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# On the Determinants of Average Income Growth and Net Migration at the Municipal Level in Sweden

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## Abstract

The purpose of this paper is to study what factors determined the average income growth and net migration at the municipal level in Sweden between 1981-1990. Our results suggest a negative correlation between the initial level of average income and the subsequent average income growth, which can be interpreted in terms of conditional convergence. We also find that local government policy variables are important determinants of net migration and average income growth. However, there is no evidence to suggest that the presence of a university or a university college in the municipality affects local growth and mobility patterns.

**Keywords:** *Local growth, net migration.*

**JEL:** O18, R23, R50.

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# 1 Introduction

This paper examines the question what are the factors determining the average income growth and net migration rates at the municipal level? This is important for several reasons. Firstly, if the average (or per capita) income tends to grow faster in 'poorer' regions compared with 'richer' ones, income levels may become more equal between municipalities. This makes the local growth pattern important from a distributional point of view. Secondly, as the local income tax constitutes the major source of funds for local government in Sweden,<sup>1</sup> average income growth and net migration determine changes in local tax bases. Consequently, this will affect the local authorities' ability to fulfil the duties imposed on them by national government. Here it is important to point out that these have increased considerably in recent decades as the main expansion of the public sector in Sweden has been at the local government level.

Methodologically, we follow Glaeser *et al.* (1995) and Aronsson *et al.* (2001) in that we use the initial conditions for a broad set of variables to explain the successive average income growth and net migration rates. The explanatory variables can roughly be divided in five categories: (i) indicators of earning potential such as the average income level and endowments of human capital; (ii) local and (iii) national policy decisions directed toward the local government sector; (iv) the political stability in the local council; and (v) the local socio-economic and demographic structure. Note that we analyze net migration rates, not population growth. Net migration differs from population growth in that it does not include fertility. This means that net migration may capture the extent to which municipalities are becoming more attractive to migrants. The analysis is based on a panel data set covering 271 Swedish municipalities during the period 1981-1990.

The literature on migration and economic growth is quite extensive.<sup>2</sup> Helms (1985) analyzed the impact of state and local income taxes on economic growth in U.S. states and found that the way in which local public revenues were used was the crucial factor. His results suggest that revenues used to fund transfer payments tend to reduce economic growth, whereas revenues used to improve public services such as highways,

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<sup>1</sup>Local authorities in Sweden have the right to raise local income tax.

<sup>2</sup>Examples of cross country studies are Baumol (1986), Romer (1986) De Long (1988), Lucas (1988) and Barro (1991). Barro & Sala-i-Martin (1991), Blanchard & Katz (1992), Borjas *et al.* (1992), Glaeser *et al.* (1992), Sala-i-Martin (1996) and Terrasi (1999) are examples of cross regional studies. See Quah (1996) for a more critical review of some of the empirical findings.

education and public health tend to have a positive impact. Helms concludes that a high public service level attracts businesses and economic activity whereas transfer payments do not have the same positive effect on economic growth.

Many authors have taken the hypothesis of convergence as their point of departure, i.e. that 'poorer' regions grow faster than richer ones (either in absolute terms or conditional on other explanatory variables). Barro & Sala-i-Martin (1992, 1995 chapter 11) for example, find clear evidence of income convergence between U.S. states, Japanese prefectures and between European countries and Persson (1997) discovers income convergence across Swedish counties. On the other hand, Glaeser *et al.* (1995) do not find significant evidence of income convergence between U.S. cities, although they do observe that cities with low manufacturing exposure, highly educated inhabitants and low unemployment rates grow faster in terms of population than others. The results presented by Aronsson *et al.* (2001) suggest that there is convergence between Swedish counties. They also report that the initial unemployment rate, the endowments of human capital and regional public expenditures are important determinants of regional net migration.

This paper complements the earlier studies of income growth and migration between Swedish counties (e.g. Persson (1997) and Aronsson *et al.* (2001)) by analyzing income growth and net migration between municipalities. Such an extension of the literature is important in the sense that a more disaggregated analysis makes it possible to identify growth and mobility patterns that have not been captured in the previous studies. Moreover, at least to our knowledge, this is the first empirical paper to include local public investments in the analysis of growth and mobility patterns at the local/regional level in Sweden.

The paper is organized as follows. The empirical specifications are discussed in Section 2. The data set used is described in Section 3. The results and interpretations are presented in Section 4 and a summary is made in Section 5.

## 2 Empirical specification

As indicated above, the main purpose of this paper is exploratory; we want to get a better understanding of what factors are important determinants of the average income growth and net migration at the municipal level. Following Glaeser *et al.* (1995) and Aronsson *et al.* (2001), we allow for a broad spectrum of potential determinants of

average income growth and net migration. By assuming that the rate of return is equal between municipalities, the attractiveness of a community for migrants will depend on the earnings opportunities as well as on the characteristics that affect individual's well-being. The net migration pattern will then mainly capture the extent to which municipalities are becoming more attractive habitats and labor markets. The set of indicators of earning possibilities to be used in the empirical analysis consists of two variables; the level of average income and an indicator of human capital endowments in the municipality.

The net migration rate and the average income growth are also likely to depend on local and national policy decisions (see Helms (1985), Glaeser *et al.* (1995) and Aronsson *et al.* (2001)). For instance, the local income tax rate is one factor that might influence migration between municipalities located in densely populated areas near major cities, where the decision to move does not necessarily mean that the individual changes his/her place of work. Similarly, the local government consumption per capita and local government investments per capita are likely to provide indicators of the present and expected future service levels, which makes them potential determinants of net migration and income growth. In addition, in order to maintain national standards in local public services, national decisionmakers have felt a need to equalize opportunities between locations. For example, the location of universities or university colleges in particular areas together with intergovernmental subsidies are, in many respects, designed to affect migrational patterns and average income growth.

Migration and average income growth may also depend on factors that relate to the level of political stability in the local council and individual well-being. The latter is related to socio-economic and demographic factors such as unemployment rates, the local industrial structure, population density and the age structure of the population and, whether the municipality is located within or close to a major metropolitan area or in the more sparsely populated northern part of the country where the distances between municipal centers are relatively large.

To be more specific, the growth rate of the average income and the net migration rate are assumed to depend on the following explanatory variables:

- (i) economic 'opportunity' factors [the average income level ( $y$ ) and the endowment of human capital ( $h$ )];
- (ii) local policy decisions [the local income tax rate ( $tax$ ), local government ex-

penditures (*exp*) and local government investments (*invest*);

- (iii) national policy decisions [a dummy variable indicating the presence of a university (*u*), a dummy variable indicating the presence of a university college (*uc*), and intergovernmental grants (*grants*)];
- (iv) political composition of the local council [a Herfindal-index<sup>3</sup> (*herf*), a dummy variable indicating whether either the socialist parties or the non-socialist parties<sup>4</sup> have more than 2/3 of the seats in the local council (*pol*)]; and
- (v) socio-economic and demographic structure [the unemployment rate (*unemp*), the proportion of the local industrial structure consisting of agriculture or industry (*industry*), the percentage of the population aged 0-15 years (*age 0 – 15*), above 65 years (*age 65–*), population density (*dens*) and a dummy variable indicating whether the municipality is located in the northern part of the country (*north*)].

Explicit definitions of all the variables are given in Appendix 1.

Previous studies of household migration based on Swedish data, suggest that the net migration in the major city areas responds differently to fiscal and other characteristics compared with the rest of the country (for instance, see Westerlund & Wyzan (1995)). To control for potential differences in the parameter estimates, we use a dummy variable (*D*) to indicate whether the municipality is located in one of the major city areas.

Denote by  $m_{i,s}$  annual net migration into municipality  $i$  at time  $s$  and the population at time  $t - T$  by  $p_{i,t-T}$ . The net migration rate between years  $t - T$  and  $t$  can be approximated as  $M_i = \ln \left( 1 + \left( \sum_{s=t-T}^t m_{i,s} \right) / p_{i,t-T} \right)$ . The net migration rate is assumed to develop according to

$$M_i = (\alpha^m + \alpha_d^m \cdot D) + (\beta^m + \beta_d^m \cdot D) \cdot \ln(y_{i,t-T}) +$$

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<sup>3</sup>The Herfindal-index is defined as  $\sum_{p=1}^P SH_p^2$ , where  $SH_p$  is the share of representatives from party  $p$ .  $herf = 1$  (its maximum value) if a single party holds all the seats in the local council and  $herf = 1/P$  (its minimum value) when the seats are equally divided between  $P$  different parties.

<sup>4</sup>Here socialists are referred to as members of the Left Party and the Social Democratic Party, while non-socialists are members of the Conservative Party, the Centre Party, the Liberal Party and the Christian Democratic Party.

$$\begin{aligned}
& (\delta_h^m + \delta_{h,d}^m \cdot D) \cdot \ln(h_{i,t-T}) + \\
& (\delta_{tax}^m + \delta_{tax,d}^m \cdot D) \cdot \ln(tax_{i,t-T}) + \\
& (\delta_{exp}^m + \delta_{exp,d}^m \cdot D) \cdot \ln(exp_{i,t-T}) + \\
& (\delta_{invest}^m + \delta_{invest,d}^m \cdot D) \cdot \ln(invest_{i,t-T}) + \\
& (\delta_{grant}^m + \delta_{grant,d}^m \cdot D) \cdot \ln(grant_{i,t-T}) + \\
& \delta_u^m \cdot u_{i,t-T} + \\
& \delta_{uc}^m \cdot uc_{i,t-T} + \\
& (\delta_{herf}^m + \delta_{herf,d}^m \cdot D) \cdot \ln(herf_{i,t-T}) + \\
& (\delta_{pol}^m + \delta_{pol,d}^m \cdot D) \cdot \ln(pol_{i,t-T}) + \\
& (\delta_{unemp}^m + \delta_{unemp,d}^m \cdot D) \cdot \ln(unemp_{i,t-T}) + \\
& (\delta_{industry}^m + \delta_{industry,d}^m \cdot D) \cdot \ln(industry_{i,t-T}) + \\
& (\delta_{age\ 0-15}^m + \delta_{age\ 0-15,d}^m \cdot D) \cdot \ln(age\ 0-15_{i,t-T}) + \\
& (\delta_{age\ 65-}^m + \delta_{age\ 65-,d}^m \cdot D) \cdot \ln(age\ 65-_{i,t-T}) + \\
& (\delta_{dens}^m + \delta_{dens,d}^m \cdot D) \cdot \ln(dens_{i,t-T}) + \\
& \delta_{north}^m \cdot north_i + \varepsilon_i^m
\end{aligned} \tag{1}$$

where the  $\alpha$ :s,  $\beta$ :s and  $\delta$ :s are parameters to be estimated and  $\varepsilon$  is the error term. Only two of the municipalities located within a major city area contain a university. One of them also contains a university college. Therefore, potential differences in parameter estimates between the major city areas and the rest of the country are not estimated for these two variables, ( $u$ ) and ( $uc$ ).

The average income growth is assumed to relate to initial conditions of the explanatory variables described above. Define the average income growth ( $Y_i$ ) in municipality  $i$  between years  $t - T$  and  $t$  as  $Y_i = \ln(y_{i,t}/y_{i,t-T})$ . We assume that  $Y_i$  is determined by

$$\begin{aligned}
Y_i = & (\alpha^y + \alpha_d^y \cdot D) + (\beta^y + \beta_d^y \cdot D) \cdot \ln(y_{i,t-T}) + \\
& (\delta_h^y + \delta_{h,d}^y \cdot D) \cdot \ln(h_{i,t-T}) + \\
& (\delta_{tax}^y + \delta_{tax,d}^y \cdot D) \cdot \ln(tax_{i,t-T}) + \\
& (\delta_{exp}^y + \delta_{exp,d}^y \cdot D) \cdot \ln(exp_{i,t-T}) + \\
& (\delta_{invest}^y + \delta_{invest,d}^y \cdot D) \cdot \ln(invest_{i,t-T}) +
\end{aligned}$$

$$\begin{aligned}
& \left( \delta_{grant}^y + \delta_{grant,d}^y \cdot D \right) \cdot \ln (grant_{i,t-T}) + \\
& \delta_u^y \cdot u_{i,t-T} + \\
& \delta_{uc}^y \cdot uc_{i,t-T} + \\
& \left( \delta_{herf}^y + \delta_{herf,d}^y \cdot D \right) \cdot \ln (herf_{i,t-T}) + \\
& \left( \delta_{pol}^y + \delta_{pol,d}^y \cdot D \right) \cdot \ln (pol_{i,t-T}) + \\
& \left( \delta_{unemp}^y + \delta_{unemp,d}^y \cdot D \right) \cdot \ln (unemp_{i,t-T}) + \\
& \left( \delta_{industry}^y + \delta_{industry,d}^y \cdot D \right) \cdot \ln (industry_{i,t-T}) + \\
& \left( \delta_{age\ 0-15}^y + \delta_{age\ 0-15,d}^y \cdot D \right) \cdot \ln (age\ 0-15_{i,t-T}) + \\
& \left( \delta_{age\ 65-}^y + \delta_{age\ 65-,d}^y \cdot D \right) \cdot \ln (age\ 65-_{i,t-T}) + \\
& \left( \delta_{dens}^y + \delta_{dens,d}^y \cdot D \right) \cdot \ln (dens_{i,t-T}) + \\
& \delta_{north}^y \cdot north_i + \varepsilon_i^y
\end{aligned} \tag{2}$$

Equations (1) and (2) will be estimated simultaneously using generalized least squares. The error terms  $\varepsilon^m$  and  $\varepsilon^y$  are assumed to have zero mean, variances  $\sigma_m^2$  and  $\sigma_y^2$  respectively, and covariance  $\sigma_{m,y}$ .

### 3 Data

The data used in this study originate from the official statistics on municipalities provided by Statistics Sweden and refer to the period 1981-1990. During this period, the number of municipalities varied between 279 in 1981 and 284 in 1990. Responsibilities and structures differ somewhat between municipalities. In contrast to the other municipalities, Gotland, Göteborg and Malmö are responsible for the provision of health care, which is normally provided at the county level. This makes it difficult to obtain comparable data for these municipalities and they are, therefore, excluded from the empirical analysis. Municipalities whose borders were changed during the estimation period are also excluded. This leaves us with a data set containing 271 Swedish municipalities.

Table 1 presents descriptive statistics of the variables in the data set. Unfortunately, we lack measures of the differences in price levels between municipalities. Therefore, all monetary variables are deflated by the national index for consumer prices. Note that the average income growth ( $Y$ ) and the average income level ( $y$ ) are only measured for the population aged 20 or above. By measuring income in this way, we avoid some of

the dependence between the age composition of the population and the average income level. This is reasonable as we disregard natural population growth.

Table 1. Descriptive statistics for year 1981.

Variable	Mean	Median	Std dev	Min	Max
Net migration rate 1981-1990	0.02	0.01	0.05	-0.18	0.17
Average income growth 1981-1990	0.19	0.19	0.02	0.12	0.26
Average income level (y)	50.09	49.15	5.99	39.96	87.60
Human capital (1985) (h)	0.12	0.10	0.06	0.05	0.42
Local income tax rate in percent (tax)	28.78	28.75	1.18	24.10	32.25
Local government expenditures (exp)	10.86	10.57	1.85	7.68	19.53
Local government investments (invest)	1.57	1.41	0.71	0.56	6.57
Intergovernmental grants (grant)	3.28	3.14	0.74	1.01	6.93
University (u)	0.02	0.00	0.13	0.00	1.00
University college (uc)	0.07	0.00	0.26	0.00	1.00
Herfindal-index (herf)	0.31	0.30	0.05	0.21	0.48
Qualified political majority (pol)	0.18	0.00	0.38	0.00	1.00
Unemployment rate (unemp)	0.02	0.02	0.01	0.00	0.09
Industry (industry)	0.50	0.50	0.14	0.10	0.80
Population density (dens)	10.35	2.68	34.60	0.03	345.59
Population aged 0-15 years (age 0-15)	0.22	0.21	0.03	0.13	0.34
Population aged 65 years or above (age 65-)	0.17	0.18	0.04	0.05	0.26
North (north)	0.24	0.00	0.43	0.00	1.00

Let us comment on and give a more detailed description of some of the figures presented in Table 1. Net migration rates ( $M$ ) and the average income growth ( $Y$ ) differ substantially between municipalities. While some municipalities located near the major city areas (Stockholm, Göteborg and Malmö) have experienced large net in migration during the period of study, many municipalities in the northern and middle parts of the country have experienced large out migration. For instance, as a result of net migration alone, Sundbyberg near Stockholm has increased its population by 17 percent, whereas the population of Kiruna in the very north of the country has declined by 18 percent. The highest average income levels are also found near the major city areas, and the lowest in the sparsely populated areas in the north and mid-west of the country. In 1981, the highest average income level was 2.19 times the lowest and the

corresponding figure for 1990 was 2.27 times.<sup>5</sup>

Human capital ( $h$ ) is measured as the share of the population aged 25 or above with post senior high school studies. Unfortunately, there is no such information available for 1981. Statistics Sweden did not collect this type of information at the municipal level prior to 1985. Therefore, we use information on the educational status within the municipalities for 1985 as an approximation for 1981. The highest endowments of human capital are found in the Stockholm area and in municipalities with a university.

Primary and secondary education and social care account for a large proportion of local government expenditure ( $exp$ ) (24 and 20 percent respectively in 1980, Statistics Sweden (1984)). These services are, to a large extent, financed by a local income tax, where the tax rate ( $tax$ ) is chosen by the municipality, and intergovernmental grants ( $grant$ ). Local government investments ( $invest$ ) may also be financed by income taxes or intergovernmental grants. Alternatively, they may be funded by loans or funds built up through budget surpluses. The number of universities ( $u$ ) has been constant during this period while the number of municipalities with a university college ( $uc$ ) has increased from 20 in 1981 to 22 in 1990.<sup>6</sup>

During this period the elections for the local council took place every third year with the last election in 1988. Hence, the Herfindal-index ( $herf$ ) and the dummy variable indicating a qualified political majority in the local council ( $pol$ )<sup>7</sup> for 1981 correspond to the election in 1979. In the category socio-economic and demographic structure, the unemployment rate ( $unemp$ ) is measured in percentage points and the industry index ( $industry$ ) as the percentage of the local industrial structure consisting of agriculture or industry.

## 4 Results

Parameter estimates of the two equations (1) and (2) are presented in Table 2. Columns with "Basic" estimates refer to municipalities located in counties that do not contain any of the major city areas (Stockholm, Göteborg or Malmö), while the corresponding estimates for municipalities located in counties that contain one of the major cities are

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<sup>5</sup>A more specific description of six municipalities, Danderyd, Kiruna, Berg, Borgholm, Sundbyberg and Solna, is given in Appendix 2.

<sup>6</sup>The large extension of the number of university colleges took place in 1976.

<sup>7</sup>Here, a qualified majority is defined as if either the socialist parties or the non-socialist parties has more than 2/3 of the seats in the local parliament.

obtained by adding the "Basic" and the "Dummy" estimate. Regional differences are controlled for by the inclusion of regional dummy variables, one for each county. To save space, these estimates are left out of Table 2.

Table 2. Parameter estimates of equations (1) and (2).

Dependent variable	$M$		$Y$	
	Basic	Dummy	Basic	Dummy
Constant ( $\alpha$ )	1.686 (4.92)	-0.227 (-0.21)	1.282 (6.43)	-0.919 (-1.62)
<u>Economic 'opportunity' factors</u>				
Average income ( $\beta$ )	-0.229 (-2.75)	-0.180 (-0.88)	-0.179 (-3.55)	0.183 (1.85)
Human capital ( $\delta_h$ )	0.092 (6.50)	0.042 (0.86)	0.002 (0.24)	0.015 (0.84)
<u>Local government policy variables</u>				
Local income tax rate ( $\delta_{tax}$ )	-0.065 (-0.87)	0.276 (1.19)	-0.072 (-1.73)	0.120 (1.20)
Local government expenditures ( $\delta_{exp}$ )	-0.060 (-2.84)	0.038 (0.56)	-0.013 (-1.19)	-0.090 (-2.95)
Local government investments ( $\delta_{invest}$ )	0.015 (2.95)	-0.032 (-1.92)	0.003 (0.93)	0.009 (1.08)
<u>National policy variables</u>				
Intergovernmental grants ( $\delta_{grant}$ )	0.008 (0.56)	-0.065 (-1.19)	-0.005 (-0.57)	0.109 (3.80)
University ( $\delta_u$ )	-0.002 (-0.67)		0.004 (0.58)	
University college ( $\delta_{uc}$ )	-0.012 (-1.88)		-0.002 (-0.60)	
<u>Political composition of the local council</u>				
Herfindal-index ( $\delta_{herf}$ )	-0.052 (-2.86)	0.070 (0.81)	-0.027 (-2.52)	0.055 (1.96)
Qualified political majority ( $\delta_{pol}$ )	0.008 (1.20)	0.020 (0.79)	0.003 (0.96)	0.007 (0.63)

(Table 2 continued)

Dependent variable	<u>M</u>		<u>Y</u>	
	Basic	Dummy	Basic	Dummy
<u>Socio-economic and demographic structure</u>				
Unemployment rate ( $\delta_{unemp}$ )	-0.012 (-1.50)	0.001 (0.04)	0.004 (0.94)	-0.011 (-1.02)
Industry ( $\delta_{industry}$ )	-0.025 (-2.50)	-0.028 (-0.86)	0.003 (0.51)	0.003 (0.21)
Population density ( $\delta_{dens}$ )	0.006 (1.62)	-0.014 (-1.65)	0.002 (0.08)	0.005 (1.26)
Population aged 0-15 years ( $\delta_{age\ 0-15}$ )	0.122 (2.74)	-0.103 (-0.70)	0.094 (3.59)	-0.040 (-0.83)
Population aged 65 years or above ( $\delta_{age\ 65-}$ )	0.105 (2.81)	-0.050 (-0.87)	-0.006 (-0.41)	0.063 (2.66)
North ( $\delta_{north}$ )	-0.012 (-0.75)		0.008 (0.83)	
R <sup>2</sup>	0.66		0.63	
Log-likelihood	1 331.13			

Note: t-values (given within parantheses) are heteroskedastic consistent using White's robust standard errors.

Let us start by discussing the correlation between the economic 'opportunity' factors and subsequent net migration rates ( $M$ ) and average income growth ( $Y$ ). According to the estimates presented in Table 2, our model predicts a negative and significant correlation between the initial average income level ( $y$ ) and the subsequent average income growth ( $Y$ ). This implies convergence in the sense that municipalities with low initial income levels tend to grow faster than municipalities with high initial income levels, conditional on the other explanatory variables. This is in line with previous studies using data on U.S. states (Barro & Sala-i-Martin (1992, 1995)) and Swedish counties (Persson (1997) and Aronsson *et al.* (2001)). However, this result is not significant for municipalities located within the major city areas (the sum of the 'Basic' and the 'Dummy' estimates is 0.004 with a t-value of 0.04). One explanation for the negative relationship between the initial income level and income growth, given in Aronsson *et al.* (2001), is that capital mobility tends to make municipalities (in their

case counties) more homogeneous over time. They also point out that the centralized system of wage formation during part of this period may have compressed the wage distribution.

For purposes of interpretation, it is important to recognize how the initial average income level affects the subsequent net migration. This relationship is negative and significant which is in contrast to the findings in Aronsson *et al.* (2001). Such a result may suggest that high income levels do not attract migrants. However, future earnings opportunities within a municipality do not only depend on the average income, they may also depend on the initial endowments of human capital ( $h$ ). Since the average income and the indicator of human capital endowments are highly correlated (the correlation coefficient is 0.86), it becomes difficult to identify separate effects of these two variables. For instance, if the human capital indicator is excluded from the migration function during the estimation, the effect of the average income becomes positive and insignificant.

Let us turn to the impact from previous fiscal decisions made by local and national governments. Investments or investment ratios are often considered to be one of the key factors for economic growth (see for instance Barro (1991) and Mankiw *et al.* (1992)). Here, we focus on the effects of investments made by local government. The results suggest that initial local government investments (*invest*) have a positive impact on net migration outside of the major city areas, although it does not influence the growth rate of the average income. One interpretation is that even though investments cause in-migration, the proportion of skilled and unskilled labor within the municipalities remains almost constant leaving the average income growth unaffected. Local government expenditures (*exp*) are estimated to have a negative impact on net migration (outside of the major city areas) and average income growth (within the major city areas, where the t-value is -3.61). However, we do not find any evidence suggesting that the initial income tax level (*tax*) affects net migration or average income growth.

It is difficult to distinguish between different interpretations for these results as the local councils were not required to balance their budget each year during this period. This means that the local government expenditure and income tax rates may not only reflect the current service level and cost for tax payers, they may also signal future policy changes. In an attempt to distinguish between different interpretations of the effects of previous decisions made by local government, we extended the model to control for as many components in the local budget restriction as possible. In

accordance with Fischer (1993), information on local budget surpluses were added to the model. However, as none of the other parameter estimates were significantly affected by this experiment, we have chosen not to present these results.

The national policy variables are found to have no or little influence on net migration and average income growth. The results suggest that intergovernmental grants (*grant*) given at the start of the period tend to have a positive effect on the average income growth within the major city areas (t-value of 3.80). However, the location of a university (*u*) or a university college (*uc*) had no significant effects on net migration (*M*) or average income growth (*Y*). One possible explanation for this result is that the presence of a university or university college may have different effects on *M* and *Y* depending on where it is located. That is, it might be the (economic) environment surrounding a university or a university college that is important for its effects on net migration and average income growth. It might also be the case that new and old universities and university colleges affect migrational and income growth patterns differently. To investigate these two possibilities we constructed a set of dummy variables, one for each university or university college, replaced the two dummy variables *u* and *uc* and re-estimated the model. We also elaborated with different combinations of *u*, *uc* and regional dummy variables along with the 'new' dummy variables for each university or university college. These experiments did not produce any robust results regarding how the different universities or university colleges affect *M* and *Y*.

The political stability of the local council is potentially important for economic growth. Here, the political stability is characterized by two different measures, a Herfindal-index (*herf*) measuring the fragmentation within the local council and a dummy variable indicating a qualified majority of either socialistic or a non-socialistic representation in the local council (*pol*). The results presented in Table 2 suggest that *herf* is negatively correlated with *M* and *Y* which indicates that a more fragmented local council stimulates economic growth at the local level. This result is in contrast to what is often found in cross-country studies, namely that political fragmentation is negative for economic growth.

The measures of socio-economic and demographic structure mainly affect net migration. The share of the local industrial structure consisting of agriculture and industry (*industry*) tends to have a negative effect on net migration (*M*) outside of the major city areas, while it has no significant effect on average income growth (*Y*). This result suggests that the out-migration from municipalities with this type of industrial

structure offsets the decreased demand for agricultural and industrial workers. As a consequence, the average income growth is left unaffected. The proportion of inhabitants aged 0-15 years (*age0 – 15*) and above 65 (*age65–*) is positively correlated with net migration. However, there is no evidence suggesting that the initial unemployment rate (*unemp*) or the population density (*dens*) affect net migration or the average income growth. Nor does our result indicate a different growth pattern for municipalities located in the northern part of the country (*north*).

## 5 Summary

The results presented in this paper suggest that there is an income convergence across Swedish municipalities in the sense of a negative relationship between the initial level of average income and its subsequent growth. Local public investments are found to have a positive effect on the subsequent net migration while leaving the average income growth unaffected. This may indicate that the net migration caused by these investments does not significantly affect the proportion of skilled and unskilled labor.

The local growth pattern and migratory behavior are also affected by other policy decisions made at the municipal level. These effects are, however, difficult to interpret as the local councils were not required to balance their budgets each year during the period studied here. This means that local government expenditures and income tax rates may not only reflect the current service level and cost for tax payers, they may also signal future policy changes.

Intergovernmental grants are found to have a positive effect on the average income growth within the major city areas, whereas the share of the local industrial structure consisting of agriculture and industry seem to be negatively correlated with the rate of net migration. However, we have not found any evidence suggesting that the location of universities or university colleges affect the average income growth or net migration. Nor do we find any significant common effect for the municipalities located in the northern part of the country.

## References

- [1] Aronsson, T., J. Lundberg & M. Wikström (2001): Regional Income Growth and Net Migration in Sweden 1970-1995, *Forthcoming in Regional Studies*.
- [2] Barro, R.J. (1991): Economic Growth in a Cross Section of Countries, *Quarterly Journal of Economics* 106, 407-443.
- [3] Barro, R.J. & X. Sala-i-Martin (1991): Convergence Across States and Regions, *Brookings Papers on Economic Activity* 1, 107-182.
- [4] Barro, R.J. & X. Sala-i-Martin (1992): Convergence, *Journal of Political Economy* 100, 223-251.
- [5] Barro, R.J. & X. Sala-i-Martin (1995): *Economic Growth*, McGraw-Hill, New York.
- [6] Baumol, W.J. (1986): Productivity Growth, Convergence, and Welfare: What the Long-Run Data Show, *The American Economic Review* 76, 1072-1085.
- [7] Blanchard, O.J. & F. Katz (1992): Regional Evolutions, *Brookings Papers on Economic Activity* 1, 1-75.
- [8] Borjas, G.L., S.G. Bronars & S.J. Trejo (1992): Self-Selection and Internal Migration in the United States, *Journal of Urban Economics* 32, 159-185.
- [9] De Long, J.B. (1988): Productivity Growth, Convergence, and Welfare: Comment, *The American Economic Review* 78, 1138-1154.
- [10] Fischer, S. (1993): The Role of macroeconomic Factors in Growth, *Journal of Monetary Economics* 32, 485-512.
- [11] Glaeser, E.L., H.D. Kallal, J.A. Scheinkman & A. Shleifer (1992): Growth in Cities, *Journal of Political Economy* 100, 1126-1152.
- [12] Glaeser, E.L., J.A. Scheinkman & A. Shleifer (1995): Economic Growth in a Cross-Section of Cities, *Journal of Monetary Economics* 36, 117-143.
- [13] Helms, L.J. (1985): The Effect of State And Local Taxes on Economic Growth: A Time Series-Cross Section Approach, *The Review of Economics and Statistics* LXVII, 574-582.

- [14] Lucas, R.E. (1988): On the Mechanics of Economic Development, *Journal of Monetary Economics* 22, 3-42.
- [15] Mankiw, N.G., D. Romer & D.N. Weil (1992): A Contribution to the Empirics of Economic Growth, *Quarterly Journal of Economics* 107, 407-437.
- [16] Persson, J. (1997): Convergence Across the Swedish Counties, 1911-1993, *European Economic Review* 41, 1834-1852.
- [17] Quah, D.T. (1996): Empirics for Economic Growth and Convergence, *European Economic Review* 40, 1353-1375.
- [18] Romer, P.M. (1986): Increasing Returns and Long-Run Growth, *Journal of Political Economy* 94, 1002-1037.
- [19] Sala-i-Martin, X. (1996): Regional Cohesion: Evidence and Theories of Regional Growth and Convergence, *European Economic Review* 40, 1325-1352.
- [20] Statistics Sweden (1984): Kommunernas finanser 1984.
- [21] Terrasi, M. (1999): Convergence and Divergence Across Italian Regions, *Annals of Regional Science* 33, 491-510.
- [22] Westerlund, O. & M. Wyzan (1995): Household Migration and the Local Public Sector: Evidence from Sweden 1981-1984, *Regional Studies* 29, 145-157.

## Appendix 1: Variable definitions

### Endogenous variables:

- Net migration,  $M$ : Net migration rate. Defined as  $\ln\left(1 + \frac{\sum m_{i,s}}{p_{i,t-T}}\right)$ , where  $m$  is net migration and  $p$  population.
- Average income growth,  $Y$ : Defined as  $\ln\left(\frac{y_{i,t}}{y_{i,t-T}}\right)$ , where  $y$  is the average income level.

### Explanatory variables:

#### *Economic 'opportunity' factors (i):*

- Average income level,  $y$ : Measured in thousand SEK per year for the population aged twenty years or above.
- Human capital,  $h$ : Measured as share of the population aged 25 or above with post senior high school studies.

#### *Local government policy variables (ii):*

- Local income tax rate,  $tax$ : Local plus regional income tax rate measured in percentage points.
- Local government expenditures,  $exp$ : Local government operating costs per capita. Measured in thousand SEK per capita.
- Local government investments,  $invest$ : Local government investments measured in thousand SEK per capita.

#### *National policy variables (iii):*

- Intergovernmental grants,  $grant$ : Total intergovernmental grants. Measured in thousand SEK per capita.
- University,  $u$ : Dummy variable indicating the presence of a university.
- University college,  $uc$ : Dummy variable indicating the presence of a university college.

#### *Political composition of the local council (iv):*

- Herfindal-index, *herf*: Defined as  $\sum_{p=1}^P SH_p^2$ , where  $SH_p$  is the share of representatives from party  $p$ .
- Qualified political majority in the local council, *pol*: A dummy variable indicating if either the socialist parties or the non-socialist parties have more than 2/3 of the seats in the local council.

*Socio-economic and demographic structure (v):*

- Unemployment rate, *unemp*: The unemployment rate in percentage points.
- Industry, *industry*: The share of the local industrial structure consisting of agriculture or industry.
- Population density, *dens*: Inhabitants per square kilometers.
- Population aged 0-15 years, *age 0 – 15*: Share of population aged 15 years or below.
- Population aged 65 years or above, *age 65–*: Share of population aged 65 years or above.
- North, *north*: A dummy variable indicating whether the municipality is located in the northern part of Sweden.

## Appendix 2: Description of six municipalities

Danderyd, Stockholm

Average income level 1981	87.60
Average income growth rate 1981-1990	0.26
Population 1981	27 842
Net migration rate 1981-1990	-0.03

Kiruna, Norrbotten

Average income level 1981	55.58
Average income growth rate 1981-1990	0.17
Population 1981	29 705
Net migration rate 1981-1990	-0.18

Berg, Jämtland

Average income level 1981	39.96
Average income growth rate 1981-1990	0.23
Population 1981	9 003
Net migration rate 1981-1990	0.01

Borgholm, Kalmar

Average income level 1981	41.39
Average income growth rate 1981-1990	0.19
Population 1981	11 030
Net migration rate 1981-1990	0.08

Sundbyberg, Stockholm

Average income level 1981	58.52
Average income growth rate 1981-1990	0.15
Population 1981	25 717
Net migration rate 1981-1990	0.17

Solna, Stockholm

Average income level 1981	61.28
Average income growth rate 1981-1990	0.12
Population 1981	50 441
Net migration rate 1981-1990	0.02

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