measures the share of the population living in urbanized areas. Density is the logarithm of the number of inhabitants per square kilometer. Women measures the share of women in the overall population. Grad. is the logarithm of the number of bachelor degrees completed per capita. <25 and >64 are the shares of persons less than 25 and above 64 years of age in the overall population. Instruments: w^* is the weighted average of foreign wages. $mino$ is the share of minorities in the overall population. m_{t-4} is the net migration share four periods back.

and an independent variable is generally not a problem from a technical perspective.

5 Empirical Application

Three types of regressions will be estimated for each of the nine dependent variables outlined above. These are ordinary least squares (OLS) for panel data, instrumental variable regression (IV) and cross-panel correlation robust regression (CPCR). This last type could be warranted due to the interconnectedness of the counties, and that error terms because of this could be correlated across panels. This would violate the i.i.d. assumption underlying standard OLS and IV regression models. A combination of CPCR and IV will also be performed by conducting the two stages of the IV regression manually, with each stage assuming corrrelation between the panels. This approach might be the most "complete" analytically, since some simultaneous causality as well as some cross-panel correlation is likely to permeate the data. Unfortunately, this manual IV regression yields no reliable standard errors of the coefficient estimates, so significance levels are unknown using this approach. In calculation of the CPCR estimates (both OLS and IV), the observations for Tulcea county have beeen excluded, since we have no observations of the graduations variable for this panel.

Below will be given an adaption of the theoretical framework to the empirical specifications. The equilibrium expressions derived in the theory section will be linearized so that it is straightforward to see what coefficients the theory predicts will be found in the data. The earnings variable will only consider the 2×1 model, since the HO model does not predict any wage changes to be caused by migration. The coefficients for the other variables (L_i, K_i and $p_i y_i$) will be inferred for the HO model. In addition, we will give a qualitative description of the expected short-term changes resulting from the the Ricardo-Viner model. Roughly speaking, we have that w is assumed to correspond to earnings, L_i to employment, K_i to net investments and $p_i y_i$ to turnover revenue and gross value added in the data.

Depending on the coefficients we estimate in the regressions, we might be able to say whether the Romanian economy tends to stabilize in a long- or short-run equilibrium (or somewhere in between those two) over the course of maximum one year following a migration shock. The regression specifications are all based on within-year observations; e.g. earnings in any given year are coupled with the dependent variable m and the control variables for that same year (so no historical observations of the net migration share m or the control variables are used as explanatory variables). Therefore, findings of the regressions can indicate which equilibrium (short- or long-term) the dependent variables will stabilize in up to a year after the migration shock. Note that this implies that the temporal interpretation of each observation set's contribution to the estimated coefficients will differ. This point might be best understood using an example. Imagine that we have two migration observations (from two counties) in say, year 2013. In both counties, all migration took place over the course of only one day. In the first county, this day was January 1, and in the second it was December 31. Both observations will take account of the changes in the dependent variables for the aggregated year in their contribution to the estimates of the coefficients on m. The second county's migration observation will then report that migration caused changes in the dependent variables during 364 days when it actually did not. This observation is in reality only able to account for dependent variable changes that occured within *one day* after the shock (very short-term changes, that is). Assume now (as a thought experiment) that the effects of a migration shock completely subside within 200 days after the shock. Then the first county's 2013 observation would report migration effects for 165 days when such effects were actually zero. For the coefficients on the net migration share m to have the clear-cut interpretation "The precise effect from migration within one year after the migration shock", we therefore strictly speaking require that all migratory movements each year happen on January 1 in all counties, and that the effects of migration last for at least 365 days.[30] Deviations

[30]Also, any omitted variable bias or simultaneous causality must be appropriately corrected for. Specifically, if the migration effect has a time span of more than 365 days, historical migration (m_{t-s}) must be

from these two conditions make both the estimates and their time spans of validity less precise. Therefore, our interpretation of the coefficients on m must be "The estimated average effect from migration within between minimum one day and maximum 365 days after the migration shock".

5.1 Earnings

If we assume that capital supply is able to adjust at least a little bit to migration (so that the derivative of wages with respect to m is given by the expression in (9')), we have that a first-order Taylor approximation of (5) around $m = 0$ yields the following relationship:

$$\ln w \approx G(\rho)|_{m=0} - \frac{(1-s)(1-\psi)}{1+\psi\phi(1-s)} m \tag{35}$$

where $G(\rho)$ is a paramter that equals $\frac{1}{s}\ln\gamma + \ln\rho - (\frac{1}{s} - 1)\ln[\rho^{\frac{s}{1-s}} - (1-\gamma)^{\frac{1}{1-s}}]$. In application of the empirical model

$$\ln W_{rt} = a_{Wr} + b_{Wt} + \beta_W m_{rt} + \varepsilon_{Wrt} \tag{36}$$

we have that region and time fixed effects (a_{Wr} and b_{Wt}, respectively) capture the effects from $G(\rho)$ in (35), whereas β_W represents the term $-\frac{(1-s)(1-\psi)}{1+\psi\phi(1-s)}$. ε_{Wrt} is an error term. In addition, a group of control variables X_{irt} should be added, corresponding to the control variables outlined above. We then have the following regression equation:

$$\ln W_{rt} = a_{Wr} + b_{Wt} + \beta_W m_{rt} + \sum_i c_{Wi} X_{irt} + \varepsilon_{Wrt} \tag{37}$$

This linearization corresponds to the method applied by Dustmann *et al.* (2013, 2015) in their estimation of migration's effect on wages. However, their model is slightly more complex since they are able to separate between different skill levels of migrants. Since data on educational attainment among Romanian migrants are by and large lacking, our model must be somewhat simpler. Also note that the price of capital ρ is expected to change with high migration levels. In (35) the effects on wages channeled through the migration effects on ρ have not been taken into account - instead ρ is assumed to be approximately constant in $G(\rho)|_{m=0}$. For small levels of the net migration share m, this is unproblematic, but as m grows larger (or more negative), this assumption becomes less credible. Another critique of this model is that ψ (labor's share in production) is not independent of factor prices. Given CRS, it will be independent of factor endowments directly,[31] and so it will also be directly independent of migration. However, if migration

included as (an) explanatory variable(s) to correct for omitted variable bias.

[31]Since under CRS, the expansion path of production will be a straight line through the origin.

influences wages and capital prices (which is postulated here), the angle of the expansion path will change, and with it ψ. This implies that the coefficient on m is not actually independent of m according to the theory. As long as the migration share is not too far from zero however, we can assume that there is a close overlap between the coefficient in (35) and β_W in (36).

We thus have that earnings are expected to be negatively influenced by immigration in the short term (equivalently, they will be positively influenced by emigration). The size of this impact depends on the substitution elasticity of labor and capital (defined through s), the share of labor in production ψ and the short-term supply elasiticy of capital ϕ. Both a large share of labor in production and a large supply elasticity of capital will diminish this effect.[32] The short-term negative immigration effect is predicted by both the labor model and R-V model. Over the longer term, the HO model predicts that structural adjustment across the sectors will lead wages to converge back to pre-migration levels. In the regression, logarithms of HICP-deflated monthly earnings will be used as observations for this variable.

5.2 Employment - L_1 and L_2

Inserting for equilibrium values of g_1 and g_2 and taking logarithms of (19) and (20) yields

$$\ln L_1 = \ln(g_2 N - \lambda\rho^{\theta}) - \ln(g_2 - g_1) \tag{38}$$

$$\ln L_2 = \ln(g_1 N - \lambda\rho^{\theta}) - \ln(g_1 - g_2) \tag{39}$$

Deriving these expressions with respect to m while bearing in mind that the capital price is independent of migration in the HO model, we get that

$$\frac{\partial \ln L_1}{\partial m} = \frac{g_2 N^0}{g_2 N - \lambda\rho^{\theta}} = \frac{g_2 N^0}{g_2 N - \bar{K}} \tag{40}$$

$$\frac{\partial \ln L_2}{\partial m} = \frac{g_1 N^0}{g_1 N - \lambda\rho^{\theta}} = \frac{g_1 N^0}{g_1 N - \bar{K}} \tag{41}$$

[32] To see this, refer to the interpretation given in the section on the labor model, or simply derive $-\frac{(1-s)(1-\psi)}{1+\psi\phi(1-s)}$ with respect to ψ and ϕ:

$$\frac{\partial}{\partial\psi}\left(-\frac{(1-s)(1-\psi)}{1+\psi\phi(1-s)}\right) = \frac{(1-s)\big(1+\phi(1-s)\big)}{\big[1+\psi\phi(1-s)\big]^2} > 0$$

$$\frac{\partial}{\partial\phi}\left(-\frac{(1-s)(1-\psi)}{1+\psi\phi(1-s)}\right) = \psi(1-\psi)\left[\frac{1-s}{1+\psi\phi(1-s)}\right]^2 > 0$$

These expressions can be used in a first-order Taylor approximation of (38) and (39) around $m = 0$. Doing this, we have that

$$\ln L_1 \approx \ln(g_2N^0 - \bar{K}) - \ln(g_2 - g_1) + \frac{g_2N^0}{g_2N^0 - \bar{K}}m = H_1(g_1, g_2; \bar{K}) + \frac{g_2N^0}{g_2N^0 - \bar{K}}m \quad (42)$$

$$\ln L_2 \approx \ln(g_1N^0 - \bar{K}) - \ln(g_1 - g_2) + \frac{g_1N^0}{g_1N^0 - \bar{K}}m = H_2(g_1, g_2; \bar{K}) + \frac{g_1N^0}{g_1N^0 - \bar{K}}m \quad (43)$$

Assuming that time and region fixed effects capture the terms in $H_i(g_1, g_2, \bar{K})$ and adding a vector of control variables, we have that the following expressions are to be estimated in the employment regressions:

$$\ln L_{1rt} = a_{L_1r} + b_{L_1t} + \beta_{L_1}m_{rt} + \sum_i c_{L_1i}X_{irt} + \varepsilon_{L_1rt} \quad (44)$$

$$\ln L_{2rt} = a_{L_2r} + b_{L_2t} + \beta_{L_2}m_{rt} + \sum_i c_{L_2i}X_{irt} + \varepsilon_{L_2rt} \quad (45)$$

Here, β_{L_1} and β_{L_2} correspond to $\frac{g_2N^0}{g_2N^0-\bar{K}}$ and $\frac{g_1N^0}{g_1N^0-\bar{K}}$, respectively. We see that these coefficients are proportional to the inverse of the difference between the other sector's ratio of capital to labor and the (pre-migration) ratio for the whole economy. If the other sector is above the economy average in terms of capital to labor intensity, then one's own sector must be above the economy average in terms of labor intensity. If this is the case, then the long-term labor use in one's own sector will be affected positively by immigration, and the larger the capital intensity in the other sector, the bigger will this effect be. In the short run, the R-V model predicts that both sectors will increase their work forces with immigration (and decrease it with emigration). Over the long run, the HO-model (as shown above) predicts that workers will have a tendency to move to the labor intensive sector following immigration, thereby causing a movement of both labor and capital from the capital intensive to the labor intensive sector. Therefore, in the long run we expect to find that employment increases in the labor intensive sector with a larger net migration share m and that it decreases in the capital intensive sector. In the regressions, logarithms of the number of employed persons (measured in 1000s) will be used as observations for these variables.

5.3 Gross Revenue - p_1y_1 and p_2y_2

An expression for y_i is given by

$$y_i = \left[\gamma_i + (1 - \gamma_i)g_i^s\right]^{\frac{1}{s}} L_i,$$

which (when also inserting for L_i) yields that

$$p_i y_i = p_i \left[\gamma_i + (1-\gamma_i) g_i^s\right]^{\frac{1}{s}} \frac{g_j N - \bar{K}}{g_j - g_i},$$

where i and j denote the two sectors. Taking logarithms gives us the following expressions:

$$\ln(p_1 y_1) = \ln p_1 + \frac{1}{s} \ln\left[\gamma_1 + (1-\gamma_1) g_1^s\right] + \ln(g_2 N - \bar{K}) - \ln(g_2 - g_1) \tag{46}$$

$$\ln(p_2 y_2) = \ln p_2 + \frac{1}{s} \ln\left[\gamma_2 + (1-\gamma_2) g_2^s\right] + \ln(g_1 N - \bar{K}) - \ln(g_1 - g_2) \tag{47}$$

From this we easily see that

$$\frac{\partial \ln(p_i y_i)}{\partial m} = \frac{g_j N^0}{g_j N - \bar{K}}$$

Using this, the first-order Taylor approximations of (46) and (47) around $m = 0$ are:

$$\ln(p_1 y_1) \approx \ln p_1 + \frac{1}{s} \ln\left[\gamma_1 + (1-\gamma_1) g_1^s\right] + H_1(g_1, g_2; \bar{K}) + \frac{g_2 N^0}{g_2 N^0 - \bar{K}} m \tag{48}$$

$$\ln(p_2 y_2) \approx \ln p_2 + \frac{1}{s} \ln\left[\gamma_2 + (1-\gamma_2) g_2^s\right] + H_2(g_1, g_2; \bar{K}) + \frac{g_1 N^0}{g_1 N^0 - \bar{K}} m \tag{49}$$

Similarily to the case for labor, we have that production income is inversely proportional to the difference between capital intensity in the opposite sector and the intensity in the overall economy over the long run. From this we expect that Romanian emigration eventually will result in a decrease in revenue and GVA in the labor intensive sector and an equivalent increase in the capital intensive sector. The following expressions specify the regression that will be run for gross revenue (proxied by turnover revenue and gross value added in the data):

$$\ln R_{1rt} = a_{R_1 r} + b_{R_1 t} + \beta_{R_1} m_{rt} + \sum_i c_{R_1 i} X_{irt} + \varepsilon_{R_1 rt} \tag{50}$$

$$\ln R_{2rt} = a_{R_2 r} + b_{R_2 t} + \beta_{R_2} m_{rt} + \sum_i c_{R_2 i} X_{irt} + \varepsilon_{R_2 rt} \tag{51}$$

Here R_1 and R_2 refer to turnover revenue or GVA in the labor intensive and the capital intensive sectors, respectively. Given that the expressions in (48) and (49) find the effects of the net migration share m to be exactly the same as what they are in equations (42) and (43), it would be reasonable to expect the sizes of β_{L_1} to be close to β_{R_1} and β_{L_2} to β_{R_2} over the long run. In the short run, we have that the R-V model predicts both sectors to benefit from immigration. Therefore, if the variables in the regressions require more than one year to reach complete long-term adaptation, we might find less positive coefficients in the labor intensive sector and more positive coefficients (equivalently, less negative) in the capital intensive sector than the HO model predicts. Immediately after an immigration shock, we expect the coefficients to be positive for both sectors. As time passes, the coefficient in the labor intensive sector will gradually become more positive, and in the capital intensive sector more negative (eventually also falling below the zero mark). In the dataset, both turnover revenue and GVA are measured in logarithms of GDP deflated million RON.

5.4 Net Investments - ΔK_1 and ΔK_2

Let net investments in sector i in period t equal $\Delta K_{it} = K_{it+1} - K_{it}$. If we assume that capital grows at a constant rate r, we have that $K_{it+1} = (1+r)K_{it}$. Then $\Delta K_{it} = rK_{it}$. Inserting for this in the factor expressions for capital in (21) and (22) and taking logarithms (while also ignoring time subscripts), we have that

$$\ln \Delta K_1 = \ln r + \ln g_1 + \ln(g_2 N - \bar{K}) - \ln(g_2 - g_1) \tag{52}$$

$$\ln \Delta K_2 = \ln r + \ln g_2 + \ln(g_1 N - \bar{K}) - \ln(g_1 - g_2) \tag{53}$$

Derivation with respect to m finds the long-term effect of migration to be exactly the same as it is for gross revenue and labor:

$$\frac{\partial \ln \Delta K_i}{\partial m} = \frac{g_j N^0}{g_j N - \bar{K}}$$

The two Taylor expressions around $m = 0$ then become:

$$\ln \Delta K_1 \approx \ln r + \ln g_1 + H_1(g_1, g_2; \bar{K}) + \frac{g_2 N^0}{g_2 N^0 - \bar{K}} m \tag{54}$$

$$\ln \Delta K_2 \approx \ln r + \ln g_2 + H_2(g_1, g_2; \bar{K}) + \frac{g_1 N^0}{g_1 N^0 - \bar{K}} m \tag{55}$$

The following equations describe the regressions that will be run for the effect of net migration shares on net investments:

$$\ln I_{1rt} = a_{I_1 r} + b_{I_1 t} + \beta_{I_1} m_{rt} + \sum_i c_{I_1 i} X_{irt} + \varepsilon_{I_1 rt} \tag{56}$$

$$\ln I_{2rt} = a_{I_2 r} + b_{I_2 t} + \beta_{I_2} m_{rt} + \sum_i c_{I_2 i} X_{irt} + \varepsilon_{I_2 rt}, \tag{57}$$

where I_1 and I_2 are net investments in the labor and capital intensive sectors, respectively. Again, the model predicts that the long-run value of β_{I_i} will be close to β_{R_i} and β_{L_i}. That these long-run effects are predicted to be the same for capital, labor and revenue is directly reflected in the HO model. From the hypothetical scenario of an exogenous labor decrease reported in Table 1 we see that these variables change by exactly the same percentage within each sector. Of course, net investments does not equal capital, and the theory does not directly have any prediction of what will happen with this variable. Presumably, given the complementarity between capital and labor and that both sectors in the short run are expected to increase their employment with net inward migration, we could deduce that the R-V model predicts investments to increase in both sectors (although the standard version of the model strictly speaking precludes capital supply changes). For the long run, the HO model predicts immigration to cause falling investments in the capital intensive sector and increasing investments in the labor intensive sector. Therefore, the more positive the coefficient on the net migration share is in the labor intensive sector, and the more negative it is in the capital intensive sector, the closer will we be to a long-run equilibrium. If the coefficients for both sectors are found to be (weakly) positive, we might conclude that we have a short-run equilibrium.

6 Results

Each dependent variable has been subjected to 16 different regression specifications; seven standard IV regressions using different combinations of the three instruments described above, seven manually perfomed IV regressions using cross-panel correlation robust estimates in both regression steps, and two OLS regressions - one standard and one robust to cross-panel correlation. To improve readability, only 8 of these specifications are shown in the regression tables (Tables 6-14). The full tables are reported in the Appendix. The choice of specifications to include in Tables 6-14 is based on two factors. First, the CPCR and non-CPCR basic OLS specifications as well as the CPCR and non-CPCR IV specifications using all instruments are always included.[33] Second, the remaining four specifications are "freely" chosen IV regressions; specifically two that assume no cross-panel correlation and two that do assume such correlation. The instruments used in these four CPCR and non-CPCR regressions will be the same (for better comparability across the two panel correlation types). The choice of the two instrument groupings is based on an assessment of the quality of the instruments for each dependent variable. Such an assessment is made in Section 6.1 below. This section will also provide an indicative test of cross-panel correlation based on Moran's I. Following this, the regression results will be presented and discussed.

[33] These correspond to the specifications denoted OLS_{fe}, OLS_{pc}, $IV_{1\text{-}fe}$ and $IV_{1\text{-}man}$ in the tables.

6.1 Instrument Validity and Cross-Panel Correlation

6.1.1 Instrument Validity

As outlined above, three possible instruments will be considered; historical migration (m_{t-4}), share of minorities ($mino$) and a weighted average of wages in emigration destination countries (w^*). Two factors should be taken into consideration when assessing instrument validity, namely instrument relevance and instrument exogeneity. An often applied rule-of-thumb to assess relevance is to look at the F-statistic testing the null hypothesis that the coefficients on the instruments in the first-stage regression are zero. If this statistic is above 10 and there is only one endogenous regressor (in our example this regressor is m), the instruments are considered relevant. This indicates that they are able to account for a significant portion of the variation in the endogenous regressor (Stock & Watson 2015: 489-490). The second factor, exogeneity, can be tested using a Hansen J-statistic. This statistic assumes the null hypothesis that the instruments are uncorrelated with the error term of the second-stage regression. It has a χ^2_{n-k} distribution, where n is the number of instruments (here either two or three) and k is the number of endogenous regressors. $n - k$ then specifies the degree of overidentification, or, equivalently, the degrees of freedom of the statistic (Stock & Watson 2015: 493-494). Table 4 reports the F-statistics and the p-values derived from the J-tests of four instrument compositions.[34] The p-values have been measured for each of the nine variables of interest. All calculations of the p-values include year and region fixed effects, with standard errors clustered at the regional level. Therefore, the test of instrument exogeneity is strictly speaking only valid for the seven fixed effects regressions, but we can hope that the results will be applicable to the CPCR specifications as well. The largest p-value in each column is shown in boldface, and indicates which instrument composition is considered most "exogenous" for each variable.

We find that six out of seven F-statistics are larger than ten, indicating that most instrument compositions are sufficiently relevant. The exception is foreign wages, which has an F-statistic of only 0.09. This indicates that w^* might not be a relevant instrument, and its estimates should be interpreted with caution. Turning to exogeneity, we have that there is not one instrument composition that stands out as the most apt for all dependent variables. All instruments appear to be sufficiently exogenous for most of the dependent variables, with three notable exceptions being earnings and turnover revenue in both sectors. Also for gross value added in the capital intensive sector do some of the instruments show signs of endogeneity.

[34]The Hansen test requires that the IV regression is overidentified - i.e. that there be more instruments than endogenous regressors. Therefore, exogeneity cannot be tested for the IV specifications where only one instrument is used.

Choice of the best instruments to include in the excerpts of the regression tables (Tables 6-14):
For earnings and turnover revenue in the labor intensive sector it is clearly recommendable from an exogeneity point of view to opt for the *mino* and w^* combination. For turnover in the capital intensive sector the J-statistic indicates that w^* and m_{t-4} are the better options. Given that w^* appears to be weak, it could be that the best instrument for earnings and turnover revenue in sector 1 (i.e. the labor intensive sector) is *mino*, and that m_{t-4} is better for sector 2 revenue. Therefore, Tables 6 (earnings) and 7 (turnover revenue in the labor intensive sector) will have IV_3 (*mino* and w^*) and IV_7 (*mino*) as their freely chosen IV specifications. Equivalently, Table 8 (turnover revenue in the capital intensive sector) will have IV_4 (m_{t-4} and w^*) and IV_5 (m_{t-4}).

For gross value added in the labor intensive sector (Table 9) all instrument compositions appear to be adequately exogenous, but given the poor relevance of foreign wages, all compositions that include this variable have been left out (i.e. IV_3, IV_4 and IV_6). IV_7 has also been excluded because using only *mino* as an instrument appears to give us estimates with large standard errors for some of the dependent variables, and (importantly) the *mino* variable is in effect only an interpolation between the three census years 1992, 2002 and 2011. For GVA_1 we are therefore left with specifications IV_2 (*mino* and m_{t-4}) and IV_5 (m_{t-4}) as the freely chosen instruments. For gross value added in the capital intensive sector (GVA_2), specifications IV_2 (*mino* and m_{t-4}) and IV_3 (*mino* and w^*) have been picked, since these combinations are the most exogenous according to Table 4.

IV_2 (m_{t-4} and *mino*) and IV_7 (*mino*) have been judged the most suitable for employment in the labor intensive sector. IV_3, IV_4 and IV_6 have been left out because they include w^*. Considering the fall in p-value from IV_3 (0.768) to IV_4 (0.501), m_{t-4} could be slightly endogenous for this variable, so we also exclude IV_5. We are then left with IV_2 and IV_7. A similar argument concerning m_{t-4} applies to employment in the capital intensive sector, so also here we choose to include IV_7 (*mino*). In addition we have that IV_3 (*mino* and w^*) is strongly preferred from an exogeneity point of view, so this is included as well.

The exogeneity results in Table 4 leaves us with a large degree of discretion concerning the choice of instruments for investments. All combinations appear to be exogenous, and all (except w^*) are relevant. We therefore leave out all specifications that include w^* (IV_3, IV_4 and IV_6). As was the case for gross value added in the labor intensive sector, we also leave out specification IV_7, because of its large standard errors and measurement method of interpolation. We are then left with specifications IV_2 (*mino* and m_{t-4}) and IV_5 (m_{t-4}) as our preferred instruments for investments in both the labor and the capital

Table 4: Tests of instrument relevance (F-statistics) and exogeneity (p-values of Hansen's J-statistic).

	p-values of Hansen's J-test[a]									F-statistic
	w	TR_1	TR_2	GVA_1	GVA_2	L_1	L_2	I_1	I_2	
$mino$, w^*, m_{t-4}	0.012	0.031	0.011	0.869	0.167	**0.789**	0.835	**0.927**	0.926	34.0
$mino$, m_{t-4}	0.005	0.015	0.011	0.602	0.379	0.711	0.583	0.907	0.710	49.9
$mino$, w^*	**0.796**	**0.618**	0.011	**0.988**	**0.425**	0.768	**0.982**	0.797	0.746	19.3
w^*, m_{t-4}	0.146	0.096	**0.407**	0.784	0.183	0.501	0.665	0.700	**0.937**	29.2
m_{t-4}	-	-	-	-	-	-	-	-	-	53.0
w^*	-	-	-	-	-	-	-	-	-	0.09
$mino$	-	-	-	-	-	-	-	-	-	37.9

[a] Subscript 1 denotes the labor intensive sector and 2 the capital intensive sector.

w: Earnings. TR: Turnover Revnue. GVA: Gross Value Added. L: Employment. I: Net investments.

intensive sectors (Tables 13 and 14).

6.1.2 Cross-Panel Correlation

As explained above, some of the observations of the dependent variables could be correlated across panels. This would violate the i.i.d assumptions underlying standard OLS and IV regressions. Stata's xtpcse command gives us OLS estimates where the error terms of the dependent variables are assumed to be correlated across panels (as well as heteroskedastic). The CPCR estimates referred to above (and reported in the tables below) have been estimated using this command. Intuitively it might sound reasonable that the observations are correlated across counties. To test this formally, Moran's I has been calculated for each of the dependent variables for each year of the dataset. The p-values resulting from this statistic are reported in Table 5. The null hypothesis of these p-values is that the observations of the dependent variables are distributed randomly across Romania, independent of the spatial distance between the counties.[35] The low values in Table 5 indicate that for most of the variables, cross-panel correlation is indeed an issue. This is most evident for the earnings variable, indicating that wages are not only determined by local productivity concerns, but might also adhere to common factors. Turnover revenue and investments in both sectors also appear to follow a common pattern across neighboring counties, as is employment in the capital intensive sector. Table 5 is a little more inconclusive regarding gross value added in both sectors and employment in the labor intensive sector, with p-values fluctuating between 0.3 and 0.4. Although it might be too

[35] For the I to be estimated, it is necessary to specify a distance matrix. The matrix entries are calculated as Euclidian distances between the geographical coordinates of each pair of counties. For more information on Moran's I, see UCLA (2015).

Table 5: Test of spatial autocorrelation. p-values of Moran's I for Romanian counties for each year in the dataset.[a] One-tailed tests.

Year	w	TR_1	TR_2	GVA_1	GVA_2	L_1	L_2	I_1	I_2
2000	0.000	-	-	0.053	0.037	-	-	-	-
2001	0.000	-	-	0.040	0.040	-	-	-	-
2002	0.000	-	-	0.100	0.118	-	-	-	-
2003	0.001	-	-	0.123	0.091	-	-	-	-
2004	0.000	-	-	0.101	0.177	-	-	-	-
2005	0.000	-	-	0.185	0.283	-	-	-	-
2006	0.000	-	-	0.222	0.385	-	-	-	-
2007	0.000	-	-	0.238	0.416	-	-	-	-
2008	0.000	0.006	0.084	0.340	0.351	0.242	0.063	0.012	0.061
2009	0.000	0.002	0.081	0.381	0.312	0.278	0.076	0.097	0.022
2010	0.000	0.003	0.053	0.147	0.386	0.318	0.097	0.002	0.049
2011	0.000	0.002	0.037	0.070	0.278	0.425	0.109	0.007	0.193
2012	0.000	0.003	0.089	0.134	0.212	0.427	0.131	0.013	0.009
2013	0.000	0.007	0.043	-	-	0.373	0.141	0.003	0.086
Average[b]	0.000	0.003	0.060	0.338	0.362	0.339	0.099	0.009	0.035

[a] Subscript 1 denotes the labor intensive sector and 2 the capital intensive sector.

[b] Average displays p-values that are calculated for the period averages of the variables (i.e. not the average of the annual p-values).

w: Earnings. TR: Turnover Revnue. GVA: Gross Value Added. L: Employment. I: Net investments.

rash to conclude that we can disregard the non-CPCR estimates from this, Table 5 does provide a strong indication that the CPCR estimates could be more relevant for most of the dependent variables.

6.2 Earnings

From Table 6, and bearing in mind the discussion of instrument validity and cross-panel correlation above, we have that it is difficult to state with certainty what kind of effect migration has on Romanian earnings. At first glance, the regression results seem to provide coherent evidence that the effect might be positive, i.e. that earnings have fallen as a result of emigration. However, after closer consideration, we have that most of the estimated coefficients might not be entirely trustworthy. First of all, simultaneous causality is likely to be an important factor for this variable. This forces us to disregard the standard OLS estimates. Second, Table 5 showed that cross-panel correlation in all likelihood permeates the earnings observations. Therefore, we cannot trust the non-CPCR IV estimates ($IV_{1\text{-fe}}$, $IV_{3\text{-fe}}$ and $IV_{7\text{-fe}}$) either. This leaves us with the CPCR IV estimates, for which we have no significance levels. In addition, these three estimates vary considerably ($IV_{7\text{-man}}$ is large and positive, $IV_{3\text{-man}}$ is small and negative, and $IV_{1\text{-man}}$ is small and positive), in itself an indication that something might be wrong with the specifications and/or the instruments. I argue that the instruments are flawed for the earnings variable. Again considering Table 4, we have that IV_3 (*mino* and w^*) is the only instrument composition that is found to be exogenous. Furthermore, *mino* does not seem able to alleviate the endogeneity issues in the two other instrument compositions where it is present (IV_1 and IV_2). Therefore, a not too far-fetched conclusion could be that it is w^* that makes IV_3 exogenous, an instrument which is shown to have very little relevance in predicting net migration shares. If m_{t-4} and *mino* are endogenous to earnings and w^* is irrelevant in predicting migration, we are left with no instruments to run this regression correctly.

Still, we can say with a fair degree of certainty (from the OLS_{pc} estimate) that there is a significant positive *association* between migration and earnings, without specifying the direction of causality. This could be a measure of the effect earnings has on migration, the effect of migration on earnings, or - most likely - both of these. The first causality would in all likelihood give us a positive coefficient, whereas the effect of the second could be positive, negative or zero. As explained in the presentation of the labor and R-V models, migration is *prima facie* expected to have a negative effect on earnings in the short run. Given a longer time perspective, the HO model predicts this wage effect to converge to zero. Still, there might be yet other mechanisms at work that could even provide us with a positive coefficient for migration's effect on earnings. One such mechanism could be increasing returns to labor. This would imply that when labor supply increases, the marginal return to labor - and hence wages - also rise. Another mechanism could concern the skill composition of the migrant population compared to the overall population. If migrants tend to have above-average skill levels, two factors are of relevance. First, skilled workers could generally be more productive than the average worker, hence having a positive effect on wages when they immigrate and a negative effect when they emigrate. Second, if skilled and unskilled labor are complements, the arrival of skilled workers would raise the productivity of unskilled workers. This again would yield a positive wage effect. Two mechanisms that could alleviate any negative effect that immigration might have on wages are endowment-induced technical change and non-migrants' labor market participation effects. The first (technical change) would imply that producers to some extent are free to choose their production functions. When labor supply increases, they might choose to become more labor intensive, hence increasing their demand for labor. Non-migrants' participation effects entail that non-migrants could move into the labor market when emigration occurs and out of it with immigration. This would mean that a change in the migration share is not reflected in a similar-sized change in the workforce, hence making the (possibly) negative effects of migration appear smaller than they actually are.

Table 6: Regression Results (Excerpt) - Log Earnings

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{3\text{-fe}}$	$IV_{7\text{-fe}}$	$IV_{1\text{-man}}$	$IV_{3\text{-man}}$	$IV_{7\text{-man}}$
Net Migration Share	1.024***	0.423***	2.358***	1.263	1.236	0.436	-0.302	2.271
	(0.229)	(0.0713)	(0.561)	(0.812)	(0.820)	(-)	(-)	(-)
Log GDP per capita	0.159***	0.202***	0.142***	0.153***	0.154	0.233	0.318	-0.0955
	(0.0265)	(0.0209)	(0.0329)	(0.0331)	(0.0333)	(-)	(-)	(-)
Unemployment	-0.167	0.906***	-0.370*	-0.167	-0.167	0.770	0.935	0.834
	(0.134)	(0.199)	(0.205)	(0.134)	(0.134)	(-)	(-)	(-)
Urban Share	-0.385***	-0.303***	-0.219	-0.371**	-0.372**	-0.252	-0.227	-0.496
	(0.148)	(0.0331)	(0.238)	(0.155)	(0.155)	(-)	(-)	(-)
Log Population Density	0.403***	0.0866***	-0.0740	0.323	0.332	0.0841	0.0744	0.118
	(0.109)	(0.00252)	(0.175)	(0.282)	(0.284)	(-)	(-)	(-)
Share of Women	-9.716***	-10.77***	-9.060**	-9.354***	-9.396***	-10.15	-3.879	-28.32
	(3.282)	(1.667)	(4.337)	(3.492)	(3.496)	(-)	(-)	(-)
Log Graduations	-0.00286	0.0125***	-0.0204***	-0.00302	-0.00300	0.0111	0.0114	0.0154
	(0.00499)	(0.000817)	(0.00720)	(0.00503)	(0.00502)	(-)	(-)	(-)
Share under 25	-0.776	-1.700***	-1.697*	-0.785	-0.784	-0.750	-1.532	-2.125
	(0.516)	(0.501)	(0.936)	(0.517)	(0.517)	(-)	(-)	(-)
Share over 64	-1.941**	0.308	-0.277	-1.881**	-1.888**	1.192	-0.521	2.419
	(0.874)	(0.355)	(1.108)	(0.896)	(0.896)	(-)	(-)	(-)
County fixed effects	Yes	No	Yes	Yes	Yes	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	510	510	358	510	510	358	510	510
Instruments used in	-IV_1: *mino*, w^* and m_{t-4}		-IV_2: *mino* and m_{t-4}		-IV_3: *mino* and w^*		-IV_4: m_{t-4} and w^*	
	-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: *mino*			

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlated errors. Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates. Standard errors are otherwise reported in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01. Full results can be found in the Appendix.

Table 7: Regression Results (Excerpt) - Log Turnover Revenue in Labor Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{3\text{-fe}}$	$IV_{7\text{-fe}}$	$IV_{1\text{-man}}$	$IV_{3\text{-man}}$	$IV_{7\text{-man}}$
Net Migration Share	0.0187	2.107***	-0.779	-10.06*	-11.99	1.603	0.337	1.223
	(0.921)	(0.222)	(2.000)	(5.622)	(7.742)	(-)	(-)	(-)
Log GDP per capita	-0.106	0.162*	-0.100	-0.0363	-0.0231	0.270	0.525	0.376
	(0.120)	(0.0854)	(0.121)	(0.167)	(0.185)	(-)	(-)	(-)
Unemployment	0.738	-8.737***	0.652	-0.350	-0.559	-9.078	-10.14	-9.999
	(0.878)	(1.579)	(0.901)	(1.329)	(1.538)	(-)	(-)	(-)
Urban Share	3.242	-0.777***	2.602	-4.834	-6.384	-0.798	-0.814	-0.912
	(2.910)	(0.118)	(3.245)	(5.903)	(7.473)	(-)	(-)	(-)
Log Population Density	-0.306	0.542***	-0.148	1.689	2.072	0.530	0.510	0.524
	(0.275)	(0.00562)	(0.447)	(1.148)	(1.563)	(-)	(-)	(-)
Share of Women	-4.552	-24.60***	-4.265	-0.925	-0.229	-21.00	-12.10	-19.66
	(18.32)	(7.371)	(18.38)	(24.90)	(27.24)	(-)	(-)	(-)
Log Graduations	-0.0235	0.141***	-0.0244	-0.0340	-0.0360	0.140	0.134	0.136
	(0.0374)	(0.0147)	(0.0375)	(0.0510)	(0.0558)	(-)	(-)	(-)
Share under 25	11.52**	-7.755***	11.86**	15.78**	16.60**	-8.056	-8.700	-8.870
	(4.864)	(0.886)	(4.934)	(6.988)	(7.886)	(-)	(-)	(-)
Share over 64	0.943	0.0292	0.605	-3.327	-4.147	-1.004	-2.944	-2.055
	(4.244)	(0.863)	(4.321)	(6.204)	(7.061)	(-)	(-)	(-)
County fixed effects	Yes	No	Yes	Yes	Yes	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197	197
Instruments used in	-IV_1: *mino*, w^* and m_{t-4}		-IV_2: *mino* and m_{t-4}		-IV_3: *mino* and w^*		-IV_4: m_{t-4} and w^*	
	-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: *mino*			

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlated errors. Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates. Standard errors are otherwise reported in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01. Full results can be found in the Appendix.

Table 8: Regression Results (Excerpt) - Log Turnover Revenue in Capital Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{4\text{-fe}}$	$IV_{5\text{-fe}}$	$IV_{1\text{-man}}$	$IV_{4\text{-man}}$	$IV_{5\text{-man}}$
Net Migration Share	2.041	-0.605***	0.164	0.218	1.210	-0.809	-0.827	-0.868
	(1.298)	(0.0545)	(2.831)	(2.830)	(3.012)	(-)	(-)	(-)
Log GDP per capita	0.287*	0.881***	0.299*	0.299*	0.292*	0.918	0.921	0.928
	(0.169)	(0.0461)	(0.171)	(0.171)	(0.170)	(-)	(-)	(-)
Unemployment	-0.235	-6.126***	-0.438	-0.432	-0.325	-6.262	-6.276	-6.295
	(1.237)	(0.983)	(1.275)	(1.275)	(1.273)	(-)	(-)	(-)
Urban Share	-14.23***	-1.212***	-15.74***	-15.69***	-14.90***	-1.201	-1.200	-1.198
	(4.101)	(0.139)	(4.595)	(4.593)	(4.648)	(-)	(-)	(-)
Log Population Density	-0.468	0.355***	-0.0963	-0.107	-0.303	0.353	0.353	0.352
	(0.388)	(0.0390)	(0.632)	(0.632)	(0.664)	(-)	(-)	(-)
Share of Women	-128.7***	-2.589	-128.0***	-128.1***	-128.4***	-1.027	-0.920	-0.584
	(25.81)	(7.490)	(26.02)	(26.01)	(25.87)	(-)	(-)	(-)
Log Graduations	0.0985*	0.183***	0.0965*	0.0966*	0.0976*	0.182	0.182	0.181
	(0.0526)	(0.0100)	(0.0531)	(0.0531)	(0.0528)	(-)	(-)	(-)
Share under 25	9.743	-12.44***	10.54	10.51	10.09	-12.49	-12.49	-12.50
	(6.855)	(0.933)	(6.986)	(6.983)	(6.960)	(-)	(-)	(-)
Share over 64	5.233	-8.582***	4.438	4.460	4.881	-8.796	-8.820	-8.879
	(5.981)	(0.826)	(6.118)	(6.116)	(6.099)	(-)	(-)	(-)
County fixed effects	Yes	No	Yes	Yes	Yes	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197	197
Instruments used in	-IV_1: *mino*, w^* and m_{t-4}		-IV_2: *mino* and m_{t-4}		-IV_3: *mino* and w^*		-IV_4: m_{t-4} and w^*	
	-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: *mino*			

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlated errors. Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates. Standard errors are otherwise reported in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01. Full results can be found in the Appendix.

Table 9: Regression Results (Excerpt) - Log Gross Value Added in Labor Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-}fe}$	$IV_{2\text{-}fe}$	$IV_{5\text{-}fe}$	$IV_{1\text{-}man}$	$IV_{2\text{-}man}$	$IV_{5\text{-}man}$
Net Migration Share	1.559**	0.431**	0.512	0.492	-0.421	0.318	0.239	0.229
	(0.668)	(0.169)	(1.787)	(1.804)	(2.353)	(-)	(-)	(-)
Log GDP per capita	0.399***	0.547***	0.393***	0.393***	0.405***	0.534	0.548	0.550
	(0.0775)	(0.0554)	(0.105)	(0.105)	(0.108)	(-)	(-)	(-)
Unemployment	0.786**	-0.0162	0.891	0.891	0.877	-4.306	-4.320	-4.322
	(0.390)	(1.102)	(0.652)	(0.652)	(0.659)	(-)	(-)	(-)
Urban Share	-0.638	-0.0776	0.421	0.418	0.307	0.204	0.210	0.211
	(0.431)	(0.162)	(0.757)	(0.758)	(0.787)	(-)	(-)	(-)
Log Population Density	0.883***	0.553***	1.131**	1.136**	1.394**	0.552	0.551	0.551
	(0.317)	(0.00784)	(0.556)	(0.560)	(0.704)	(-)	(-)	(-)
Share of Women	32.56***	-26.31***	34.65**	34.63**	33.94**	-38.92	-38.22	-38.13
	(9.587)	(4.113)	(13.80)	(13.81)	(14.00)	(-)	(-)	(-)
Log Graduations	0.0114	0.192***	0.0114	0.0115	0.0146	0.202	0.202	0.202
	(0.0146)	(0.00638)	(0.0229)	(0.0229)	(0.0237)	(-)	(-)	(-)
Share under 25	-2.607*	-7.244***	-3.626	-3.625	-3.563	-7.184	-7.173	-7.172
	(1.506)	(0.873)	(2.979)	(2.979)	(3.013)	(-)	(-)	(-)
Share over 64	-8.165***	-2.828*	-6.255*	-6.262*	-6.560*	0.220	0.130	0.118
	(2.551)	(1.526)	(3.527)	(3.528)	(3.599)	(-)	(-)	(-)
County fixed effects	Yes	No	Yes	Yes	Yes	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	510	510	358	358	358	358	358	358
Instruments used in	-IV_1: *mino*, w^* and m_{t-4}		-IV_2: *mino* and m_{t-4}		-IV_3: *mino* and w^*		-IV_4: m_{t-4} and w^*	
	-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: *mino*			

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlated errors. Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates. Standard errors are otherwise reported in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01. Full results can be found in the Appendix.

Table 10: Regression Results (Excerpt) - Log Gross Value Added in Capital Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{2\text{-fe}}$	$IV_{3\text{-fe}}$	$IV_{1\text{-man}}$	$IV_{2\text{-man}}$	$IV_{3\text{-man}}$
Net Migration Share	0.299	-0.409***	1.316*	1.456**	2.593***	-0.465	-0.494	-1.242
	(0.249)	(0.0785)	(0.677)	(0.685)	(0.964)	(-)	(-)	(-)
Log GDP per capita	1.367***	0.817***	1.395***	1.393***	1.309***	0.790	0.795	0.951
	(0.0289)	(0.0484)	(0.0397)	(0.0398)	(0.0393)	(-)	(-)	(-)
Unemployment	0.0777	-1.466***	-0.400	-0.397	0.0843	-4.101	-4.106	-1.434
	(0.146)	(0.528)	(0.247)	(0.248)	(0.159)	(-)	(-)	(-)
Urban Share	-0.0270	-0.268**	-0.0403	-0.0233	0.110	-0.0831	-0.0810	-0.181
	(0.161)	(0.104)	(0.287)	(0.288)	(0.184)	(-)	(-)	(-)
Log Population Density	1.021***	0.328***	0.828***	0.788***	0.256	0.315	0.315	0.314
	(0.118)	(0.00709)	(0.211)	(0.213)	(0.334)	(-)	(-)	(-)
Share of Women	-2.668	-3.191	-4.219	-4.113	0.811	-7.725	-7.464	4.723
	(3.578)	(2.625)	(5.231)	(5.244)	(4.145)	(-)	(-)	(-)
Log Graduations	0.00895	0.134***	0.0124	0.0120	0.00738	0.149	0.149	0.132
	(0.00544)	(0.00653)	(0.00868)	(0.00871)	(0.00597)	(-)	(-)	(-)
Share under 25	1.744***	-0.746	1.491	1.481	1.663***	-0.481	-0.477	-0.554
	(0.562)	(0.674)	(1.129)	(1.132)	(0.614)	(-)	(-)	(-)
Share over 64	0.446	0.122	1.990	2.036	1.022	2.372	2.338	-0.830
	(0.952)	(0.896)	(1.336)	(1.340)	(1.064)	(-)	(-)	(-)
County fixed effects	Yes	No	Yes	Yes	Yes	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	510	510	358	358	510	358	358	510
Instruments used in	-IV_1: $mino$, w^* and m_{t-4}		-IV_2: $mino$ and m_{t-4}		-IV_3: $mino$ and w^*		-IV_4: m_{t-4} and w^*	
	-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: $mino$			

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlated errors. Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates. Standard errors are otherwise reported in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01. Full results can be found in the Appendix.

Table 11: Regression Results (Excerpt) - Log Employment in Labor Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{2\text{-fe}}$	$IV_{7\text{-fe}}$	$IV_{1\text{-man}}$	$IV_{2\text{-man}}$	$IV_{7\text{-man}}$
Net Migration Share	0.106	-0.0497	1.343*	1.493*	0.817	-0.124	-0.138	2.124
	(0.318)	(0.0933)	(0.723)	(0.780)	(1.835)	(-)	(-)	(-)
Log GDP per capita	0.0325	0.153***	0.0240	0.0230	0.0276	0.167	0.169	-0.210
	(0.0413)	(0.0507)	(0.0437)	(0.0442)	(0.0438)	(-)	(-)	(-)
Unemployment	0.0123	-7.655***	0.146	0.162	0.0890	-7.705	-7.714	-7.362
	(0.303)	(1.111)	(0.326)	(0.331)	(0.364)	(-)	(-)	(-)
Urban Share	3.196***	0.196	4.187***	4.307***	3.765**	0.197	0.198	-0.0404
	(1.003)	(0.122)	(1.174)	(1.207)	(1.771)	(-)	(-)	(-)
Log Population Density	0.189**	0.406***	-0.0563	-0.0860	0.0479	0.405	0.405	0.442
	(0.0949)	(0.00808)	(0.162)	(0.172)	(0.371)	(-)	(-)	(-)
Share of Women	-9.708	-20.97***	-10.15	-10.21	-9.964	-20.41	-20.30	-39.70
	(6.314)	(2.281)	(6.645)	(6.727)	(6.457)	(-)	(-)	(-)
Log Graduations	0.00215	0.193***	0.00343	0.00358	0.00288	0.193	0.193	0.197
	(0.0129)	(0.0137)	(0.0136)	(0.0137)	(0.0132)	(-)	(-)	(-)
Share under 25	1.490	-3.065***	0.967	0.904	1.190	-3.090	-3.094	-3.421
	(1.677)	(0.748)	(1.784)	(1.810)	(1.869)	(-)	(-)	(-)
Share over 64	1.409	2.686***	1.933	1.997	1.710	2.584	2.564	5.016
	(1.463)	(0.443)	(1.563)	(1.586)	(1.674)	(-)	(-)	(-)
County fixed effects	Yes	No	Yes	Yes	Yes	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197	197

Instruments used in: -IV_1: $mino$, w^* and m_{t-4}; -IV_2: $mino$ and m_{t-4}; -IV_3: $mino$ and w^*; -IV_4: m_{t-4} and w^*; -IV_5: m_{t-4}; -IV_6: w^*; -IV_7: $mino$

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlated errors. Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates. Standard errors are otherwise reported in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01. Full results can be found in the Appendix.

Table 12: Regression Results (Excerpt) - Log Employment in Capital Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{3\text{-fe}}$	$IV_{7\text{-fe}}$	$IV_{1\text{-man}}$	$IV_{3\text{-man}}$	$IV_{7\text{-man}}$
Net Migration Share	-0.0992	-0.597***	0.453	0.946	0.961	-0.615	-1.375	-0.376
	(0.221)	(0.0908)	(0.490)	(1.072)	(1.355)	(-)	(-)	(-)
Log GDP per capita	0.0257	-0.201***	0.0219	0.0185	0.0184	-0.200	-0.101	-0.257
	(0.0288)	(0.0687)	(0.0296)	(0.0318)	(0.0323)	(-)	(-)	(-)
Unemployment	0.00253	-7.310***	0.0621	0.115	0.117	-7.320	-6.938	-6.955
	(0.211)	(1.430)	(0.221)	(0.253)	(0.269)	(-)	(-)	(-)
Urban Share	-0.773	-0.431***	-0.331	0.0640	0.0763	-0.423	-0.276	-0.390
	(0.700)	(0.125)	(0.795)	(1.126)	(1.308)	(-)	(-)	(-)
Log Population Density	0.0243	0.279***	-0.0851	-0.183	-0.186	0.280	0.267	0.283
	(0.0662)	(0.0128)	(0.109)	(0.219)	(0.274)	(-)	(-)	(-)
Share of Women	-14.66***	-4.858	-14.86***	-15.04***	-15.04***	-4.684	2.998	-6.006
	(4.404)	(3.288)	(4.502)	(4.750)	(4.768)	(-)	(-)	(-)
Log Graduations	0.0119	0.178***	0.0125	0.0130	0.0130	0.178	0.178	0.180
	(0.00898)	(0.0140)	(0.00919)	(0.00972)	(0.00977)	(-)	(-)	(-)
Share under 25	3.651***	-2.081*	3.418***	3.209**	3.203**	-2.056	-1.634	-1.760
	(1.170)	(1.204)	(1.209)	(1.333)	(1.380)	(-)	(-)	(-)
Share over 64	1.345	4.643***	1.579	1.788	1.794	4.701	3.945	5.203
	(1.021)	(0.684)	(1.059)	(1.183)	(1.236)	(-)	(-)	(-)
County fixed effects	Yes	No	Yes	Yes	Yes	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197	197
Instruments used in	-IV_1: *mino*, w^* and m_{t-4}		-IV_2: *mino* and m_{t-4}		-IV_3: *mino* and w^*		-IV_4: m_{t-4} and w^*	
	-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: *mino*			

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlated errors. Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates. Standard errors are otherwise reported in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01. Full results can be found in the Appendix.

Table 13: Regression Results (Excerpt) - Log Investments in Labor Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-}fe}$	$IV_{2\text{-}fe}$	$IV_{5\text{-}fe}$	$IV_{1\text{-}man}$	$IV_{2\text{-}man}$	$IV_{5\text{-}man}$
Net Migration Share	1.537	1.100***	-6.677	-5.862	-5.781	0.589	0.584	0.583
	(2.892)	(0.301)	(6.437)	(6.821)	(6.850)	(-)	(-)	(-)
Log GDP per capita	0.175	0.209*	0.231	0.226	0.225	0.313	0.314	0.314
	(0.376)	(0.114)	(0.389)	(0.387)	(0.387)	(-)	(-)	(-)
Unemployment	-1.783	-10.63***	-2.670	-2.582	-2.573	-10.98	-10.98	-10.99
	(2.757)	(2.531)	(2.900)	(2.896)	(2.896)	(-)	(-)	(-)
Urban Share	18.35**	-0.205*	11.77	12.42	12.48	-0.212	-0.214	-0.214
	(9.137)	(0.118)	(10.45)	(10.56)	(10.57)	(-)	(-)	(-)
Log Population Density	-0.383	0.598***	1.244	1.082	1.066	0.588	0.588	0.588
	(0.864)	(0.0181)	(1.438)	(1.504)	(1.509)	(-)	(-)	(-)
Share of Women	-2.390	-20.12***	0.567	0.273	0.244	-16.39	-16.36	-16.35
	(57.52)	(6.285)	(59.15)	(58.86)	(58.83)	(-)	(-)	(-)
Log Graduations	-0.115	0.160***	-0.123	-0.123	-0.122	0.158	0.158	0.158
	(0.117)	(0.0109)	(0.121)	(0.120)	(0.120)	(-)	(-)	(-)
Share under 25	0.983	-8.032***	4.457	4.112	4.078	-8.282	-8.290	-8.291
	(15.27)	(0.828)	(15.88)	(15.83)	(15.83)	(-)	(-)	(-)
Share over 64	12.92	-2.476	9.441	9.787	9.821	-3.379	-3.389	-3.390
	(13.33)	(1.879)	(13.91)	(13.88)	(13.87)	(-)	(-)	(-)
County fixed effects	Yes	No	Yes	Yes	Yes	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197	197
Instruments used in	$-IV_1$: *mino*, w^* and m_{t-4}		$-IV_2$: *mino* and m_{t-4}		$-IV_3$: *mino* and w^*		$-IV_4$: m_{t-4} and w^*	
	$-IV_5$: m_{t-4}		$-IV_6$: w^*		$-IV_7$: *mino*			

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlated errors. Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates. Standard errors are otherwise reported in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01. Full results can be found in the Appendix.

Table 14: Regression Results (Excerpt) - Log Investments in Capital Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-}fe}$	$IV_{2\text{-}fe}$	$IV_{5\text{-}fe}$	$IV_{1\text{-}man}$	$IV_{2\text{-}man}$	$IV_{5\text{-}man}$
Net Migration Share	2.755	-0.608***	10.56	10.04	10.31	-0.750	-0.862	-0.866
	(4.058)	(0.0817)	(8.901)	(9.464)	(9.518)	(-)	(-)	(-)
Log GDP per capita	0.376	1.190***	0.323	0.326	0.324	1.214	1.235	1.236
	(0.528)	(0.0485)	(0.537)	(0.537)	(0.537)	(-)	(-)	(-)
Unemployment	2.051	-3.321***	2.893	2.838	2.867	-3.414	-3.483	-3.485
	(3.869)	(0.513)	(4.010)	(4.019)	(4.023)	(-)	(-)	(-)
Urban Share	-2.662	-1.866***	3.591	3.177	3.396	-1.857	-1.853	-1.853
	(12.82)	(0.196)	(14.45)	(14.66)	(14.69)	(-)	(-)	(-)
Log Population Density	0.943	0.475***	-0.602	-0.500	-0.554	0.474	0.473	0.472
	(1.213)	(0.0155)	(1.988)	(2.087)	(2.097)	(-)	(-)	(-)
Share of Women	-114.4	-29.39***	-117.2	-117.0	-117.1	-28.29	-27.46	-27.42
	(80.71)	(3.975)	(81.80)	(81.67)	(81.74)	(-)	(-)	(-)
Log Graduations	0.0798	0.290***	0.0879	0.0873	0.0876	0.289	0.289	0.289
	(0.165)	(0.0264)	(0.167)	(0.167)	(0.167)	(-)	(-)	(-)
Share under 25	-30.85	-10.45***	-34.15	-33.93	-34.05	-10.47	-10.51	-10.51
	(21.43)	(0.831)	(21.96)	(21.97)	(21.99)	(-)	(-)	(-)
Share over 64	-7.235	1.565***	-3.929	-4.148	-4.032	1.442	1.281	1.275
	(18.70)	(0.417)	(19.23)	(19.25)	(19.27)	(-)	(-)	(-)
County fixed effects	Yes	No	Yes	Yes	Yes	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197	197
Instruments used in	-IV_1: $mino$, w^* and m_{t-4}		-IV_2: $mino$ and m_{t-4}		-IV_3: $mino$ and w^*		-IV_4: m_{t-4} and w^*	
	-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: $mino$			

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlated errors. Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates. Standard errors are otherwise reported in parentheses. Significance levels: * p< 0.10, ** p< 0.05, *** p< 0.01. Full results can be found in the Appendix.

It would appear that all we are able to say with the limited data at hand is that the net effect of all these causal relations gives us the positive (non-causal) coefficient in OLS_{pc}. However, if we are able to infer a time horizon from the findings on the structural variables, we might be able to say which of the two models (the labor model or the HO model) that is more suitable for discussing the wage effects. If we find that the structural variables show signs of short-term adaptation, we might infer that theory predicts negative wage effects, and if their time horizon is long-term, we could expect that it is the reversed causality that dominates the positive coefficient found in OLS_{pc}, and that the effect on earnings is small. Still, we could never be certain of the actual effects, since the alternative mechanisms mentioned above are valid both for the short and long terms.[36]

6.3 Turnover Revenue

From the *p*-values in Table 5 we have that turnover revenue in both sectors appears to suffer from cross-panel correlation. Therefore, our preferred specifications are the CPCR estimates. In the labor intensive sector, we find that these four coefficients are postive, ranging from 0.337 ($IV_{3\text{-man}}$) to 2.107 (OLS_{pc}). That the OLS_{pc} estimate is larger than the CPCR IV estimates could indicate that the instruments correct for some simultaneous causality bias. The IV estimates vary somewhat, possibly indicating that not all of the instruments are entirely suitable. This is also reflected in the tests of instrument validity (Table 4), where it is shown that only $IV_{3\text{-fe}}$ is adequately exogenous.

Given the consistently positive signs of the CPCR estimates, it seems reasonable to conclude that turnover revenue in the labor intensive sector increases with larger net migration shares. The precise size of this effect is uncertain, since the estimates vary somewhat in this respect. We therefore have that both the Ricardo-Viner and the HO model could have explanatory power, with the short-term R-V model predicting small positive changes in turnover revenue and the long-term HO model predicting large positive effects. The two models differ more in their predictions for the capital intensive sector, and the results for this sector might be used to decide which of the two models are best suited to analyse the migration effects (and thereby indicate whether the variables have stabilized for the short or long term).

Also turnover revenue in the capital intensive sector appears to suffer from cross-panel correlation. Therefore, we will consider the CPCR estimates in Table 8. These coefficients are fairly unanimous in their estimated effects of net migration share changes. All three CPCR IV specifications estimate the impact to between -0.8 and -0.9, meaning that a one

[36]For instance, the effect of increased marginal productivity of unskilled non-migrants is likely to subside as the supply of unskilled workers increases (making this phenomenon short-term), whereas technical change is more likely to last.

percent increase in the net migration share is expected to decrease turnover revenue in the capital intensive sector by 0.8-0.9 percent within maximum one year after the migration shock. The OLS_{pc} coefficient is slightly more positive (-0.6), something which could be due to simultaneous causality creating a positive bias.[37]

Overall, it would therefore seem that the variables have adjusted to the long-term predictions of the HO model. The revenue appears to increase in the labor intensive sector and decrease in the capital intensive sector with positive changes in net migration shares. Still, as was the case with earnings, we need not have that the HO model fully captures all the processes at work here. Wrong assumptions about the production functions (for example if the return to labor in reality is increasing), or if some typical qualities that migrants have (such as language skills) are more beneficial to the labor intensive sector than to the capital intensive sector, we would also expect to observe these effects for turnover revenue, without them being addressed in the HO model in the form it has above. However, it is fair to say that we do not find anything which contradicts the predictions of the HO model. If we find similar effects for the other dependent variables as well, HO theory would in our case appear to be correct in its predictions for structural variables changes. This would then also indicate that a year might be sufficient time for these variables to adapt.

6.4 Gross Value Added

The tests with Moran's I did not provide conclusive evidence regarding whether gross value added (in either sector) is correlated across Romanian counties. The two p-values for the period averages are both around 0.35, indicating that we should not reject the null hypothesis of no cross-panel correlation. Still, it far from proves that such correlation is not a problem. Therefore, we should take both the CPCR and non-CPCR estimates into consideration in Tables 9 and 10. For the labor intensive sector we have that most estimates (except $IV_{5\text{-fe}}$) are positive, but only the two OLS estimates are significant. If we have reversed causality for this variable, the OLS estimates could in effect be measuring the positive effect of GVA on migration decisions. In this case the IV specifications could indicate that the effect of migration on gross value added (in the labor intensive sector) is zero or near-zero. The R-V and HO models gives no explanation why this might be so, as both predict a positive effect of net migration increases on production in the labor intensive sector.

Alternatively, as above we could have that the migration effects are influenced by factors

[37] This will be the case if migrants are attracted to regions with larger turnover revenue in the capital intensive sector.

not included in the formal models. For instance, if migrants are above-average skilled, and skilled labor is more complementary to capital than unskilled labor is, we might have that this complementarity would benefit the capital intensive sector relatively more. Also, native labor market attrition from immigration would bias the estimates negatively. In addition, if the panels are correlated, the CPCR estimates would be the appropriate specifications to consider, and it could be that these estimates (however small) are significantly different from zero (we do not know, since standard errors for these specifications are unavailable). In sum, I consider it difficult to conclude with certainty what the effects of migration on gross value added in the labor intensive sector are. The estimates are generally positive, but the lack of significance could indicate that the actual effect is zero.

Considering the gross value added in the capital intensive sector, we recognize the pattern from the turnover revenue regressions in that assuming CPCR completely changes the sign of the predicted migration effect. The CPCR estimates in Table 10 are all negative, whereas the non-CPCR estimates are all positive (and the three IV estimates are all significant). If we assume cross-panel correlation, we have that a larger net migration share is expected to decrease GVA in the capital intensive sector, in accordance with HO theory (but not the R-V model). This would then indicate that the long-term structural variables (notably capital exchange between the sectors) require no more than a year to adjust to migration shocks. If we assume that the county gross value observations are independent of each other, Table 10 shows a clear positive effect of immigration in the capital intensive sector (something which would accord with the short-term R-V model).

Interestingly, for the non-CPCR specifications in the capital intensive sector we have that the IV estimates appear to correct for a *negative* bias in the OLS variable, with OLS_{fe} estimated to 0.299 (insignificant) and the preferred IV specification (from an exogeneity point of view) $\text{IV}_{\text{3-fe}}$ to 2.593 (significant at the 1% level). I cannot readily think of any variables that would cause this under-estimation, either through reversed causality or omitted variable bias. The omitted variable bias would have to occur because of some factor that is correlated with the net migration share m, but not with any of the three instruments. It is worth noting that the instruments are all considered to be possibly endogenous from the J-tests in Table 4, meaning that we should perhaps not place too much emphasis on these IV results. As with gross value added in the labor intensive sector, we find that it is difficult to state with certainty the effects of labor migration.

For the capital intensive sector (although not for the labor intensive sector), we have that a possible reason for the inconclusiveness of the GVA estimation is that the economy is between the short and the long term. The actual coefficient on GVA in the capital intensive sector would then be somewhere in between sligthly positive (in accordance with the R-V model) and clearly negative (from the HO model), and attempting to estimate this coefficient in this instance could be a confusing exercise. However, since this inference results from the assumed gradual movement of capital and labor from the capital intensive to the labor intensive sector, we should have that these effects also show up in the corresponding coefficients for the labor intensive sector. This does not appear to be the case, hence leaving this idea with only weak support in the data.

Again, we cannot conclude decisively what the migration effects are. However, since the non-CPCR IV estimates appear to correct for an apparently unexplainable negative bias, and Moran's I does provide indication that panels may be correlated, I am inclined to say that the CPCR estimates are the more suitable. These indicate (in accordance with HO theory) that larger net migration shares cause falling GVA in the capital intensive sector. This would in turn indicate that structural variables within a year stabilize in a long-term equilibrium, or that they are on their way in reaching such an equilibrium. It could also be relevant when interpreting the GVA estimates that eight ISIC sectors have been excluded from this variable's dataset. This could potentially bias the estimates and weaken the predictive value that the theoretical models can be expected to have for the GVA observations.

6.5 Employment

For most of the dependent sectoral variables it could be reasonable to expect the level of cross-county correlation to be approximately the same in both sectors. This is however not the case for the employment variable. Here we have that the labor intensive sector show fewer signs of cross-panel correlation (Moran period average p-value of 0.339) than the capital intensive sector does (p-value of 0.099). If public sector workers typically work in the labor intensive sector, one possible explanation for this could be that these workers are more insensitive to economic shocks originating in neighboring counties than those in the private sector, hence causing less correlation between the panels. Regardless of the reason for the difference in p-values, we find that for the labor intensive sector we should consider both CPCR and non-CPCR estimates, while for the capital intensive sector it is safer to exclude the non-CPCR specifications.

From Table 11 we have that few of the estimated migration coefficients for the labor intensive sector are significant. Both OLS estimates are close to zero, as are two of the CPCR IV estimates ($IV_{\text{1-man}}$ and $IV_{\text{2-man}}$). However, two of the non-CPCR IV estimates ($IV_{\text{1-fe}}$ and $IV_{\text{2-fe}}$) are significantly positive at the 10% level, in accordance with both R-V and HO theory. These IV estimates appear to correct for a negative bias in the OLS estimate. As for GVA in the capital intensive sector, I cannot think of any variables that could reasonably cause this bias, indicating that these findings should be interpreted with some caution. In sum, it would appear that the net migration share's effect on employment in the labor intensive sector could be close to zero; at least we have found nothing which can conclusively refute such a claim.

Given the strong indication that employment in the capital intensive sector is correlated across counties, I choose to focus on the CPCR estimates in Table 12. The OLS variant of these estimates assumes a negative value of approximately -0.6 and is significant at the 1% level. Also the three chosen CPCR IV specifications assume negative values that range from -0.376 ($IV_{7\text{-man}}$) to -1.375 ($IV_{3\text{-man}}$). From Table 4 we have that the testable non-CPCR equivalents of these estimates (i.e. $IV_{1\text{-fe}}$ and $IV_{3\text{-fe}}$) most likely are exogenous to capital intensive sector employment. If this exogeneity holds for the CPCR estimates, we have that migration is predicted to have a negative effect on employment in the capital intensive sector, with coefficients suggesting that a one percent increase in the net migration share will lead to a fall in employment of more than 0.6%. Comparing the CPCR IV estimates and the OLS estimate, we have that two of the instrument compostions ($IV_{1\text{-fe}}$ and $IV_{3\text{-fe}}$) appear to correct for a positive OLS bias.

The employment findings for the capital intensive sector seem to lend support to the HO model, indicating that this variable is nearing a long-term equilibrium. However, if the HO model is indeed applicable for this variable, we ought perhaps to have found stronger support for the same theory in the labor intensive employment data. The reason for this deviation might again lie in factors that are not accounted for in the formalized models presented above. For instance, if the labor market is not perfectly competetive, the movement of labor between the two sectors might be less fluid than the theory assumes. This would slow down the adaptation process to the migration shock, and possibly also yield unpredicted results. For instance, if the sectors do not adhere to perfect competition principles in their use of labor, workers could be difficult to fire. Most of the migration data for Romanian counties are observations of emigration, something which implies that the HO model expects most observations of employment changes in the labor intensive sector to consist of reductions in labor (not increases). If employment protection is significant, these employment decreases would not actually take place, and the estimated coefficients would then yield a weaker link between migration and employment than predicted by the R-V and HO models for the labor intensive sector. However, given that the process of hiring new workers is not hindered by government regulation (it might even be encouraged), most observations for employment changes in the capital intensive sector will (if the HO theory is correct) consist of positive observations. This would imply that the estimated coefficient for the capital intensive sector is negative, i.e. that immigration (the more uncommon direction of migration in Romania) causes decreased employment in this sector. In the presence of employment reduction barriers (i.e. labor market regulations) we could therefore have that the employment findings are consistent with HO theory.

6.6 Investments

Investments appear to be correlated across counties, with the period average Moran p-values being 0.009 in the labor intensive sector and 0.035 in the capital intensive sector. We will therefore consider the CPCR estimates for this variable. From Table 4 we have that all instrument compositions can be regarded as sufficiently exogenous, and we should therefore consider all CPCR IV specifications in Tables 13 and 14. For the labor intensive sector, we find that these estimates are remarkably stable; only ranging from 0.583 in $IV_{7\text{-man}}$ to 0.589 in $IV_{1\text{-man}}$. The OLS CPCR estimate is 1.1 (and significant at the 1% level), indicating that the instruments correct for a positive bias. Unfortunately, we do of course not know the significance of the CPCR IV estimates, but their stability and the positive bias they correct for in the (significant) OLS estimate fits very well with the predictions of HO theory. It could be worth noting that the HO model outlined above strictly speaking predicts no new production of capital, since the capital price is unaffected by migration in this model. Still, in the real world, it might be reasonable to think that the capital price instantly rises with immigration (as predicted by R-V theory), which incentivizes both a transfer of capital from the capital intensive sector as well as production of new capital in the long run (without such production being predicted by neither the R-V nor the HO model).[38] I argue that the core point of the HO model is not that new capital cannot be produced following a factor endowment shock such as migration. It is rather that such a shock is beneficial to the sector that uses that factor intensively and unfavorable to the sector that uses the other factor intensively. Therefore, I find the estimates in Table 13 to be well in line with HO theory.

Also for the capital intensive sector we have that the non-CPCR IV estimates are fairly stable. They are all negative, ranging from -0.750 ($IV_{1\text{-man}}$) to -0.866 ($IV_{5\text{-man}}$). The OLS_{pc} estimate is -0.608 (significant at the 1% level), indicating that the IV specifications might be correcting for a small positive bias. Like investments in the labor intensive sector, we have that these findings conform well with the predictions of HO theory.

Considering the temporality aspect surrounding this variable, we have that investments somehow represent a link between the long and the short term. The long-term result of a positive migration shock is predicted to be increased capital stocks in the labor intensive

[38]For the R-V model, this results from the assumption that capital supply is fixed in the short run. The R-V model does however not predict that capital supply cannot rise in the long run.

sector (and decreased stocks in the capital intensive sector), and a way to achieve such changes is by altering investments. The findings in Tables 13 and 14 do therefore not necessarily imply that we reach a long-run equilibrium after maximum one year (although this could also technically be the case), but they do tell us that one year is sufficient time for the structural variables to be well on their way in such adaptation.

7 Conclusion

This thesis began by considering previous studies of the effects of Romanian labor migration. We found that a common problem in these analyses is the lack of comprehensive migration data; how well educated the migrants are, what sectors they work in, their levels of work experience and so forth. The population surveys conducted every ten years provide us with fairly detailed information, but the time that lapses between each of these surveys and the patchiness of the sort of information collected in them give us little opportunity to study the relevant variables over time. This thesis has attempted to provide an as coherent and detailed analysis as possible of the migration effects with the data that is available. To my knowledge, there exist no freely available and relevant data series measured on the county level that have not been included in the empirical analysis. Therefore, while I do not argue that the estimates that have been calculated in this thesis are in any way perfect or exact, I do believe that it would be difficult to come up with alternatives that are much more suitable given the scarcity of data.

The three theories considered in this thesis have due to their different time perspectives altering expectations for what will happen to economic variables following a positive migration shock. The short-term labor and Ricardo-Viner models predict that wages will fall with larger net migration shares, while the return to capital rises. In the short term we assume that capital is both immobile between the sectors and inelastic in overall supply, making these relative factor price changes possible. The economic structure is predicted to change for the better for both sectors, with the intuitively appealing argument that more resources imply larger benefits for all as the reason. Production and employment are expected to rise in both sectors, and if we introduce a "medium" term, so will investments. However, due to labor's general inclination to move to the labor intensive sector, we expect these medium-term investments to accrue more to this sector. This in turn induces labor from the capital intensive sector to follow suit, causing a fall in both employment and investments in this sector as time progresses. Over the long term, the Heckscher-Ohlin model therefore expects the capital intensive sector to lose and the labor intensive sector to gain from positive net migration rates. These structural changes will in turn facilitate a change in factor prices back to pre-migration levels.

Since the independent variable of our analysis is the net migration share, we have that most of its observations in the Romanian case will be negative. We can therefore expect that the migration-related changes that have taken place have the opposite signs of what is shown in Tables 6-14. We have that the investment findings show strong concordance with HO theory, indicating that this variable reaches at least medium-term adaptation within a year after a migration shock. I argue that both the turnover revenue and employment coefficients seem to support the predictions of HO theory, the latter especially if we assume that labor market regulations reduce the ease with which workers are fired. The findings for gross value added are less clear-cut, and it could be that migration has no effect on this variable. However, GVA observations exclude eight of nineteen ISIC industries, hence rendering these findings less trustworthy than those of the other variables. If we then assume that the structural variables overall adjust approximately according to HO theory, we have that one year is sufficient time for the economy to find a long- or near long-term equilibrium. Our models then predict that migration's effect on earnings will be zero, something which the estimated coefficients in Table 6 could support. However, mechanisms that have not been accounted for in the HO model above are also likely to influence this variable, so we cannot conclude with certainty.

The large-scale exodus from Romania that has taken place over the past years therefore seems to have caused a decline in revenue in the labor intensive sector, matched by a revenue increase in the capital intensive sector. Employment in the labor intensive sector does not appear to have fallen, whereas employment in the capital intensive sector has increased. Emigration is likely to have caused a rise in investments in the capital intensive sector and a fall in the labor intensive sector. The different findings for employment and investments could be due to differences in the degree of liberalization of these factor markets. This is of course only speculation, but it might seem reasonable that the labor market is less liberalized than the market for capital, hence making adaptation in capital easier than changes (especially reductions) in employment. Furthermore, we find a strong positive correlation between migration and earnings, but we cannot say with any certainty that this is because migration has caused wages to increase. For the earnings and gross value added variables, our findings are therefore less conclusive.

References

Anderson, James E. (2011). "The Gravity Model". *Annual Review of Economics*, 3, 133-160

Baldwin-Edwards, Martin (2008). "Migration Policies for a Romania within the European Union: Navigating between Scylla and Charybdis" in (eds.) Grigore Silai and Ovidiu Laurian Simina: *Migration, Mobility and Human Rights at the Eastern Border of the European Union Space of Freedom and Security.* Editura Universitatii de Vest, Timisoara

Ban, Cornel (2012). "Economic Transnationalism and its Ambiguities: The Case of Romanian Migration to Italy". *International Migration*, 50(6), 129-149

Card, David (2001). "Immigrant Inflows, Native Outflows, and the Local Market Impacts of Higher Immigration". *Journal of Labor Economics*, 19(1), 22-64

Card, David (2007). "How Immigration Affects U.S. Cities." CReAM Discussion Paper no. 11/07, University College London

Boboc, Cristina, Valentina Vasile, Simona Ghita & Mihaela Covrig (2014). "Romanian Labour Migration: Employees Perspective". *Procedia Economics and Finance*, 10, 244-248

Borjas, George J. (2003). "The Labor Demand Curve *Is* Downward Sloping: Reexamining the Impact of Immigration on the Labor Market". *Quarterly Journal of Economics*, 118(4), 1335-1374

Borjas, George J., Richard B. Freeman, & Lawrence Katz (1996). "Searching for the Effect of Immigration on the Labor Market". *American Economic Review*, 86(2), 246-251

Bratsberg, Bernt, Oddbjørn Raaum, Marianne Røed & Pål Schøne (2014). "Immigration Wage Effects by Origin". *Scandinavian Journal of Economics*, 116(2), 356-393

Calcagno, Peter T., Frank Hefner & Marcus Dan (2006). "Restructuring Before Privatization - Putting the Cart Before the Horse: A Case Study of the Steel Industry in Romania". *Quarterly Journal of Austrian Economics*, 9(1), 27-45

Ciutacu, Constantin & Luminita Chivu (2007). *Quality of Work and Employment in Romania.* European Foundation for the Improvement of Living and Working Conditions, Bucharest

Dixit, Avinash & Victor Norman (1980). *Theory of International Trade. A Dual, General Equilibrium Approach.* Cambridge Economic Handbooks, Cambridge University Press

Dustmann, Christian, Tommaso Frattini & Ian Preston (2013). "The Effect of Immigration along the Distribution of Wages". *Review of Economic Studies*, 80(1), 145-173

Dustmann, Christian, Tommaso Frattini & Anna Rosso (2015). "The Effect of Emigration from Poland on Polish Wages". *Scandinavian Journal of Economics*, 117(2), 522-564

Elrick, Tim & Oana Ciobanu (2009). "Migration Networks and Policy Impacts: Insights from Romanian-Spanish Migrations". *Global Networks*, 9(1), 100-116

Feenstra, Robert C. (2004). *Advanced International Trade. Theory and Evidence.* Princeton University Press

Financial Times (2014, January 16). *Romanian Labour Minister Warns of Disastrous Skills Exodus.* URL: www.ft.com/intl/cms/s/0/6223da90-7ece-11e3-8642-00144feabdc0.html#axzz3oSRDuPqu. Accessed on October 13, 2015

Friedberg, Rachel M. & Jennifer Hunt (1995). "The Impact of Immigrants on Host Country Wages, Employment and Growth". *The Journal of Economic Perspectives*, 9(2), 23-44

Gaston, Noel & Douglas R. Nelson (2011). "Bridging Trade Theory and Labour Econometrics: The Effects of International Migration". *Journal of Economic Surveys*, 27(1), 98-139

Gonzales, Libertad & Francesc Ortega (2011). "How do very open economies adjust to large immigration flows? Evidence from Spanish regions". *Labour Economics*, 18(1), 57-70

Greenwood, Michael J. (1975). "Research on Internal Migration in the United States: A Survey". *Journal of Economic Literature*, 13(2), 397-433

Hanson, Gordon H. & Matthew J. Slaughter (2002). "Labor-market adjustment in open economies. Evidence from US states". *Journal of International Economics*, 57, 3-29

Harrigan, James (1997). "Technology, Factor Supplies and International Specialization: Estimating the Neoclassical Model". *American Economic Review*, 87(4). 475-494

IOM (2015). *Annual Report 2014.* IOM Romania

Krieger, Hubert (2004). *Migration Trends in an Enlarged Europe.* European Foundation for the Improvement of Living and Working Conditions, Dublin

Leamer, Edward E. (1995). "The Heckscher-Ohlin Model in Theory and Practice". *Princeton Studies in International Finance*, 77. Princeton University

Lewis, Ethan (2013). "Immigration and Production Technology". *Annual Review of Economics*, 5, 165-191

Molho, Ian (1986). "Theories of Migration: A Review". *Scottish Journal of Political Economy*, 33(4), 396-419

Naterstad, Svanhild (2012). *Romania.* (In Norwegian). Akademika forlag, Trondheim

OECD (2013). *International Migration Outlook 2013.* OECD Publishing

Ottaviano, Gianmarco I. P. & Giovanni Peri (2012). "Rethinking the Effect of Immigration on Wages". *Journal of the European Economic Association*, 10(1), 152-197

Potot, Swanie (2008). "Romanian Migration Movements: Networks as Informal Transnational Organisations" in (eds.) Corrado Bonifazi, Marek Okolski, Jeannette Schoorl & Patrick Simon: *International Migration in Europe. New Trends and Methods of Analysis.* Amsterdam University Press

Sandu, Dumitru (2005a). "Emerging Transnational Migration from Romanian Villages". *Current Sociology*, 53(4), 555-582

Sandu, Dumitru (2005b). "Dynamics of Romanian Emigration After 1989: From a Macro- to a Micro-Level Approach". *International Journal of Sociology*, 35(3), 36-56

Stan, Sabina (2009). "Romanian Migration to Spain and Its Impact on the Romanian Labour Market". Working paper no. 14, Centre d'Estudis Sociologics sobre la vida Quotidiana I el Treball, Universitat Autonoma de Barcelona

Stan, Sabina & Roland Erne (2014). "Explaining Romanian Labor Migration. From Development Gaps to Development Trajectories". *Labor History*, 55(1), 21-46

Stock, James H. & Mark W. Watson (2015). *Introduction to Econometrics. Updated Third Edition.* Pearson Education Ltd., Harlow

The Telegraph (2014, September 5). *Immigration to Britain 'Cuts Romanian Unemployment.* URL: www.telegraph.co.uk/news/uknews/immigration/11076853/Immigration-to-Britain-cuts-Romanian-unemployment.html. Accessed on October 13, 2015

UCLA (2015). "FAQ: How can I detect/address spatial autocorrelation in my data?". Institute for Digital Research and Education, University of California. URL: www.ats.ucla.edu/stat/mult_pkg/faq/general/spatial_autocorr.htm (accessed on October 10, 2015)

Vasile, Valentina (2014). "Labour Mobility Impact on Sending Countries. Romanian EU Workers Case Study". *Procedia Economics and Finance*, 8, 737-746

Appendix

Full Regression Tables

This appendix presents the results from all sixteen regression specifications. Each table is split in two; the first part contains the two OLS specifications and the seven non-CPCR IV specifications, and the second part shows the IV CPCR specifications. The numbering of the IV specifications consistently refers to the same instrument compositions in all tables.

Table A.1: Regression Results - Log Earnings

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-}fe}$	$IV_{2\text{-}fe}$	$IV_{3\text{-}fe}$	$IV_{4\text{-}fe}$	$IV_{5\text{-}fe}$	$IV_{6\text{-}fe}$	$IV_{7\text{-}fe}$
Net Migration Share	1.024***	0.423***	2.358***	2.400***	1.263	3.740***	4.059***	5.015	1.236
	(0.229)	(0.0713)	(0.561)	(0.568)	(0.812)	(0.775)	(0.832)	(20.47)	(0.820)
Log GDP per capita	0.159***	0.202***	0.142***	0.142***	0.153***	0.125***	0.121***	0.0576	0.154***
	(0.0265)	(0.0209)	(0.0329)	(0.0330)	(0.0331)	(0.0368)	(0.0380)	(0.522)	(0.0333)
Unemployment	-0.167	0.906***	-0.370*	-0.369*	-0.167	-0.349	-0.344	-0.156	-0.167
	(0.134)	(0.199)	(0.205)	(0.205)	(0.134)	(0.226)	(0.233)	(0.183)	(0.134)
Urban Share	-0.385***	-0.303***	-0.219	-0.214	-0.371**	-0.0501	-0.0111	-0.147	-0.372**
	(0.148)	(0.0331)	(0.238)	(0.239)	(0.155)	(0.269)	(0.278)	(1.238)	(0.155)
Log Population Density	0.403***	0.0866***	-0.0740	-0.0858	0.323	-0.464**	-0.554**	-0.929	0.332
	(0.109)	(0.00252)	(0.175)	(0.176)	(0.282)	(0.233)	(0.249)	(6.828)	(0.284)
Share of Women	-9.716***	-10.77***	-9.060**	-9.028**	-9.354***	-8.005*	-7.762	-3.664	-9.396***
	(3.282)	(1.667)	(4.337)	(4.347)	(3.492)	(4.804)	(4.950)	(31.32)	(3.496)
Log Graduations	-0.00286	0.0125***	-0.0204***	-0.0206***	-0.00302	-0.0251***	-0.0262***	-0.00558	-0.00300
	(0.00499)	(0.000817)	(0.00720)	(0.00722)	(0.00503)	(0.00811)	(0.00838)	(0.0154)	(0.00502)
Share under 25	-0.776	-1.700***	-1.697*	-1.700*	-0.785	-1.791*	-1.813*	-0.917	-0.784
	(0.516)	(0.501)	(0.936)	(0.938)	(0.517)	(1.034)	(1.065)	(0.985)	(0.517)
Share over 64	-1.941**	0.308	-0.277	-0.264	-1.881**	0.174	0.278	-0.939	-1.888**
	(0.874)	(0.355)	(1.108)	(1.111)	(0.896)	(1.234)	(1.272)	(5.262)	(0.896)
County fixed effects	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	510	510	358	358	510	358	358	510	510

Instruments used in: -IV_1: $mino$, w^* and m_{t-4}; -IV_2: $mino$ and m_{t-4}; -IV_3: $mino$ and w^*; -IV_4: m_{t-4} and w^*; -IV_5: m_{t-4}; -IV_6: w^*; -IV_7: $mino$

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlation. Standard errors in parentheses. * p< 0.10, ** p< 0.05, *** p< 0.01. Table continues on next page.

Table A.1 (cont.): Regression Results - Log Earnings

	$IV_{1\text{-man}}$	$IV_{2\text{-man}}$	$IV_{3\text{-man}}$	$IV_{4\text{-man}}$	$IV_{5\text{-man}}$	$IV_{6\text{-man}}$	$IV_{7\text{-man}}$
Net Migration Share	0.436	0.408	-0.302	0.436	0.406	-3.520	2.271
Log GDP per capita	0.233	0.238	0.318	0.233	0.239	0.836	-0.0955
Unemployment	0.770	0.765	0.935	0.770	0.765	1.061	0.834
Urban Share	-0.252	-0.250	-0.227	-0.252	-0.250	0.108	-0.496
Log Population Density	0.0841	0.0836	0.0744	0.0841	0.0836	0.0206	0.118
Share of Women	-10.15	-9.897	-3.879	-10.15	-9.884	26.69	-28.32
Log Graduations	0.0111	0.0110	0.0114	0.0111	0.0110	0.00645	0.0154
Share under 25	-0.750	-0.746	-1.532	-0.750	-0.746	-0.791	-2.125
Share over 64	1.192	1.159	-0.521	1.192	1.158	-4.199	2.419
County fixed effects	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	358	358	510	358	358	510	510
Instruments used in	-IV_1: *mino*, w^* and m_{t-4}		-IV_2: *mino* and m_{t-4}		-IV_3: *mino* and w^*		
	-IV_4: m_{t-4} and w^*		-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: *mino*

Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates.

Table A.2: Regression Results - Log Turnover Revenue in Labor Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{2\text{-fe}}$	$IV_{3\text{-fe}}$	$IV_{4\text{-fe}}$	$IV_{5\text{-fe}}$	$IV_{6\text{-fe}}$	$IV_{7\text{-fe}}$
Net Migration Share	0.0187	2.107***	-0.779	-0.149	-10.06*	-0.804	0.367	-8.175	-11.99
	(0.921)	(0.222)	(2.000)	(2.124)	(5.622)	(2.000)	(2.135)	(6.459)	(7.742)
Log GDP per capita	-0.106	0.162*	-0.100	-0.104	-0.0363	-0.0999	-0.108	-0.0493	-0.0231
	(0.120)	(0.0854)	(0.121)	(0.121)	(0.167)	(0.121)	(0.121)	(0.156)	(0.185)
Unemployment	0.738	-8.737***	0.652	0.720	-0.350	0.649	0.776	-0.147	-0.559
	(0.878)	(1.579)	(0.901)	(0.902)	(1.329)	(0.901)	(0.903)	(1.292)	(1.538)
Urban Share	3.242	-0.777***	2.602	3.108	-4.834	2.582	3.521	-3.325	-6.384
	(2.910)	(0.118)	(3.245)	(3.290)	(5.903)	(3.246)	(3.295)	(6.253)	(7.473)
Log Population Density	-0.306	0.542***	-0.148	-0.273	1.689	-0.143	-0.375	1.316	2.072
	(0.275)	(0.00562)	(0.447)	(0.468)	(1.148)	(0.447)	(0.470)	(1.305)	(1.563)
Share of Women	-4.552	-24.60***	-4.265	-4.492	-0.925	-4.256	-4.678	-1.603	-0.229
	(18.32)	(7.371)	(18.38)	(18.33)	(24.90)	(18.38)	(18.34)	(22.94)	(27.24)
Log Graduations	-0.0235	0.141***	-0.0244	-0.0237	-0.0340	-0.0244	-0.0232	-0.0320	-0.0360
	(0.0374)	(0.0147)	(0.0375)	(0.0374)	(0.0510)	(0.0375)	(0.0374)	(0.0470)	(0.0558)
Share under 25	11.52**	-7.755***	11.86**	11.59**	15.78**	11.87**	11.37**	14.99**	16.60**
	(4.864)	(0.886)	(4.934)	(4.932)	(6.988)	(4.935)	(4.934)	(6.632)	(7.886)
Share over 64	0.943	0.0292	0.605	0.872	-3.327	0.594	1.090	-2.529	-4.147
	(4.244)	(0.863)	(4.321)	(4.321)	(6.204)	(4.322)	(4.324)	(5.936)	(7.061)
County fixed effects	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197	197	197
Instruments used in	-IV_1: *mino*, w^* and m_{t-4}		-IV_2: *mino* and m_{t-4}		-IV_3: *mino* and w^*		-IV_4: m_{t-4} and w^*		
	-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: *mino*				

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlation. Standard errors in parentheses. * p< 0.10, ** p< 0.05, *** p< 0.01. Table continues on next page.

Table A.2 (cont.): Regression Results - Log Turnover Revenue in Labor Intensive Sector

	$IV_{1\text{-man}}$	$IV_{2\text{-man}}$	$IV_{3\text{-man}}$	$IV_{4\text{-man}}$	$IV_{5\text{-man}}$	$IV_{6\text{-man}}$	$IV_{7\text{-man}}$
Net Migration Share	1.603	1.570	0.337	1.593	1.570	-0.770	1.223
Log GDP per capita	0.270	0.277	0.525	0.272	0.277	0.698	0.376
Unemployment	-9.078	-9.110	-10.14	-9.079	-9.112	-10.03	-9.999
Urban Share	-0.798	-0.802	-0.814	-0.799	-0.802	-0.697	-0.912
Log Population Density	0.530	0.529	0.510	0.530	0.529	0.491	0.524
Share of Women	-21.00	-20.76	-12.10	-20.89	-20.77	-1.415	-19.66
Log Graduations	0.140	0.140	0.134	0.140	0.140	0.132	0.136
Share under 25	-8.056	-8.084	-8.700	-8.058	-8.085	-8.474	-8.870
Share over 64	-1.004	-1.058	-2.944	-1.022	-1.058	-4.311	-2.055
County fixed effects	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197
Instruments used in	-IV_1: *mino*, w^* and m_{t-4}		-IV_2: *mino* and m_{t-4}		-IV_3: *mino* and w^*		
	-IV_4: m_{t-4} and w^*		-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: *mino*

Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates.

Table A.3: Regression Results - Log Turnover Revenue in Capital Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{2\text{-fe}}$	$IV_{3\text{-fe}}$	$IV_{4\text{-fe}}$	$IV_{5\text{-fe}}$	$IV_{6\text{-fe}}$	$IV_{7\text{-fe}}$
Net Migration Share	2.041	-0.605***	0.164	2.041	7.366	0.218	1.210	-6.031	21.13*
	(1.298)	(0.0545)	(2.831)	(2.993)	(6.180)	(2.830)	(3.012)	(8.231)	(11.69)
Log GDP per capita	0.287*	0.881***	0.299*	0.287*	0.250	0.299*	0.292*	0.342*	0.155
	(0.169)	(0.0461)	(0.171)	(0.170)	(0.183)	(0.171)	(0.170)	(0.198)	(0.279)
Unemployment	-0.235	-6.126***	-0.438	-0.235	0.339	-0.432	-0.325	-1.107	1.825
	(1.237)	(0.983)	(1.275)	(1.271)	(1.461)	(1.275)	(1.273)	(1.646)	(2.321)
Urban Share	-14.23***	-1.212***	-15.74***	-14.23***	-9.964	-15.69***	-14.90***	-20.70***	1.065
	(4.101)	(0.139)	(4.595)	(4.635)	(6.489)	(4.593)	(4.648)	(7.969)	(11.28)
Log Population Density	-0.468	0.355***	-0.0963	-0.468	-1.522	-0.107	-0.303	1.131	-4.248*
	(0.388)	(0.0390)	(0.632)	(0.660)	(1.262)	(0.632)	(0.664)	(1.663)	(2.360)
Share of Women	-128.7***	-2.589	-128.0***	-128.7***	-130.6***	-128.1***	-128.4***	-125.8***	-135.6***
	(25.81)	(7.490)	(26.02)	(25.83)	(27.38)	(26.01)	(25.87)	(29.24)	(41.12)
Log Graduations	0.0985*	0.183***	0.0965*	0.0985*	0.104*	0.0966*	0.0976*	0.0901	0.118
	(0.0526)	(0.0100)	(0.0531)	(0.0527)	(0.0560)	(0.0531)	(0.0528)	(0.0599)	(0.0843)
Share under 25	9.743	-12.44***	10.54	9.743	7.491	10.51	10.09	13.16	1.672
	(6.855)	(0.933)	(6.986)	(6.949)	(7.682)	(6.983)	(6.960)	(8.452)	(11.90)
Share over 64	5.233	-8.582***	4.438	5.233	7.489	4.460	4.881	1.812	13.32
	(5.981)	(0.826)	(6.118)	(6.089)	(6.819)	(6.116)	(6.099)	(7.565)	(10.66)
County fixed effects	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197	197	197
Instruments used in	-IV_1: *mino*, w^* and m_{t-4}		-IV_2: *mino* and m_{t-4}		-IV_3: *mino* and w^*		-IV_4: m_{t-4} and w^*		
	-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: *mino*				

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlation. Standard errors in parentheses. * p< 0.10, ** p< 0.05, *** p< 0.01. Table continues on next page.

Table A.3 (cont.): Regression Results - Log Turnover Revenue in Capital Intensive Sector

	$IV_{1\text{-man}}$	$IV_{2\text{-man}}$	$IV_{3\text{-man}}$	$IV_{4\text{-man}}$	$IV_{5\text{-man}}$	$IV_{6\text{-man}}$	$IV_{7\text{-man}}$
Net Migration Share	-0.809	-0.868	-3.588	-0.827	-0.868	-6.900	-0.953
Log GDP per capita	0.918	0.929	1.331	0.921	0.928	1.832	0.920
Unemployment	-6.262	-6.295	-5.794	-6.276	-6.295	-4.652	-5.838
Urban Share	-1.201	-1.198	-0.808	-1.200	-1.198	-0.506	-1.106
Log Population Density	0.353	0.352	0.308	0.353	0.352	0.251	0.350
Share of Women	-1.027	-0.587	24.93	-0.920	-0.584	61.78	1.199
Log Graduations	0.182	0.181	0.178	0.182	0.181	0.174	0.183
Share under 25	-12.49	-12.50	-11.68	-12.49	-12.50	-10.58	-12.02
Share over 64	-8.796	-8.879	-11.93	-8.820	-8.879	-16.23	-8.622
County fixed effects	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197

Instruments used in: -IV_1: $mino$, w^* and m_{t-4}; -IV_2: $mino$ and m_{t-4}; -IV_3: $mino$ and w^*; -IV_4: m_{t-4} and w^*; -IV_5: m_{t-4}; -IV_6: w^*; -IV_7: $mino$

Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates.

Table A.4: Regression Results - Log Gross Value Added in Labor Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{2\text{-fe}}$	$IV_{3\text{-fe}}$	$IV_{4\text{-fe}}$	$IV_{5\text{-fe}}$	$IV_{6\text{-fe}}$	$IV_{7\text{-fe}}$
Net Migration Share	1.559**	0.431**	0.512	0.492	0.934	-0.255	-0.421	1.590	0.929
	(0.668)	(0.169)	(1.787)	(1.804)	(2.370)	(2.251)	(2.353)	(46.13)	(2.395)
Log GDP per capita	0.399***	0.547***	0.393***	0.393***	0.415***	0.403***	0.405***	0.398	0.415***
	(0.0775)	(0.0554)	(0.105)	(0.105)	(0.0968)	(0.107)	(0.108)	(1.176)	(0.0972)
Unemployment	0.786**	-0.0162	0.891	0.891	0.785**	0.880	0.877	0.787*	0.785**
	(0.390)	(1.102)	(0.652)	(0.652)	(0.391)	(0.658)	(0.659)	(0.412)	(0.391)
Urban Share	-0.638	-0.0776	0.421	0.418	-0.676	0.327	0.307	-0.636	-0.676
	(0.431)	(0.162)	(0.757)	(0.758)	(0.453)	(0.781)	(0.787)	(2.790)	(0.453)
Log Population Density	0.883***	0.553***	1.131**	1.136**	1.092	1.347**	1.394**	0.873	1.094
	(0.317)	(0.00784)	(0.556)	(0.560)	(0.822)	(0.677)	(0.704)	(15.39)	(0.830)
Share of Women	32.56***	-26.31***	34.65**	34.63**	31.61***	34.06**	33.94**	32.60	31.60***
	(9.587)	(4.113)	(13.80)	(13.81)	(10.20)	(13.96)	(14.00)	(70.60)	(10.21)
Log Graduations	0.0114	0.192***	0.0114	0.0115	0.0118	0.0140	0.0146	0.0114	0.0118
	(0.0146)	(0.00638)	(0.0229)	(0.0229)	(0.0147)	(0.0236)	(0.0237)	(0.0347)	(0.0147)
Share under 25	-2.607*	-7.244***	-3.626	-3.625	-2.585*	-3.574	-3.563	-2.608	-2.585*
	(1.506)	(0.873)	(2.979)	(2.979)	(1.510)	(3.006)	(3.013)	(2.220)	(1.510)
Share over 64	-8.165***	-2.828*	-6.255*	-6.262*	-8.322***	-6.506*	-6.560*	-8.158	-8.323***
	(2.551)	(1.526)	(3.527)	(3.528)	(2.617)	(3.584)	(3.599)	(11.86)	(2.618)
County fixed effects	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	510	510	358	358	510	358	358	510	510

Instruments used in: -IV_1: $mino$, w^* and m_{t-4}; -IV_2: $mino$ and m_{t-4}; -IV_3: $mino$ and w^*; -IV_4: m_{t-4} and w^*; -IV_5: m_{t-4}; -IV_6: w^*; -IV_7: $mino$

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlation. Standard errors in parentheses. * $p< 0.10$, ** $p< 0.05$, *** $p< 0.01$. Table continues on next page.

Table A.4 (cont.): Regression Results - Log Gross Value Added in Labor Intensive Sector

	$IV_{1\text{-man}}$	$IV_{2\text{-man}}$	$IV_{3\text{-man}}$	$IV_{4\text{-man}}$	$IV_{5\text{-man}}$	$IV_{6\text{-man}}$	$IV_{7\text{-man}}$
Net Migration Share	0.318	0.239	-0.732	0.347	0.229	-17.73	12.86
Log GDP per capita	0.534	0.548	0.734	0.529	0.550	3.467	-1.452
Unemployment	-4.306	-4.320	0.0294	-4.301	-4.322	0.696	-0.504
Urban Share	0.204	0.210	0.0436	0.202	0.211	1.817	-1.375
Log Population Density	0.552	0.551	0.534	0.552	0.551	0.249	0.762
Share of Women	-38.92	-38.22	-15.27	-39.18	-38.13	146.2	-144.4
Log Graduations	0.202	0.202	0.190	0.202	0.202	0.164	0.211
Share under 25	-7.184	-7.173	-6.976	-7.189	-7.172	-3.059	-10.11
Share over 64	0.220	0.130	-4.157	0.254	0.118	-23.58	11.38
County fixed effects	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	358	358	510	358	358	510	510
Instruments used in	-IV_1: $mino$, w^* and m_{t-4}		-IV_2: $mino$ and m_{t-4}		-IV_3: $mino$ and w^*		
	-IV_4: m_{t-4} and w^*		-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: $mino$

Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates.

Table A.5: Regression Results - Log Gross Value Added in Capital Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{2\text{-fe}}$	$IV_{3\text{-fe}}$	$IV_{4\text{-fe}}$	$IV_{5\text{-fe}}$	$IV_{6\text{-fe}}$	$IV_{7\text{-fe}}$
Net Migration Share	0.299	-0.409***	1.316*	1.456**	2.593***	0.693	0.988	16.54	2.490***
	(0.249)	(0.0785)	(0.677)	(0.685)	(0.964)	(0.843)	(0.879)	(55.70)	(0.967)
Log GDP per capita	1.367***	0.817***	1.395***	1.393***	1.309***	1.402***	1.399***	0.954	1.312***
	(0.0289)	(0.0484)	(0.0397)	(0.0398)	(0.0393)	(0.0400)	(0.0402)	(1.420)	(0.0392)
Unemployment	0.0777	-1.466***	-0.400	-0.397	0.0843	-0.409*	-0.405	0.124	0.0840
	(0.146)	(0.528)	(0.247)	(0.248)	(0.159)	(0.246)	(0.246)	(0.498)	(0.158)
Urban Share	-0.0270	-0.268**	-0.0403	-0.0233	0.110	-0.117	-0.0805	0.943	0.104
	(0.161)	(0.104)	(0.287)	(0.288)	(0.184)	(0.292)	(0.294)	(3.368)	(0.183)
Log Population Density	1.021***	0.328***	0.828***	0.788***	0.256	1.004***	0.920***	-4.397	0.290
	(0.118)	(0.00709)	(0.211)	(0.213)	(0.334)	(0.253)	(0.263)	(18.58)	(0.335)
Share of Women	-2.668	-3.191	-4.219	-4.113	0.811	-4.695	-4.470	21.96	0.655
	(3.578)	(2.625)	(5.231)	(5.244)	(4.145)	(5.224)	(5.230)	(85.24)	(4.121)
Log Graduations	0.00895	0.134***	0.0124	0.0120	0.00738	0.0145*	0.0135	-0.00215	0.00745
	(0.00544)	(0.00653)	(0.00868)	(0.00871)	(0.00597)	(0.00882)	(0.00886)	(0.0419)	(0.00592)
Share under 25	1.744***	-0.746	1.491	1.481	1.663***	1.533	1.513	1.170	1.666***
	(0.562)	(0.674)	(1.129)	(1.132)	(0.614)	(1.125)	(1.126)	(2.680)	(0.609)
Share over 64	0.446	0.122	1.990	2.036	1.022	1.787	1.883	4.525	0.997
	(0.952)	(0.896)	(1.336)	(1.340)	(1.064)	(1.341)	(1.344)	(14.32)	(1.057)
County fixed effects	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	510	510	358	358	510	358	358	510	510
Instruments used in	-IV_1: $mino$, w^* and m_{t-4}		-IV_2: $mino$ and m_{t-4}		-IV_3: $mino$ and w^*		-IV_4: m_{t-4} and w^*		
	-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: $mino$				

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlation. Standard errors in parentheses. * p< 0.10, ** p< 0.05, *** p< 0.01. Table continues on next page.

Table A.5 (cont.): Regression Results - Log Gross Value Added in Capital Intensive Sector

	$IV_{1\text{-man}}$	$IV_{2\text{-man}}$	$IV_{3\text{-man}}$	$IV_{4\text{-man}}$	$IV_{5\text{-man}}$	$IV_{6\text{-man}}$	$IV_{7\text{-man}}$
Net Migration Share	-0.465	-0.494	-1.242	-0.458	-0.497	-6.685	3.112
Log GDP per capita	0.790	0.795	0.951	0.789	0.796	1.826	0.251
Unemployment	-4.101	-4.106	-1.434	-4.100	-4.106	-1.220	-1.604
Urban Share	-0.0831	-0.0810	-0.181	-0.0835	-0.0808	0.387	-0.636
Log Population Density	0.315	0.315	0.314	0.315	0.315	0.223	0.387
Share of Women	-7.725	-7.464	4.723	-7.780	-7.439	56.43	-36.63
Log Graduations	0.149	0.149	0.132	0.149	0.149	0.124	0.139
Share under 25	-0.481	-0.477	-0.554	-0.482	-0.476	0.700	-1.557
Share over 64	2.372	2.338	-0.830	2.379	2.334	-7.051	4.145
County fixed effects	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	358	358	510	358	358	510	510
Instruments used in	-IV_1: *mino*, w^* and m_{t-4}		-IV_2: *mino* and m_{t-4}		-IV_3: *mino* and w^*		
	-IV_4: m_{t-4} and w^*		-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: *mino*

Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates.

Table A.6: Regression Results - Log Employment in Labor Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{2\text{-fe}}$	$IV_{3\text{-fe}}$	$IV_{4\text{-fe}}$	$IV_{5\text{-fe}}$	$IV_{6\text{-fe}}$	$IV_{7\text{-fe}}$
Net Migration Share	0.106	-0.0497	1.343*	1.493*	0.506	1.342*	1.522*	0.204	0.817
	(0.318)	(0.0933)	(0.723)	(0.780)	(1.438)	(0.723)	(0.785)	(1.787)	(1.835)
Log GDP per capita	0.0325	0.153***	0.0240	0.0230	0.0298	0.0240	0.0228	0.0318	0.0276
	(0.0413)	(0.0507)	(0.0437)	(0.0442)	(0.0426)	(0.0436)	(0.0443)	(0.0430)	(0.0438)
Unemployment	0.0123	-7.655***	0.146	0.162	0.0555	0.146	0.165	0.0229	0.0890
	(0.303)	(1.111)	(0.326)	(0.331)	(0.340)	(0.326)	(0.332)	(0.357)	(0.364)
Urban Share	3.196***	0.196	4.187***	4.307***	3.516**	4.186***	4.331***	3.274*	3.765**
	(1.003)	(0.122)	(1.174)	(1.207)	(1.510)	(1.173)	(1.212)	(1.730)	(1.771)
Log Population Density	0.189**	0.406***	-0.0563	-0.0860	0.109	-0.0561	-0.0919	0.169	0.0479
	(0.0949)	(0.00808)	(0.162)	(0.172)	(0.294)	(0.162)	(0.173)	(0.361)	(0.371)
Share of Women	-9.708	-20.97***	-10.15	-10.21	-9.852	-10.15	-10.22	-9.743	-9.964
	(6.314)	(2.281)	(6.645)	(6.727)	(6.369)	(6.644)	(6.744)	(6.348)	(6.457)
Log Graduations	0.00215	0.193***	0.00343	0.00358	0.00256	0.00343	0.00361	0.00225	0.00288
	(0.0129)	(0.0137)	(0.0136)	(0.0137)	(0.0130)	(0.0136)	(0.0138)	(0.0130)	(0.0132)
Share under 25	1.490	-3.065***	0.967	0.904	1.321	0.968	0.891	1.449	1.190
	(1.677)	(0.748)	(1.784)	(1.810)	(1.787)	(1.784)	(1.815)	(1.835)	(1.869)
Share over 64	1.409	2.686***	1.933	1.997	1.579	1.933	2.009	1.451	1.710
	(1.463)	(0.443)	(1.563)	(1.586)	(1.587)	(1.562)	(1.590)	(1.642)	(1.674)
County fixed effects	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197	197	197
Instruments used in	-IV_1: *mino*, w^* and m_{t-4}		-IV_2: *mino* and m_{t-4}		-IV_3: *mino* and w^*		-IV_4: m_{t-4} and w^*		
	-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: *mino*				

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlation. Standard errors in parentheses. * p< 0.10, ** p< 0.05, *** p< 0.01. Table continues on next page.

Table A.6 (cont.): Regression Results - Log Employment in Labor Intensive Sector

	$IV_{1\text{-man}}$	$IV_{2\text{-man}}$	$IV_{3\text{-man}}$	$IV_{4\text{-man}}$	$IV_{5\text{-man}}$	$IV_{6\text{-man}}$	$IV_{7\text{-man}}$
Net Migration Share	-0.124	-0.138	-0.200	-0.119	-0.140	-3.111	2.124
Log GDP per capita	0.167	0.169	0.175	0.166	0.170	0.626	-0.210
Unemployment	-7.705	-7.714	-7.626	-7.702	-7.715	-7.140	-7.362
Urban Share	0.197	0.198	0.218	0.197	0.198	0.514	-0.0404
Log Population Density	0.405	0.405	0.404	0.405	0.405	0.355	0.442
Share of Women	-20.41	-20.30	-19.55	-20.45	-20.29	9.695	-39.70
Log Graduations	0.193	0.193	0.193	0.193	0.193	0.189	0.197
Share under 25	-3.090	-3.094	-3.016	-3.088	-3.095	-2.318	-3.421
Share over 64	2.584	2.564	2.524	2.592	2.561	-1.118	5.016
County fixed effects	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197

Instruments used in: -IV_1: $mino$, w^* and m_{t-4}; -IV_2: $mino$ and m_{t-4}; -IV_3: $mino$ and w^*; -IV_4: m_{t-4} and w^*; -IV_5: m_{t-4}; -IV_6: w^*; -IV_7: $mino$

Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates.

Table A.7: Regression Results - Log Employment in Capital Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{2\text{-fe}}$	$IV_{3\text{-fe}}$	$IV_{4\text{-fe}}$	$IV_{5\text{-fe}}$	$IV_{6\text{-fe}}$	$IV_{7\text{-fe}}$
Net Migration Share	-0.0992	-0.597***	0.453	0.403	0.946	0.454	0.378	0.931	0.961
	(0.221)	(0.0908)	(0.490)	(0.520)	(1.072)	(0.490)	(0.521)	(1.337)	(1.355)
Log GDP per capita	0.0257	-0.201***	0.0219	0.0222	0.0185	0.0219	0.0224	0.0186	0.0184
	(0.0288)	(0.0687)	(0.0296)	(0.0295)	(0.0318)	(0.0296)	(0.0294)	(0.0322)	(0.0323)
Unemployment	0.00253	-7.310***	0.0621	0.0567	0.115	0.0622	0.0541	0.114	0.117
	(0.211)	(1.430)	(0.221)	(0.221)	(0.253)	(0.221)	(0.220)	(0.267)	(0.269)
Urban Share	-0.773	-0.431***	-0.331	-0.371	0.0640	-0.330	-0.391	0.0521	0.0763
	(0.700)	(0.125)	(0.795)	(0.805)	(1.126)	(0.795)	(0.805)	(1.294)	(1.308)
Log Population Density	0.0243	0.279***	-0.0851	-0.0751	-0.183	-0.0853	-0.0703	-0.180	-0.186
	(0.0662)	(0.0128)	(0.109)	(0.115)	(0.219)	(0.109)	(0.115)	(0.270)	(0.274)
Share of Women	-14.66***	-4.858	-14.86***	-14.84***	-15.04***	-14.86***	-14.83***	-15.03***	-15.04***
	(4.404)	(3.288)	(4.502)	(4.486)	(4.750)	(4.502)	(4.479)	(4.749)	(4.768)
Log Graduations	0.0119	0.178***	0.0125	0.0125	0.0130	0.0125	0.0124	0.0130	0.0130
	(0.00898)	(0.0140)	(0.00919)	(0.00916)	(0.00972)	(0.00919)	(0.00914)	(0.00973)	(0.00977)
Share under 25	3.651***	-2.081*	3.418***	3.439***	3.209**	3.417***	3.450***	3.216**	3.203**
	(1.170)	(1.204)	(1.209)	(1.207)	(1.333)	(1.209)	(1.205)	(1.373)	(1.380)
Share over 64	1.345	4.643***	1.579	1.558	1.788	1.579	1.547	1.781	1.794
	(1.021)	(0.684)	(1.059)	(1.057)	(1.183)	(1.059)	(1.056)	(1.229)	(1.236)
County fixed effects	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197	197	197

Instruments used in: -IV_1: $mino$, w^* and m_{t-4}; -IV_2: $mino$ and m_{t-4}; -IV_3: $mino$ and w^*; -IV_4: m_{t-4} and w^*; -IV_5: m_{t-4}; -IV_6: w^*; -IV_7: $mino$

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlation. Standard errors in parentheses. * p< 0.10, ** p< 0.05, *** p< 0.01. Table continues on next page.

Table A.7 (cont.): Regression Results - Log Employment in Capital Intensive Sector

	$IV_{1\text{-man}}$	$IV_{2\text{-man}}$	$IV_{3\text{-man}}$	$IV_{4\text{-man}}$	$IV_{5\text{-man}}$	$IV_{6\text{-man}}$	$IV_{7\text{-man}}$
Net Migration Share	-0.615	-0.631	-1.375	-0.619	-0.631	-2.631	-0.376
Log GDP per capita	-0.200	-0.198	-0.101	-0.200	-0.198	0.0893	-0.257
Unemployment	-7.320	-7.327	-6.938	-7.325	-7.326	-6.502	-6.955
Urban Share	-0.423	-0.421	-0.276	-0.422	-0.421	-0.162	-0.390
Log Population Density	0.280	0.279	0.267	0.280	0.279	0.246	0.283
Share of Women	-4.684	-4.561	2.998	-4.671	-4.557	16.99	-6.006
Log Graduations	0.178	0.178	0.178	0.178	0.178	0.176	0.180
Share under 25	-2.056	-2.056	-1.634	-2.058	-2.055	-1.213	-1.760
Share over 64	4.701	4.679	3.945	4.696	4.679	2.316	5.203
County fixed effects	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197
Instruments used in	-IV_1: $mino$, w^* and m_{t-4}		-IV_2: $mino$ and m_{t-4}		-IV_3: $mino$ and w^*		
	-IV_4: m_{t-4} and w^*		-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: $mino$

Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates.

Table A.8: Regression Results - Log Investments in Labor Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{2\text{-fe}}$	$IV_{3\text{-fe}}$	$IV_{4\text{-fe}}$	$IV_{5\text{-fe}}$	$IV_{6\text{-fe}}$	$IV_{7\text{-fe}}$
Net Migration Share	1.537	1.100***	-6.677	-5.862	-10.05	-6.677	-5.781	-12.32	-7.714
	(2.892)	(0.301)	(6.437)	(6.821)	(13.74)	(6.437)	(6.850)	(17.53)	(17.01)
Log GDP per capita	0.175	0.209*	0.231	0.226	0.255	0.231	0.225	0.270	0.238
	(0.376)	(0.114)	(0.389)	(0.387)	(0.407)	(0.389)	(0.387)	(0.422)	(0.406)
Unemployment	-1.783	-10.63***	-2.670	-2.582	-3.034	-2.670	-2.573	-3.279	-2.782
	(2.757)	(2.531)	(2.900)	(2.896)	(3.247)	(2.900)	(2.896)	(3.505)	(3.378)
Urban Share	18.35**	-0.205*	11.77	12.42	9.063	11.76	12.48	7.242	10.93
	(9.137)	(0.118)	(10.45)	(10.56)	(14.42)	(10.45)	(10.57)	(16.97)	(16.42)
Log Population Density	-0.383	0.598***	1.244	1.082	1.911	1.244	1.066	2.361	1.449
	(0.864)	(0.0181)	(1.438)	(1.504)	(2.804)	(1.438)	(1.509)	(3.541)	(3.434)
Share of Women	-2.390	-20.12***	0.567	0.273	1.780	0.567	0.244	2.598	0.940
	(57.52)	(6.285)	(59.15)	(58.86)	(60.85)	(59.15)	(58.83)	(62.27)	(59.84)
Log Graduations	-0.115	0.160***	-0.123	-0.123	-0.127	-0.123	-0.122	-0.129	-0.124
	(0.117)	(0.0109)	(0.121)	(0.120)	(0.124)	(0.121)	(0.120)	(0.128)	(0.123)
Share under 25	0.983	-8.032***	4.457	4.112	5.882	4.457	4.078	6.844	4.895
	(15.27)	(0.828)	(15.88)	(15.83)	(17.07)	(15.88)	(15.83)	(18.00)	(17.32)
Share over 64	12.92	-2.476	9.441	9.787	8.013	9.441	9.821	7.050	9.002
	(13.33)	(1.879)	(13.91)	(13.88)	(15.16)	(13.91)	(13.87)	(16.11)	(15.51)
County fixed effects	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197	197	197
Instruments used in	-IV_1: $mino$, w^* and m_{t-4}		-IV_2: $mino$ and m_{t-4}		-IV_3: $mino$ and w^*		-IV_4: m_{t-4} and w^*		
	-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: $mino$				

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlation. Standard errors in parentheses. * p< 0.10, ** p< 0.05, *** p< 0.01. Table continues on next page.

Table A.8 (cont.): Regression Results - Log Investments in Labor Intensive Sector

	$IV_{1\text{-man}}$	$IV_{2\text{-man}}$	$IV_{3\text{-man}}$	$IV_{4\text{-man}}$	$IV_{5\text{-man}}$	$IV_{6\text{-man}}$	$IV_{7\text{-man}}$
Net Migration Share	0.589	0.584	0.788	0.592	0.583	-0.461	1.789
Log GDP per capita	0.313	0.314	0.301	0.312	0.314	0.498	0.130
Unemployment	-10.98	-10.98	-11.35	-10.97	-10.99	-11.30	-11.15
Urban Share	-0.212	-0.214	-0.293	-0.213	-0.214	-0.157	-0.403
Log Population Density	0.588	0.588	0.591	0.588	0.588	0.571	0.608
Share of Women	-16.39	-16.36	-19.05	-16.41	-16.35	-7.426	-27.48
Log Graduations	0.158	0.158	0.157	0.158	0.158	0.155	0.159
Share under 25	-8.282	-8.290	-8.612	-8.280	-8.291	-8.394	-8.819
Share over 64	-3.379	-3.389	-3.292	-3.375	-3.390	-4.816	-2.346
County fixed effects	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197

Instruments used in: -IV_1: $mino$, w^* and m_{t-4} -IV_2: $mino$ and m_{t-4} -IV_3: $mino$ and w^*
-IV_4: m_{t-4} and w^* -IV_5: m_{t-4} -IV_6: w^* -IV_7: $mino$

Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates.

Table A.9: Regression Results - Log Investments in Capital Intensive Sector

	OLS_{fe}	OLS_{pc}	$IV_{1\text{-fe}}$	$IV_{2\text{-fe}}$	$IV_{3\text{-fe}}$	$IV_{4\text{-fe}}$	$IV_{5\text{-fe}}$	$IV_{6\text{-fe}}$	$IV_{7\text{-fe}}$
Net Migration Share	2.755	-0.608***	10.56	10.04	7.920	10.54	10.31	11.96	3.770
	(4.058)	(0.0817)	(8.901)	(9.464)	(18.38)	(8.901)	(9.518)	(23.24)	(23.06)
Log GDP per capita	0.376	1.190***	0.323	0.326	0.341	0.323	0.324	0.313	0.369
	(0.528)	(0.0485)	(0.537)	(0.537)	(0.545)	(0.537)	(0.537)	(0.560)	(0.550)
Unemployment	2.051	-3.321***	2.893	2.838	2.609	2.892	2.867	3.045	2.161
	(3.869)	(0.513)	(4.010)	(4.019)	(4.345)	(4.010)	(4.023)	(4.647)	(4.580)
Urban Share	-2.662	-1.866***	3.591	3.177	1.477	3.577	3.396	4.715	-1.848
	(12.82)	(0.196)	(14.45)	(14.66)	(19.30)	(14.44)	(14.69)	(22.50)	(22.26)
Log Population Density	0.943	0.475***	-0.602	-0.500	-0.0803	-0.599	-0.554	-0.880	0.742
	(1.213)	(0.0155)	(1.988)	(2.087)	(3.752)	(1.988)	(2.097)	(4.694)	(4.657)
Share of Women	-114.4	-29.39***	-117.2	-117.0	-116.3	-117.2	-117.1	-117.7	-114.8
	(80.71)	(3.975)	(81.80)	(81.67)	(81.42)	(81.79)	(81.74)	(82.56)	(81.14)
Log Graduations	0.0798	0.290***	0.0879	0.0873	0.0851	0.0878	0.0876	0.0893	0.0808
	(0.165)	(0.0264)	(0.167)	(0.167)	(0.167)	(0.167)	(0.167)	(0.169)	(0.166)
Share under 25	-30.85	-10.45***	-34.15	-33.93	-33.03	-34.14	-34.05	-34.74	-31.28
	(21.43)	(0.831)	(21.96)	(21.97)	(22.85)	(21.96)	(21.99)	(23.86)	(23.49)
Share over 64	-7.235	1.565***	-3.929	-4.148	-5.047	-3.937	-4.032	-3.335	-6.805
	(18.70)	(0.417)	(19.23)	(19.25)	(20.28)	(19.23)	(19.27)	(21.36)	(21.03)
County fixed effects	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	197	197	197	197	197	197	197	197	197

Instruments used in: -IV_1: $mino$, w^* and m_{t-4} -IV_2: $mino$ and m_{t-4} -IV_3: $mino$ and w^* -IV_4: m_{t-4} and w^*
-IV_5: m_{t-4} -IV_6: w^* -IV_7: $mino$

Subscript fe indicates inclusion of county fixed effects. Subscript pc indicates that the estimates are robust to cross-panel correlation. Standard errors in parentheses. * p< 0.10, ** p< 0.05, *** p< 0.01. Table continues on next page.

Table A.9 (cont.): Regression Results - Log Investments in Capital Intensive Sector

	$IV_{1\text{-man}}$	$IV_{2\text{-man}}$	$IV_{3\text{-man}}$	$IV_{4\text{-man}}$	$IV_{5\text{-man}}$	$IV_{6\text{-man}}$	$IV_{7\text{-man}}$
Net Migration Share	-0.750	-0.862	-4.483	-0.760	-0.866	-15.60	4.382
Log GDP per capita	1.214	1.235	1.782	1.216	1.236	3.490	0.343
Unemployment	-3.414	-3.483	-3.005	-3.424	-3.485	-0.496	-2.376
Urban Share	-1.857	-1.853	-1.362	-1.856	-1.853	-0.270	-2.354
Log Population Density	0.474	0.473	0.413	0.474	0.472	0.227	0.559
Share of Women	-28.29	-27.46	6.084	-28.23	-27.42	121.7	-71.74
Log Graduations	0.289	0.289	0.284	0.289	0.289	0.268	0.300
Share under 25	-10.47	-10.51	-9.564	-10.48	-10.51	-6.556	-10.97
Share over 64	1.442	1.281	-2.858	1.429	1.275	-16.93	7.182
County fixed effects	No	No	No	No	No	No	No
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	358	358	510	358	358	510	510
Instruments used in	-IV_1: $mino$, w^* and m_{t-4}		-IV_2: $mino$ and m_{t-4}		-IV_3: $mino$ and w^*		
	-IV_4: m_{t-4} and w^*		-IV_5: m_{t-4}		-IV_6: w^*		-IV_7: $mino$

Subscript man indicates that the two stages of the IV regression have been conducted separately, each assuming cross-panel correlated error terms. Standard errors and significance levels are not available for these estimates.