

Stockholm School of Economics
Department of Economics
Course 5210: Master's Thesis in Economics

Impact of Migration on Wages of Low Educated Natives in Sweden, 1993-2003

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Abstract

The questions addressed in this paper are (i) What impact does immigration have on the wage level of the low educated Swedish population?, and (ii) what are the other possible factors determining the wages of the low educated Sweden born? Using full population data from 1993 to 2003 with two-year intervals for Swedish data, a fixed effects model is estimated. Factors associated with increasing wage are share of foreign migrants (both from OECD and non-OECD countries) in the labour market, employment level in the economy, share of low educated natives in the labour market, age and having relatively higher education. Factors associated with lower wages, on the other hand, are found to be internal movement from a labour market to another and total days unemployed.

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Presentation: February 21, 2008; 10:15-12:00

Venue: Room 550

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1 Introduction

“We live in a time of migration, today more than ever” –Elsie Franzén

The world has turned into a global arena where individuals can move rapidly. At the end of the 20th century, about 140 million people live in a country where they were not born (Borjas, 1999: 1698). The reasons for emigration are various: Some people are forced to leave their home countries because of political enforcements or natural disasters, whereas some move for better life conditions while others reside in a new country for family reasons (Zink, 2001: 7). Besides the reasons of migration, the receiving country of immigrants has a role in determining the outcomes of migration, too. Martin Miller defines this role with an ironic way: “The migrant in the US is the donkey to carry the load, whereas in Europe the migrant is the mouse to bite the pie.” (Erder, 2007: 10). The population at the upper parts of the income distribution seems to gain more, whereas there is no conclusive evidence indicating the bottom part is gaining or losing from immigration. Whether the population at the lower parts of income distribution loses from immigration is the main idea of this thesis.

In this paper, I aim to test for two hypotheses: (i) What impact does immigration have on the wage level of the low educated Swedish population?, and (ii) what are the other possible factors determining the wages of the low educated Swedish born? The theory recommends a differentiation in approaching income and income inequality changes as a consequence immigration: between from the angle of those already established in the labour market and from the angle of the new arrivals. For the first approach, standard economic theory suggests that, because of the increased supply of labour, the already-settled-in-labour-market immigrants should experience a downward pressure on their level of income, leading to a convergence of incomes at least in those segments of the destination labour market. As for the incomes of the latter, however, empirical results seem to indicate that immigrants (increasingly) tend to fall behind and that it is therefore primarily the immigrants that contribute to any widening of income disparities as might exist. It is known that immigrant groups are often concentrated in specific segments of the labour market, immigrants typically occupying low-paying types of work with bad working conditions, also implying inferior societal status and low security income security. It would therefore be of considerable interest to discuss the incidence of relative deprivation. This in turn suggests that the outcome is not clear and needs further proof, and that the fortunes of the (relatively) new arrivals can't be seen in isolation from the nature of the destination labour market or those already present

there. However recent comparative research published by Blume *et al.* (2007), which analyses levels of relative poverty of immigrant groups (including by country of origin) and natives in Denmark and Sweden, suggests that the probability of being poor – which has increased over time for immigrants – is tied to institutional peculiarities, e.g., levels of support provided by the authorities (rather than, say labour market characteristics), but possibly also to individual or household characteristics.

It is conceivable that in-migration by non-nationals may contribute to a widening gap not only on account of immigrants being restricted to low-paid segments of the labour market (or not being able to enter the labour market in the first place), but also that their presence allows for higher productivity and hence higher incomes amongst non-immigrants. For instance Korpi (2006) finds that wage inequality increases with local population size where the inequality stems from higher increases in top wages. And an increase in the share of foreign born migrants increases wage inequality¹. One interesting finding of this study is that 50/10 percentile ratio as a measure of wage inequality in lower median wages decreases as population size increases. In another study of Korpi (2008)² finds that population in the 5th and 10th percentile in the wage distribution are losing a little bit as a result of immigration. The results are contradictory and needs further analysis, which has been the main research question of this thesis. A different econometric technique with longitudinal data is employed in this paper different from the traditional cross sectional analysis. Explanatory variables include the share of foreign born at the specific labour market (with a distinction of from OECD and non-OECD countries), supply of labour in the labour market, employment level, age, education, days unemployed and internal movements from one labour market to another as a first cut on the issue of the internal migratory movements where the individual switches from a labour market to another.

The paper is structured as follows: section 2 presents a summary of the literature, section 3 represents the historical background for immigration patterns to/from Sweden with descriptive statistics and income inequality measures for Sweden, section 4 shows the theoretical framework where the methodology, model and hypotheses to be tested are described. Section 5 gives information on the data used in the study. Section 6 presents the

¹ The significance of the impact changes according to the definition of the income inequality measure. The effect is significant when ratio of 99/50 percentile ratio is used as the measure.

² in his draft paper “Migration and Wage Income Inequality - Economic Effects of Migration to and within Sweden, 1993-2003” to be published later.

findings and estimation results and section 7 concludes by discussing these findings and suggesting ideas for future work.

2 Review of Literature

There is a large literature on economic integration of immigrants and impact of immigration on salaries and income distribution (or income inequality). Regarding labour market performances of immigrants, some groups are found to be more vulnerable to poverty in the EU. These groups include ethnic minorities, women and the young. Even when the effect of differences in age and education are ignored, foreigners still face a lower chance of entering the labour market in the EU for 1980s, perhaps due to discrimination (Room, 1990: 79). Therefore studying employment and income patterns of immigrants has been a critical subject although few studies focus on this in developed countries. The literature suggests that immigrants face an economic disadvantage upon arrival, whereas the immigrant earnings converge toward those of native born workers over time. The integration of immigrants and their families is found to be achieved within one generation. Panel analysis, apart from the traditional cross-sectional analyses, shows that cross-sectional evidence is too optimistic, at least for more recent cohorts in the US and Canada; immigrants seem to fail to achieve labour market parity with their native born counterparts. Hum and Simpson (2007) finds evidence for complete integration of second-generation, i.e. for men and women, separately, hourly wages and annual earnings are never significantly below those of other native born.

Hammarstedt and Shukur (2006) analyse earnings assimilation of immigrants in the Swedish labour market with a quantile regression approach on pooled data from 1990 to 1999. Immigrants from Nordic and Western European countries have a smaller entry earnings disadvantage and slower rate of assimilation than other groups of immigrants. For some cohorts of immigrants from European countries, the initial earnings disadvantage disappears after 15-20 years in Sweden, but as non-European immigrants suffered from the very large entry earnings disadvantages, their earnings will not catch up with the earnings of natives during their first 20 years in Sweden. More recent non-European immigrant cohorts had a larger entry earnings disadvantage than previous ones. The immigration policy, discrimination, and the economic conditions may have contributed to the decline in the earnings assimilation of non-European immigrants.

Hammarstedt and Shukur (2007) investigate the immigrants' relative earnings in Sweden. Their findings suggest that immigrants (both females and males) are doing relatively better at the top than at the bottom of the earnings distribution, i.e. earnings differential between immigrants and natives is larger at the bottom than at the top of the earnings

distribution. This finding conflicts with the result of previous research such as Chiswick *et al's* (2006) paper, where they conclude that earnings differential between immigrants and natives is larger at the top of the earnings distribution according to the US and Canada data. Hammarstedt and Shukur (2007) find that in times of regression, the gap between non-European immigrants and natives at the bottom of the earnings distribution increases considerably, whereas the earnings gap between immigrants from European countries and natives remain stable. South European and non-European immigrants with a late year of immigration and at the bottom of the earnings distribution were those who suffered the most from the economic decline during 1990s. Another finding is that economic migrants tend to assimilate quite fast into the host country's labour market, whereas the earnings assimilation among refugees takes considerably longer time.

Swedish studies propose that immigrants assimilate in the sense that their earnings grow relative to those of natives as number of years in Sweden increases, however immigrants' earnings do not catch up with their native counterparts. Assimilation has been found to vary across immigrants from European countries and those from countries outside Europe, which is faster among immigrants from Europe. Main obstacle to assimilation is to get access to the labour market than getting high earnings. Many of the immigrants that have had difficulties in entering the labour market are concentrated at the bottom of the earnings distribution. In many cases immigrants' human capital is not fully transferable to the Swedish labour market. Discrimination might be the cause for immigrants to be hindered from reaching the top of the earnings distribution. Therefore Hammarstedt and Shukur (2007) assume differences in earnings between immigrants and natives at the bottom as well as the top of the earnings distribution. In their analysis, Hammarstedt and Shukur (2007) control for age, educational attainment, area of residence, civil status and number of children. Another study on labour market performances of immigrants in Sweden is by Tasiran and Tezic (2007) on second-generation immigrants. Parental resources (marital status, education, occupation and income) are found to affect later labour-market success of second-generation immigrants as well as their continuing education. Geographical origin (being from Africa, Middle-East and Latin America) is also a major labour-market hindrance for second-generation immigrants. Finding a job is difficult for second-generation immigrants, and the significance of an unobserved-heterogeneity parameter might indicate discrimination. To conclude second-generation immigrants have worse labour market performances relative to their native-born counterparts. The conclusion gives a strong support to the long integration process of

immigrants. Tasiran and Tezic's paper contributes to literature in three ways: (i) Data set is longitudinal (from 1991 to 2000), (ii) They employ a dynamic model controlling for unobserved heterogeneity, (iii) Their findings do not support "melting pot" (quick economic integration) hypothesis. Another study on second-generation immigrants' labour market performance is by Behrenz *et al* (2007). They conclude that there is a clear threshold effect of being a second-generation immigrant in possibilities of getting a job, i.e. second-generation individuals have a lower probability of having a job. Male second-generation immigrants with parents born in the Nordic countries, in Eastern or Southern Europe are found to have statistically significant lower incomes than their native 'twins'. The probability of having an income is considerably lower for non-European male second-generation immigrants than for their native 'twins'. Previous studies have shown that second-generation immigrants tend to do well in the US labour market. However previous Swedish studies indicate that second-generation immigrants tend to perform worse than children of natives, as regards earnings.

Why immigrants are falling behind has been an interesting subject of discussion. Early theorists adopted an assimilationist perspective in line with human capital theory and status attainment tradition. According to this view, lower earnings of foreign born result from individual differences such as formal schooling, job training and experience, language ability and other worker characteristics such as ambition, talent and intelligence. The argument has not been without criticisms though; structural factors such as market conditions and public views about the acceptability of immigrant labour seem to be responsible for migrants falling behind, too (Tienda, 1983).

Social capital is also found to be associated with low labour market performance of immigrants. Behtoui (2007) analyses the distribution of social capital in Sweden, where social capital is defined as "the resources embedded in an individual's social networks that are potentially available to her or him through these contacts." Both human capital and social capital are rewarded with higher wages and more adequate jobs. Being an immigrant is found to be associated with social capital deficit. Immigrants from countries outside north-west Europe and North America "face a double handicap in forming social capital". Earlier Swedish empirical studies confirm that individuals from those countries have an inferior status in terms of employment level or wage compared to individuals from north-west Europe and North America countries, and run a higher risk of suffering from discrimination. Being an immigrant was associated with social capital deficit also because "immigrants are being embedded in social networks that constrain their ability to gain valuable social resources".

However once having accessed social capital, returns on the capital are similar for natives and immigrants. It should be noted that immigrants in this sample are a positively selected group as compared with the entire group of immigrants in the Swedish labour force.

Another study on income performance of immigrants is Scott's: Scott (1999) studies the immigrants' changing employment and income patterns in Sweden for the period 1970-1993. In one of his models where income is the dependent variable, he analyses the effect of being a foreign born on income. Scott (1999: 118-79) also shows cross sectional and longitudinal analyses in his research. In the cross sectional analyses, he groups migrants in four groups for 1970 and in five groups for 1990. For instance migrants from Turkey is in the group of labour migrants with less close cultural and large linguistic distance to Sweden for 1970 and in the group of refugees with large cultural and large linguistic distance to Sweden for 1990. The coefficients for these groups have the highest negative values among all groups, when the dependent variable is obtaining median native earnings in one model, and log yearly earnings in another. In the longitudinal analysis, dynamic investigation is carried out. Scott concludes that the immigrant's first year in the labour market is critical and if success is not achieved immediately, the chances for achievement in following years are fairly small.

Gustafsson and Pedersen (2000) analyse poverty, which can be taken as a relatively low income situation, in Sweden for the period 1975-1995 by using two alternative poverty lines. The estimates are based on the household income survey, HINK, made by Statistics Sweden, which contains about 10,000 households each year. They look at different categories of population, namely, different age groups, households in different regions, people of different citizenship, retired households, household adults with different working hours and gender groups. Their findings suggest that the situation of immigrants in the labour market has deteriorated during later decades. With number of years since immigration, poverty rates among recently arrived immigrants decreases. Poverty in Sweden is found to vary strongly with employment, age of the person and citizenship of the household. Gender differences are found to be small and poverty shows no regional variation. An interesting part of this study is the analysis of poverty dynamics where the families are followed year after year. This makes it possible to identify how large proportion of the households escaped or fell to poverty the following year. They analyse exits and entries from/to poverty including poverty consequences of a job loss and of less work. Many poor are found to escape poverty quickly by taking up a job or increasing their number of working hours.

A recent paper by Blume *et al* (2007) investigates determinants of relative poverty among immigrants and natives in Denmark and Sweden during the 1980s and 1990s. They use 60 percent of the median in the distribution of equivalent disposable income as the poverty line. In the model where low-income risk is the dependent variable, explanatory variables include years since immigration, demographic characteristics and country of origin, namely age interval, household type, age at the arrival, gender, origin of country, years since migration times origin of country in their first model and education in the second model. The Swedish data used in the study is called SWIP (Swedish Income Panel) collected by Swedish Social Science Data Service at the University of Gothenburg. In their probit analysis, three years; 1984, 1990 and 1997 are selected. The findings suggest that the risk for a man coming from Turkey, who is 35 years old, and living in a couple with three children be 0.45 for Sweden, 0.50 for Denmark. For a male immigrant from Turkey without any registered education, the poverty risk is found to be 2-3 times higher for individuals compared with the highly educated ones. Poverty risk differs according to national origin and poverty rates decline with the duration of residence. Their overall conclusion is that low-income status is increasingly an “immigrant phenomenon” in Sweden and Denmark. This is most pronounced in Denmark where family cash benefits are more favourable to the typical native family structure than to the bigger families of immigrants from less-developed countries. Child cash benefits and family cash benefits are in favour of big families in Sweden relative to Denmark.

Income inequality in the country of origin and/or the country of destination can also lead to migration. It is surprising that the relationship between migration and inequality at origin or at destination has not been studied intensively. Stark (2006) observed a positive relationship between income inequality and the incentive to migrate holding population's income constant, i.e. controlling for GNP per capita, the Gini coefficient always has shown a positive and highly significant impact on the propensity to migrate. In a paper by Royo (2005) investigating reasons for Portuguese emigration; duality of the economy and imbalances in the economic structure has been mentioned among the push factors. Wage differentials between Portugal and receiving countries, on the other hand, constitute the pull factors. Uneven economic growth and income inequality within the country are emphasized as the main reasons of Portuguese emigration. On the other hand the impact of emigration is analyzed in terms of demographics and remittances.

According to Partridge (2006: 4), there are two antagonist effects of inequality on migratory movements. First inequality can lead to out-migration as inequality is related to

many “disamenities” including crime. Second income inequality attracts higher skilled workers to migrate because of a relatively higher market rewards for their skill set³. This migration can in turn increase income and job growth in states with more inequality. Less risk-averse individuals may select to reside in areas with greater income inequality, which can increase long-run innovation and entrepreneurship⁴. As a result, long-run job growth is found to be closely associated with net migration and utility gains from migration. State level inequality is associated with greater long-run job growth.

According to Roy’s self selection model, skills level of migrants can be explained by the relative wage differentials between sending and host countries and transferability of skills across the two countries. Depending on the values of the parameters, positive or negative selection might occur. Positive selection is likely to occur if wage dispersion is higher in the source country⁵. However empirical results are ambivalent: Borjas who applied the classical Roy model to migration context found that it is the earnings distribution in the emigration and immigration country that is decisive for whether positive or negative selection occurs. He analysed how the degree of income inequality at destination causes a destination to be differentially attractive to workers of different skill levels. In his empirical study, Borjas found that “if the income distribution in the sending country is more unequal, emigrants will be chosen from the lower tail of income distribution in the country of origin” suggesting negative self-selection. However Chiswick’s study found that a larger wage inequality in the country of origin does not necessarily imply negative self selection, but rather only a less favourable (positive) self selection, i.e. negative selection is not likely to occur (Liebig and Sousa-Poza, 2004). In another study Chiswick and Carliner explained labour market success of US immigrants as an outcome of their assimilation in 10-15 years by the fact that “immigrants were positively selected in the sense that they were more able and highly motivated” (Hammarstedt and Shukur, 2006: 286). Liebig and Sousa-Poza (2004) tests the hypothesis that a more unequal income distribution in the sending country will have a negative impact on the skills mix of migrants in the host country. Their findings suggest that positive selection be generally expected in international migration even in the presence of

³ Referring to Borjas, G. J., Bronars, S. G. and S. J. Trejo (1992), “Self-Selection and Internal Migration in the United States”, *Journal of Urban Economics*, 32, pp. 159-85.

⁴ Partridge refers to Heitmueller, A. (2002), “Unemployment Benefits, Risk Aversion, and Migration Incentives”, *IZA Discussion Paper No. 610*, accessed at www.iza.org.

⁵ Presentation named “Immigration Economics” by Libertad González, Universitat Pompeu Fabra, October 26, 2006, available at <http://www.inside.org.es/docs/activities/26octubre.ppt>

high income inequality in the country of origin, meaning that even countries with a rather equal income distribution can expect relatively skilled immigrants through positive selectivity. The positive selectivity is expected to be more pronounced in host countries with a higher inequality.

Within the context of self selection model's theoretical debates, Stark's paper (2006) finds that migration will be negatively selected as a consequence of the prevalence of relative deprivation at origin. The paper moves ahead the view that the negative selectivity arises from the inequality of the income distribution at origin *per se*, not from the inequality of the income distribution at origin being higher or lower than the inequality of the income distribution at destination.

As migration is affected by income inequality, it can also have an impact on income inequality. In a study by Fields and Schultz (1980) the determinants of income inequality in Colombia were gender, employees and employers, education categories, regions (labelled as four to one between the richest and poorest departments), urban-rural distinction, and age. The results showed that education, age, region and rural-urban variables contributed significantly to income inequality. Region was a rather poor predictor of income.

Davies and Wooton (1992) analyse the impact of international factor movements on the personal distribution of income. They apply a simple model with two traded goods (exports and imports) and three factors with a distinction between unskilled and skilled workers. Their findings suggest that unskilled emigration reduces inequality in source countries and increases it in the hosts. On the other hand brain drain (skilled emigration) raises inequality in the source country and lowers it in the host. They conclude with the statement that other outcomes may also occur.

Previous studies have examined the effect of international migration on income distribution using cross-country data⁶. However the effect of internal migration on regional income inequality has not been analysed intensively. Ngarambe and Goetz (1998), in the US South analysed the impact of net migration and human capital accumulation on regional income distribution. Net migration was found to have caused overall income inequality to decrease, but had a positive effect on black income inequality.

⁶ Ngarambe and Goetz (1998: 34) refer to Chiswick, B. (1988), "Illegal Immigration and Immigration Control", *Journal of Economic Perspectives*, 2, pp. 101-16; Stark, O., Edward, T. J. and Y. Shlomo, "Migration, Remittances and Inequality: A Sensitivity Analysis Using the Extended Gini Index", *Journal of Development Economics*, 28, pp. 309-22; Davies, J. B. and W. Ian, "Income Inequality and International Migration", *Economic Journal*, 102, pp. 789-802.

Korpi (2006) addresses two questions in his paper: (i) does wage inequality increase with local population size, and if so, (ii) what are possible factors behind this increase? He applies a cross-section analysis of Swedish local labour markets using unique full population data. His findings indicate that size of local population has significant positive effects on wage inequality because although all wages increase with population size, top wages increase the most (also these patterns are stable over time). This result is in line with the recent empirical literature⁷. Other explanatory variables, namely, labour market diversification, human capital, migration, age structure and employment are also shown to be significantly associated with inequality. As of our subject of interest, migration of Swedish and foreign born population is included in Korpi's model to control for possible worker supply-side effects. Economic outcomes of migration are often assumed to be dependent on the migrants' educational background. If they're mostly lower educated, positive net migration is expected to increase inequality because lower educated workers are losing out due to negative supply side effects. Increasing inequality is seen as reflecting the fact that immigration has affected the relative supply of low educated workers in the economy (Korpi, 2006: 2)⁸. However if the flow of migrants mostly consists of higher educated, lower levels of inequality is expected following net increases in migration because of top wages being suppressed. If positive externalities associated with the migrant population are assumed, a potential negative effect on wages and inequality of the entry of higher educated may fail to occur because the migrants are assumed to be "more productive, gifted or ambitious". In short, what effect on inequality from net migration is open to question. Korpi (2006) assumes, in a neoclassical setting, no externalities and expects higher shares of Swedish born migrants to be associated with lower levels of inequality, as Swedish migrants are relatively more educated. Foreign born migrants, on the other hand, are expected to be associated with higher levels of inequality since they frequently compete for jobs demanding only average or lower educational background (even though they may be highly educated). Contrary to what is

⁷ Earlier empirical and theoretical work supported the conclusion that inequality decreased with city size and size of local population. Later on, this belief was replaced by the opposite view; the larger the city the higher the level of inequality. This latter conclusion has also been strengthened by some empirical work of the past few years using state level data (Korpi, 2006: 7).

⁸ Korpi refers to Borjas, G. J. (2003), "The Labour Demand Curve is Downward Sloping: Reexamining the Impact of Immigration on the Labour Market", *The Quarterly Journal of Economics* 118, pp. 1335-1374; Borjas, G. J. and R. B. Freeman (1992), *Immigration and the work force: economic consequences for the United States and source areas*, Chicago: University of Chicago Press; Borjas, G. J., Freeman, R. B., Katz, L. F., Dinardo, J. and J. M. Abowd (1997), "How Much Do Immigration and Trade Affect Labour Market Outcomes?", *Brookings Papers on Economic Activity*, pp. 1-90; Reed (2001), "Immigration and Males' Earnings Inequality in the regions of the United States", *Demography*, 38, pp. 363-373.

expected, migration of the Swedish born is found to be positively associated with inequality as measured by the Gini. Thus, as regarding these migrants, no negative supply side effect is apparent and these migrants should be associated with some kind of positive externalities, or that demand for higher educated is larger than supply during this period. The coefficient of the variable of changes in the foreign born population, on the other hand, is only significant in one regression, with the 99/50 ratio as the dependent variable. This result is not surprising given a pattern of higher unemployment rates among foreign born in Sweden, and that, during this time, the Swedish labour market has not completely recovered from a very sharp downturn after the housing and financial market crises in the beginning of the decade. However the result regarding top level income inequality (the 99/50 ratio) is confusing. A possible interpretation could be a consequence of a differing migration pattern of the foreign born, who mostly moved to bigger metropolitan areas where top level income inequality is higher, rather than reflecting a causal mechanism. In short, Korpi (2006) finds that wage inequality increases with local population size where the inequality stems from higher increases in top wages. And an increase in the share of foreign born migrants increases wage inequality⁹. One interesting finding of this study is that 50/10 percentile ratio as a measure of wage inequality in lower median wages decreases as population size increases. This is an unexpected result and needs further analysis, which has been the main research question of this thesis.

Korpi (2008) analyzes the impact of migration on wage inequality, and his results are interesting: For the period 1993-2003, a change in the size of local population due to migration has a large and significant impact on wage inequality. In Korpi's study, the share of foreign born is found not to be significantly related to the increases in all inequality measures of wage income inequality. Although share of foreign born does not have any effect on total population estimates of inequality, the bottom percentiles (5th and 10th) are found to be losing out a little with increasing total migration.

A causal mechanism in two-way between migration and income may also exist according to the literature. Chiu and Lui (2004) analyses the applicability of Global City-Social Polarisation thesis to Hong Kong since the 1990s. According to the social polarisation thesis, social structure resembles an hour-glass shape in a global city which has been turning into a world city with accelerated globalisation and increasing integration. Within the

⁹ The significance of the impact changes according to the definition of the income inequality measure. The effect is significant when ratio of 99/50 percentile ratio is used as the measure.

theoretical framework, Sassen first proposed hypotheses on social consequences of global city development. According to Sassen, high level business services that employ large number of professionals are specific to global cities and negative consequences in terms of social equality and income distribution occur. Sassen summarises polarisation thesis in three dynamic processes¹⁰: (i) Inequality in the earning capacities of different types of workers and profit making capacities of different economic sectors grows. (ii) Polarisation tendencies are also embedded in the organisation of service industries and the “casualisation” (making work less secure with no full-time contracts) of the employment relation. (iii) Urban marginality is produced. According to Sassen¹¹ “immigration is providing labour for low-wage service and manufacturing jobs that service both the expanding highly specialised service sector and the high-income lifestyles of those employed in the specialised, expanding service sector... The expanding in the supply of low-wage jobs generated by major growth sectors is one of the key factors in the continuation of ever-higher levels of the current immigration.” According to Friedmann¹² there are three facts in class polarisation: huge income gaps, large scale immigration and structural trends in evolution of jobs. Global city theory suggests that there appears to be a widening income disparity between high-income and low-income stratum of workers. This is a direct result of differential earning abilities and rates of growth of firms in different sectors. Chiu and Lui’s (2004) findings indicate that for Hong Kong income polarisation is not very clear; however income inequality is clearly observed. As Hong Kong has been transferring from an industrial colony to a producer service-driven global city, a sizeable increase at both the top and the bottom of the occupational hierarchy was observed and both of these trends seem to be related to the inflow of migrant workers.

According to Okun-Richardson model, internal migration can be affected by regional income inequality within a developing country, vice versa. Income differentials, rates of growth and employment opportunities are among the explanatory variables of internal migration. On the other way round, migration can widen regional income inequality and the result of migration depend on other factors such as short or long run, whether the country is advanced or underdeveloped, and similar matters. There may also be other cases where the

¹⁰ The authors refer to Sassen, S. (2000), *Cities in a World Economy*, 2nd edn., Thousand Oaks, CA: Pine Forge Press.

¹¹ The authors refer to Sassen, S. (2001), *The Global City: New York, London, Tokyo*, 2nd edn., Princeton, NJ: Princeton University Press, pp. 321.

¹² The authors refer to Friedmann, J. (1995), “The world city hypothesis”, in Knox P. L. and P. J. Taylor, eds., *World Cities in a World-System*, Cambridge: Cambridge University Press, pp. 317-31.

outcome is indeterminate. The study by Newman (1981), on the other hand, indicates that migration may be relatively unresponsive to income differentials and have little impact on income growth or vice versa. Instead in Imperial Germany, migration seems to have been responsive to, and to have affected, other matters. Net migration was found to be positively associated with expanding job opportunities (labour force structure and urbanisation, labour force participation rates) and negatively associated with agriculture and fertility. All these matters were found to be more important than income determining net migration.

According to classical micro migration theory (by Kuznets), intersectoral urban-rural size differences result in an intersectoral income inequality increasing the national inequality, this in turn, causes an intersectoral migration decreasing inequality. However this theory pertains to the “industrialisation-led urbanisation phase of societies by construction.” (Anbarci and Ulubasoglu, 2005). Glomm (1997) reviews empirical evidence regarding Kuznets curve. He expects to find no evidence if a model of the arrival of new opportunities associated with information technologies is correct.

3 Historical Review

Before analyzing impact of immigration on salaries of the population with low income, the history of migration in Sweden and income inequality measures in Sweden should be summarized. This chapter will try to meet this need.

3.1 Background

Swedish labour market is characteristic with its high levels of unionization, high relative minimum wages, a low variance in the earnings distribution, a big role for the public sector as employer and female participation rates close to men. Moreover tax/GNP ratios are highest in the OECD area (Blume *et al*, 2007). Sweden has an outstandingly egalitarian distribution of income and low rate of poverty. The living standards of the poor are closer to those of median citizens than in other advanced countries. Despite the depression in 1990s, the country maintained a low rate of poverty and avoided the growth of an underclass and homelessness that appeared in the US and UK (Björklund and Freeman, 1995: 1). Sweden's distribution of earnings and income show a high degree of equality (Domeij and Klein, 1998: 1). In Sweden, income inequality decreased between the mid-1970s and mid-1980s and increased later cancelling out previous changes (OECD, 2000: 48). Figure 1 shows the Gini coefficient for Sweden for the age group 20-64 between 1951 and 2002. The figures indicate that income inequality is small. Table 1 shows numerically the Gini coefficient and income quintile share ratio for the whole population of Sweden.

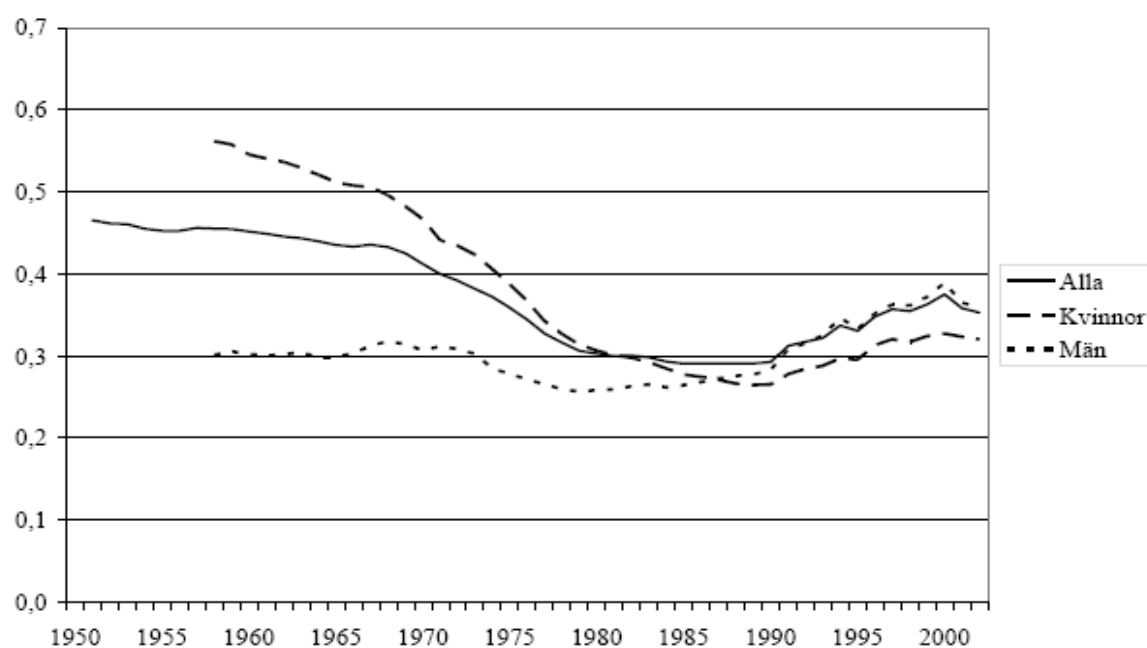


Figure 1. Gini-Coefficient 1951-2002 age group 20-64 for Sweden (alla (all), Kvinnor (female), män (male)).

Source: Johansson (2006: 19).

Table 1. Income Inequality Measures for Sweden

Year	G	s80_s20
1995	..	..
1996	..	..
1997	21	3.3
1998	..	..
1999	22	3.1
2000	..	..
2001	24	3.4
2002	23	3.3
2003	..	..
2004	23	3.3
2005	23	3.3

Source: Eurostat, G: Gini coefficient, s80_s20: Inequality of income distribution (income quintile share ratio).

At the lower end of the table, *immigrants* are observed when it comes to poverty analyses (Blume *et al*, 2007). Immigrants are defined to be members of migration that is the process of redistribution of the population in space depending on the changes in the society. However for

a place change to be defined as migration, it should take place in significant distance and continuity which are able to create an effect (Erder: 2006).

Sweden was a country of emigration in the late nineteenth and beginning of twentieth centuries. In the 1930s, Sweden underwent a transition from emigration country to an immigration country [Karlsson, 2002]. Net immigration values for these periods are given in Table 2 and immigration and emigration figures are given in Figure 2:

Table 2. Net Migration for Sweden

<i>Year</i>	<i>1875</i>	<i>1900</i>	<i>1925</i>	<i>1950</i>	<i>1975</i>	<i>2000</i>
<i>Net Migration</i>	-6922	-12644	-6895	15080	16884	24568

Source: Statistics Sweden.

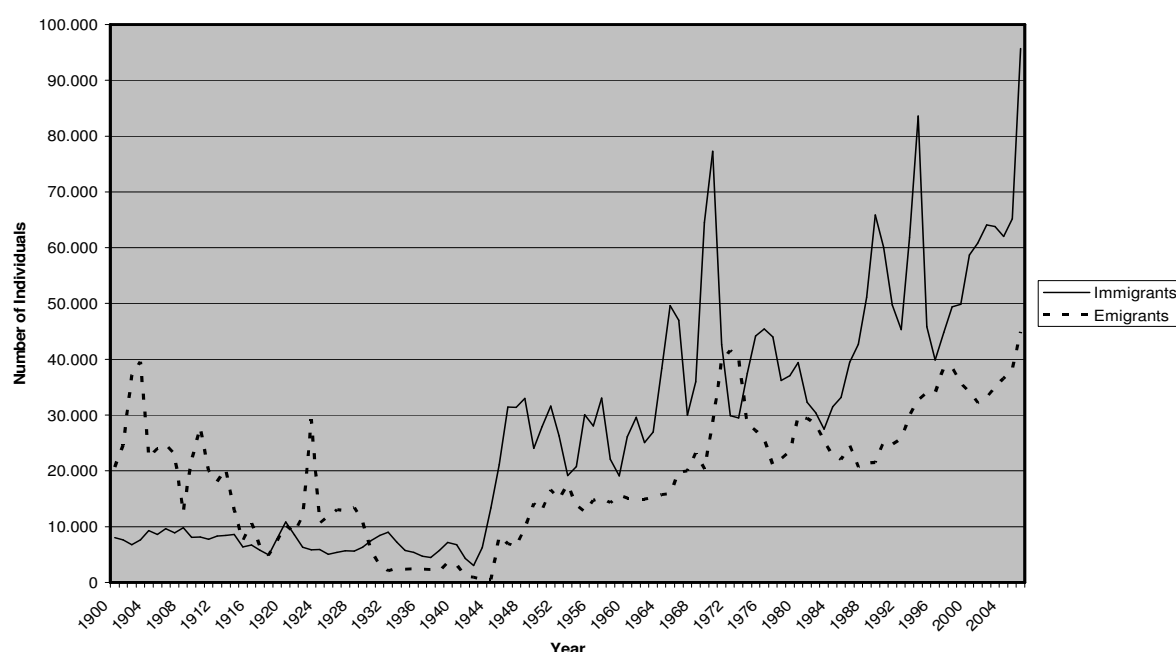


Figure 2. Immigration and emigration from Sweden 1900-2006.

Source: Statistics Sweden.

Reconstruction of Europe after the Second World War led European countries to export cheap labour from developing nations.

Labour migration reflects only one part of migration from to Sweden. Other relevant theories explaining migration to Sweden are asylum and social networks theories. Sweden has been a destination for asylum seekers and refugees throughout after 1950s. In 1950, the

number of foreign-born persons in Sweden was less than 200,000 (less than 3% of the total population. In 2000, the portion of foreign-born persons had grown to 11.4% of the entire population of almost 9 million [Karlsson, 2002]).

One should understand asylum migration in order to analyze income assessment of foreign-born immigrants in Sweden. According to Koser (1997), the social networks approach is the one possible appropriate framework to apply to the case of asylum seekers. Because it has two strengths: (1) it is an integrative approach that combines micro and macro level migration approaches. Second it provides a single framework for studying the variety of economic, social and political factors that are involved in the migration process. Neumayer (2005) has recently analyzed determinants of asylum migration to the Western Europe. He has 127 developing countries in his sample. He groups costs of staying and costs of migration, and individuals in developing countries decide whether to apply for asylum or not, comparing these costs. Results support the economic theories of migration that low income, low growth and economic discrimination against ethnic minorities lead to higher flows of asylum seekers. Income improvements in source countries can reduce migration pressure. However, all asylum seekers should not be seen as “bogus” -in Neumayer’s terms- or economic refugees since political oppression, human rights abuse, violent conflict and state failure are also important determinants. Migration networks and geographical proximity are also important facilitators of asylum flows as predicted by theory. Colonial experience, religious similarity and casual contact with the developed world like bilateral aid, trade and tourism are not statistically significant determinants though. Natural disasters and famines are not, that are typically short-term and unexpected events, whereas asylum migration to Western Europe requires planning and preparation. In my view, one should not claim that only one theory is valid empirically. Theories focusing on only economic factors in determining migration fail to include the effects of social and cultural factors. Social network theory has strong foundations, however as Lim argues (1987), social networks explain continuation of migration, not the initiation of a migration.

3.2 Immigrants in Sweden¹³

The share of foreign born individuals living in Sweden has increased rapidly throughout the post-war years. In 1940, about 1 per cent of the population living in Sweden was born abroad,

¹³ This section mainly drives upon Hammarstedt and Shukur (2006) and Hammarstedt and Shukur (2007).

whereas in 1970, this share rose to about 7 percent. In 2006, it had increased to about 12.9 percent counting for over one million individuals (1,175,200 individuals in 2006). As the size of the immigrant population has increased throughout the years, the character of immigration has also changed.

After the Second World War, during the 1950s and 1960s the immigration was a kind of refugee immigration from countries in Eastern Europe. These migrants from Eastern Europe were in general well educated and performed well in the Swedish labour market. From 1950s until the mid-1970s immigration to Sweden was mainly labour-force migration as a result of the industrial and economic expansion. Labour recruitment started with labour from the Nordic countries, Germany and Italy. By the 1960s labour recruitment was extended to include Turkey, Yugoslavia and Greece (The Center for Migration Studies of New York, 1964). In 1965 The Labour Market Commission in Sweden argued in favour of extensive labour force immigration. A debate was in progress however, arguing using elderly or women instead of immigrant men in the industry. As a result women began to enter the labour market more extensively [Karlsson, 2002]. The labour-force migration consisted mostly of low educated individuals from Finland and countries in Southern Europe. The great majority of the labour force migrants from Southern Europe came from former Yugoslavia but there was also labour force migration from Italy and Greece. During the 1950s and 1960s labour-force migrants also came from Nordic countries other than Finland, and from countries in Western Europe such as West Germany. These migrants were in general better educated than those who came from Finland or Southern Europe. The economic migrants did well in the Swedish labour market and, during the 1950s as well as the 1960s; the unemployment concentration was lower among immigrants than among native Swedes. In the mid-1960s, Swedish trade unions observed immigrants holding down the wage level for low-paid workers. Therefore a more restrictive immigration policy was adopted and the deterioration of the labour market situation changed the character of immigration during the 1970s. As the labour-force migration of European immigrants was narrowed, the number of refugees from non-European countries started to increase. Migration from non-European countries until the mid-1970s was mostly return migration of Swedish citizens. However, in the mid-1970s refugee migration from Latin America started to reach significant proportions and during the 1980s a great number of refugees came from Asia and Africa. During the 1990s and the beginning of the 2000s, refugee immigration to Sweden has continued to increase, mostly dominated by refugees from former Yugoslavia and the Middle East (especially from Iraq). The changed

character of the immigration has led to a change in the composition of the immigrant population. Table 1 shows how the composition of the immigrant population has changed. In 1960 about 60 percent of the foreign-born persons living in Sweden had been born in other Nordic countries and about 37 percent in other European countries. Only about 5 percent were born in countries outside Europe. In 2003, however, less than 26 percent were born in other Nordic countries, more than 30 percent were born in other European countries, and over 40 percent of the immigrant population was born in non-European countries.

Table 3. Foreign-born persons according to region of birth in per cent of all foreign-born persons 1960–2003

<i>Region of birth</i>	<i>1960</i>	<i>1970</i>	<i>1980</i>	<i>1990</i>	<i>2000</i>	<i>2003</i>
Nordic countries	58.1	59.7	54.4	40.3	27.9	25.9
Other European countries	37.0	34.9	33.8	32.1	32.9	32.5
Non-European countries	4.9	5.4	11.8	27.6	39.2	41.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Hammerstedt and Shukur (2006: 290).

Family tied migration has also been common in immigration characteristics of Sweden. Regarding migration policies of Sweden, close family member of an immigrant is defined to be “a person who is granted a residence permit because he/she has close relatives living in Sweden. Spouses, partners and unmarried children under the age of 18 are regularly granted residence permits in Sweden. The term, family ties is often used.” [Karlsson, 2002] and this policy made family reunifications easier to achieve resulted from social networks.

Sweden does not register ethnicity, religion or language in the national census. Numbers of asylum seekers and persons who got Swedish citizenships were as follows for the years 2004 and 2005:

Table 4. Number of Asylum Seekers and Acquired Swedish Citizenship in 2004 and 2005

<i>Citizenship</i>	<i>2004</i>		<i>2005</i>	
	<i>Asylum seekers</i>	<i>Acquired Swedish citizenship</i>	<i>Asylum seekers</i>	<i>Acquired Swedish citizenship</i>
All	23161	28893	17530	39573

Source: Statistics Sweden, available at <http://www.ssd.scb.se/databaser/makro/produkt.asp?produktid=be0101&lang=2>

Another analysis can be carried out on adaptation, integration of migrants living in the place of destination based on statistics of some prospects of these migrants. The following sections in this chapter are dedicated to this analysis.

3.3 Swedish Immigration/Integration Policies

The post-war period can be divided into two migration policy phases. The first phase, which lasted until the early 1970's, was dominated by labour migration and the second phase by asylum seeking and family reunification migration (Österberg, 2000: 2). According to Akpınar [2004], Swedish Immigration Policy of 1974 was based on three principles: (1) The Principle of Equality implying individual citizen rights to health, housing, care and schooling, (2) The Principle of Freedom of Choice implying that immigrants could preserve their cultures, (3) The Principle of Partnership implying support for different cultures if they so desired. To implement these principles, home language classes were established and immigrant associations were financially supported by the Swedish Government. However in the late 1980s and 1990s an anti-immigration position replaced this attitude in the Swedish media. Cultural differences were presented as a problem.

After the establishment of the Department of Integration in 1997, two different arguments have been discussed in the public debate in Sweden. The first argument says that structural transformation of Sweden beginning in early 1980s necessitates better knowledge of Swedish social relations and better knowledge of Swedish language to find a place in the Swedish labour market. The second argument says that there is an ethnic and gender segregation in the Swedish labour market which is sometimes direct and sometimes more discrete, hidden in some rules, regulations and representations of so called immigrants amongst employers, trade unions and public opinion makers. According to the Integration Policy of 1997, each individual is herself/himself responsible for integration and the policy only offers *conditions* for integration¹⁴ [Akpınar, 2004]. According to a recent survey called the Eurobarometer, integration of immigrants is still not working: In Malmö, only 12 percent believe that foreigners who live in Malmö are well-integrated, while 83 percent thought they were not. In Stockholm 78 percent of the people disagreed that foreigners who live there were well-integrated (The Local, 2007).

¹⁴ An example of Swedish Government adopting necessary laws and regulations in favor of integration is the SFI (Swedish for Immigrants) courses which have been held for free for migrants who have residence permit in Sweden, which do not take into account any ethnic or cultural differences. However effectiveness of this free course programme is of discussion (the Local news, Senior Politicians: scrap SFI, available at <http://www.thelocal.se/6339/20070208/>).

4 Theoretical Framework

Korpi's (2008) study finds no evidence that immigrants have any effect on general income inequality measures, but total positive net migration (natives and foreign born) seems to be associated with lower wage increases in the lower part of the income distribution, namely the 5th and 10th percentiles (with very low adjusted R-squared measures) for Sweden. Immigration's potential effect on lower parts of the income distribution appears to be an interesting issue to study according to the up-to-the-present-literature. The determinants of the wage pattern of the low educated Swedes (which is a good proxy for the population in lower parts of income distribution) are to be analyzed by using panel data in this study. The hypotheses and model specifications generated below are based on this research question.

4.1 Hypotheses

The four hypotheses to be tested and their theoretical/empirical links to the model are explained below:

H1: A high share of foreign born (with a differentiation between OECD and non-OECD immigrants) at the specific labour market is associated with a low wage level of the low educated Sweden born population.

H2: Moving from one labour market to another (internal migration) is associated with an increase in wages for the low educated Swedes.

H3: Macro variables such as the supply of labour in the labour market and employment level in the economy (as a proxy for business cycles) affect the wage level of low educated Swedish population.

H4: Human capital variables such as years of education, age and days unemployed are associated with the wage of the low educated Swedish population.

To test the four hypotheses, the dependent variable is chosen to be yearly wage before tax and no other income sources. Logarithm of the wage income was chosen as the dependent variable, while a number of migration-related variables (taking into account OECD membership status of the home countries of the immigrants), as well as variables indicating

the level and composition of labour supply in the specific labour market of interest, among others, were used as the independent variables.

Explanatory variables are to be divided in four groups, where the first group stands for immigration with the definition of the share of foreign born in the specific labour market. The second group represents only one independent variable, which is the internal movements between labour markets (which may also be called internal migration). Third are the macro variables, namely employment level, and supply of labour in the labour market which is calculated as the share of low educated Sweden born in the labour market. Finally the last group corresponds to individual level human capital and socio-economic variables such as age, years of education and days unemployed. Two-year intervals are used as one-year intervals might have showed too little change from year to year.

The variables and their expected signs are presented in the Table 5:

Table 5. Variables, their definitions and expected signs in the model

<i>Variable</i>	<i>Definition</i>	<i>Expected sign of the coefficient</i>
logwage	Log of yearly wage before tax	Dependent Variable
shareOECD	Share of foreign born from an OECD country in the specific labour market	(-)/(+)
shareNONOECD	Share of foreign born from a non-OECD country in the specific labour market	(-)/(+)
OECD_NONOECD	Interaction variable for the variables shareOECD and shareNONOECD	(-)/(+)
MGRNT	Dummy variable which takes the value 1 for a movement from a labour market to another	(+)
sizeLowEduc	Share of low educated Swedes in the specific labour market	(-)
employment	Employment level	(-)
educdummy	Dummy variable which takes value 1 for relatively higher education	(+)
age	Age of the individual	(+)
ALosDag	Days unemployed	(-)

The variable in question according to the first hypothesis is the share of foreign born in the labour market where the individual belongs to. As pointed out in Section 2, the conclusions regarding the impact of immigration on wages of the population in lower parts of income distribution in Sweden are contradictory. However the most recent (ongoing) study of Korpi (2008) supports the view that total migration decreases the wages of the lower income

percentiles slightly. Therefore a negative coefficient is anticipated in the models. However Korpi does not make a differentiation of the foreign born size as OECD and non-OECD countries, therefore empirically both positive and negative associations between the shares of OECD countries and/or non-OECD countries and wage of low educated Swedes may be expected. An interaction variable between share of OECD born and share of non-OECD born might capture the total effect of migration. Therefore this variable is also to be included in the regression. As Korpi's study suggests, a negative coefficient to occur is more likely. This follows after the logic that foreign born (even higher educated ones) often compete for low-income jobs with the low educated Swedes.

Moving from one labour market to another is assumed to be motivated for higher income opportunities and better jobs. Therefore internal labour market switches are expected to be positively correlated to the wages of the individuals, i.e. a positive coefficient for the variable is expected.

One of the two aggregated independent variables is the share of low educated Swedes in the labour market as a proxy for the supply of labour in the specific labour market. According to the neoclassical theory, an increase in the supply of labour should decrease wages. Therefore a negative sign for the coefficient of `sizeLowEduc` is expected. The next macro variable, employment level in the Swedish economy, may be used as a proxy for business cycles as cyclical unemployment arises from recession and decreases in the recovery phases of recessions. In the boom periods, unemployment can decrease and even excess of jobs may occur¹⁵ (and employment increases). The relationship between wage and unemployment is straightforward according to the classical economics. The wage curve represents the negative relationship between wage level and unemployment¹⁶. Therefore we can assume a positive relationship between wage level and employment theoretically.

According to the human capital approach, returns to education and experience should lead to higher wages. Therefore relatively more education should be reflected in higher wages. Age is also expected to increase wages as it is usually linked with experience. Another variable, total days unemployed in a year, is to be included in the model as for the ones working part time, it would reflect the time having stayed unemployed as a determinant of the

¹⁵ Presentation available at http://www1.eeg.uminho.pt/economia/fjveiga/emi_ni/Chap3_1.pdf based on Frank and Bernanke (2007).

¹⁶ From http://www.leftbusinessobserver.com/Race_curve.html referring to Blanchflower and Oswald (1995), *The Wage Curve*, New York: the MIT Press.

yearly wage. And days unemployed is expected to be negatively associated with the total wage income of the low educated Swedish population.

4.2 Model Specifications

The models used in this study are advanced panel models, namely fixed effects, between effects and random effects models. By applying a formal test, the superior model is to be selected in the end.

The basic model from which the advanced ones will be derived is the unobserved effects model where one can control for some types of omitted variables that differ between cases but are constant over time (constant term is assumed to be a time-invariant but varying across individuals):

$$\ln w_{it} = \alpha_i + f'_{it} \cdot \beta + x_{1it} \cdot \gamma + x_{2it}' \cdot \theta + x_{3it}' \cdot \phi + v_{it} \quad (1)$$

Where $v_{it} \sim \text{IID}(0, \sigma_v^2)$ and;

$\ln w_{it}$ = Log of yearly wage

f_{it} = Vector for foreign born in the labour market, including share of OECD born immigrants, non-OECD born immigrants and the interaction between the two.

x_{1it} = Dummy variable which takes value 1 for moving from a labour market to another, 0 otherwise.

x_{2it} = Vector for aggregated variables, namely share of low educated Swedes in the labour market and the employment level in the economy.

x_{3it} = Vector for human capital and socio-economic variables, namely age, dummy for relatively higher education and days unemployed.

i = Individual, 1 - 3,690,626 (it changes according to years as an unbalanced panel is used in the analysis).

t = Year, ($t = 1993, 1995, 1997, 1999, 2001, 2003$)

α_i = Unobserved effect

v_{it} = Error term,

The first model to be estimated is the “between effects model”:

$$\ln \bar{w}_{i\bullet} = \alpha_i + \bar{f}'_{i\bullet} \cdot \beta + \bar{x}_{1i\bullet} \cdot \gamma + \bar{x}_{2i\bullet}' \cdot \theta + \bar{x}_{3i\bullet}' \cdot \phi + \bar{v}_{i\bullet} \quad (2)$$

Where;

$$\ln \bar{w}_{i\bullet} = \frac{1}{T} \sum_{t=1}^T w_{it}$$

$$\bar{x}_{1i\bullet} = \frac{1}{T} \sum_{t=1}^T x_{1it}$$

$$\bar{x}_{2i\bullet} = \frac{1}{T} \sum_{t=1}^T x_{2it}$$

$$\bar{x}_{3i\bullet} = \frac{1}{T} \sum_{t=1}^T x_{3it}$$

$$\bar{f}_{i\bullet} = \frac{1}{T} \sum_{t=1}^T f_{it}$$

$$\bar{v}_{i\bullet} = \frac{1}{T} \sum_{t=1}^T v_{it}$$

And the within transformation ((1)-(2)) or “the fixed effects transformation” is:

$$\ln w_{it} - \ln \bar{w}_{i\bullet} = (f'_{it} - \bar{f}'_{i\bullet}) \cdot \beta + (x_{1it} - \bar{x}_{1i\bullet}) \cdot \gamma + (x'_{2it} - \bar{x}'_{2i\bullet}) \cdot \theta + (x'_{3it} - \bar{x}'_{3i\bullet}) \cdot \phi + v_{it} - \bar{v}_{i\bullet} \quad (3)$$

The random effects model assumes that the unobserved effect (μ_i) is uncorrelated with each explanatory variable in the following model:

$$\ln w_{it} = \alpha + f'_{it} \cdot \beta + x_{1it} \cdot \gamma + x'_{2it} \cdot \theta + x'_{3it} \cdot \phi + (\mu_i + u_{it}) \quad (4)$$

Where $u_{it} \sim \text{IID} (0, \sigma_u^2)$

If we define the composite error term as $v_{it} = \mu_i + u_{it}$, (4) can be written as:

$$\ln w_{it} = \alpha + f'_{it} \cdot \beta + x_{1it} \cdot \gamma + x'_{2it} \cdot \theta + x'_{3it} \cdot \phi + v_{it} \quad (5)$$

Since μ_i is in the composite error in each time period, the v_{it} are serially correlated across time. Under the random effects assumptions;

$$Corr(v_{it}, v_{is}) = \sigma_\mu^2 / (\sigma_\mu^2 + \sigma_u^2), \quad t \neq s,$$

Where $\sigma_\mu^2 = Var(\mu_i)$ and $\sigma_u^2 = Var(u_{it})$.

GLS transformation is needed to eliminate the serial correlation in the error term where the transformed model becomes (“the random effects model” to be estimated is):

$$\ln w_{it} - \lambda \ln \bar{w}_{i\bullet} = \delta(1 - \lambda) + (f'_{it} - \lambda \bar{f}'_{i\bullet}) \cdot \beta + (x_{1it} - \lambda \bar{x}_{1i\bullet}) \cdot \gamma + (x'_{2it} - \lambda \bar{x}'_{2i\bullet}) \cdot \theta + (x'_{3it} - \lambda \bar{x}'_{3i\bullet}) \cdot \phi + (v_{it} - \lambda \bar{v}_{i\bullet}) \quad (6)$$

Where, $\lambda = 1 - [\sigma_u^2 / (\sigma_u^2 + T \sigma_\mu^2)]^{1/2}$

Hausman Specification Test to choose between (3) and (6) is applied to see which model is superior for this study.

5 Data

Using panel data brings several advantages: Panel data can control for the factors that (i) vary across entities but do not vary over time, (ii) could cause omitted variable bias if they are omitted and (iii) are unobserved or unmeasured.

The study utilizes a database consisting of longitudinal full population data covering all individuals living in Sweden some time between the years 1993-2003. The database has been compiled in cooperation between Statistics Sweden (SCB) and the Department of Social and Economic Geography at Uppsala University. The database provides a series of individual level data, including place of residence and work, occupational status, education, level of income, country of birth and gender.

For this study, concentrating on the impact of migration on wages of the low educated Sweden born; data for six years (1993, 1995, 1997, 1999, 2001 and 2003) are used. Individuals younger than 21 and older than 64 years old are excluded from the study as the elder years are defined as economically inactive years and under the age of 21, many individuals are not yet fully established on the labour market, either because of unemployment or because they are still in education.

As the next step, the individual data are linked to municipalities and municipalities to local labour markets. The definition of the local markets have changed over time as the changes in the size and age structure of local and regional population, and improvements in infrastructure and communication over time. In this study the 1998 definition of local Swedish labour markets by Statistics Sweden is employed as Korpi (2008) also uses. From this definition, Sweden can be divided into 100 local labour markets, made up of some 289 municipalities. The separation is carried out with the logic that if more than 20 percent commute from municipality *a* to municipality *b*, municipality *a* is registered as belonging to the local labour market of municipality *b*, and so on. As a later stage, shares of foreign born, shares of low educated Swedes for each labour market that each individual belongs to are calculated.

As the population of interest is the low educated Swedish individuals, individuals born in a country other than Sweden and high educated people are excluded. For defining “low educated”, two education groups were created: education up to 9 years and education up to 12-13 years implying a gymnasium (equivalent to college) education. The high education group with 13 and more than 13 years implying a university level education was excluded

from the dataset. What are left are all men and women between the ages 21 and 65, a population of around 3.5 million people for each year.

Employment data came from Statistics Sweden as an external source and merged with our dataset. From this data, an unbalanced panel data set is constructed and a variable to count for moving from one labour market to another is created.

The final data set to be used for regressions included about 15.4 million observations.

6 Estimation Results

As mentioned in Section 4.2 two main models, namely fixed effects and random effects models are to be estimated. Another model named between effects model is carried out additionally to show the intermediate stage for obtaining the fixed effects model. All the regressions are run by using the software STATA. The variables of the regressions and outcomes are listed in detail in the appendix.

Prior to analyzing the coefficients, the superior model is to be chosen. Fixed effects model gives consistent results but not the most efficient and random effects model gives better p values. By testing the null hypothesis that “coefficients estimated by the efficient random effects estimator are the same as the ones estimated by consistent fixed effects estimator” with the Hausman specification test, one can choose between the two models. According to the test, fixed effects model should be chosen as Prob>chi2 is smaller than 0.05 (with the value of 0.00). Therefore fixed effects model will be analyzed onwards. The results of the fixed effects regression are summarised in Table 5:

Table 6. Variables, their coefficients and level of significance in the fixed effects model

<i>Variable</i>	<i>Coefficient</i>	<i>Significance</i>
Constant	5.256	0.000
Share of migrants born in an OECD country in the labour market	0.479	0.000
Share of migrants born in a non-OECD country in the labour market	1.408	0.000
Interaction variable for share of OECD and non-OECD born migrants	18.040	0.000
Dummy for moving from one labour market to another	-0.021	0.000
Share of low educated Swedes in the labour market	0.163	0.000
Employment	1.251	0.000
Dummy for having relatively higher education in the low educated Swedish population	0.262	0.000
Age	0.018	0.000
Days unemployed	-0.005	0.000

R-squared overall 0.1203

To find out the effects of migration on the wages of low educated Swedes, a fixed effects regression was run. More than 15 million observations with around 3.7 million individuals were used¹⁷.

¹⁷ The interpretation of the coefficients follow the *ceteris paribus* statement onwards.

Two important results concerning migration follow from this regression. On the one hand, the regression outcome indicates a striking contradiction to the popular belief regarding the question at hand. In fact, the outcome does not comply with the popular belief that migration from outside of the host country affects the incomes of the low educated locals in a negative way. Therefore Hypothesis 1 is not supported with the case of Sweden. Actually, the effect in question has been found to be significantly positive. Indeed, wage incomes of low educated Swedes are found to be rising as the share of foreign-born individuals in the specific labour market rises. This applies in the case of immigrants from both OECD and non-OECD countries. Surprisingly, this statistically significant effect is even greater in the case of immigrants that originate from non-OECD countries. A 0.1 increase in the share of migrants born in an OECD country in the labour market is predicted to increase the wage level by 4.8 percent and if the share of migrants born in a non-OECD country in the labour market increases by 0.1, the wage of a low educated native increases by 14.1 percent. Likewise, the coefficient of the variable that represents the interaction between two above-mentioned variables is positive and significant.

An increase in the movements within the labour markets on the other hand, significantly reduces the wage incomes of low educated Swedes as indicated by the negative coefficient of the dummy variable, which takes on values according to the mobility of the individual within the labour market. Therefore internal migration has been shown to be negatively related to the wage incomes of low educated Swedes. Moving from one labour market to another is associated with a 2.1 percent decline in the wage of the individual. This result is interesting and even confusing as theory predicts that inter-labour market movements to result in higher wages for the individual. However our finding provides evidence for Hypothesis 2 to be rejected.

Meanwhile, a change in the variable representing the share of low educated Swedes in the specific labour market, which is intended to represent change in the level of labour supply in that market, tends to affect their wages in the same direction. Thus, according to the outcome of the regression; among all the labourers in the market, as the share of low educated Swedes increase, their wage incomes also tend to increase. 0.1 unit increase in the share of low educated Swedes in the labour market results in 1.63 percent increase in the wage level. This contradicts with the neoclassical settings. Besides, as one might expect, a rise in the employment level of the economy would trigger a rise in the level of wage incomes of low educated Swedes, as indicated by the significantly positive coefficient of the variable that

represents the employment level. 0.1 unit increase in the employment level is found to be associated with 12.5 percent increase in the wage level of the low educated Swede. Third hypothesis, where macro variables are expected to affect the wage levels of low educated Swedish population is therefore not to be rejected. However, the sign of the coefficient of the supply of labour has turned out to be positive.

Another highly expected outcome of the regression is the fact that individuals in the relatively highly educated group among the low educated Swedes tend to get higher wages, which is clear from the statistically significant coefficient of the dummy variable that takes on values according to the detailed education level of the low educated individual. The coefficient implies that a relatively higher educated Swede's wage is, on average, 26.2 % above a comparable low educated Swede's wage. Likewise, wages of low educated Swedes tend to rise as their age increases (when age increases by one year, wage level increases by 1.8 percent) and as the number of unemployed days fall (when days unemployed decreases by 1, wage level of the low educated Swede increases by 0.5 percent). Hypothesis 4 is not to be rejected according to these results.

All coefficients mentioned so far have large enough t-values to allow one to reject the null hypothesis that the particular coefficients are zero. Put another way, the p-values associated with those coefficients are all below one percent, which suggest less than 1 percent levels of significance for the rejection of the null hypothesis.

The F statistic of the model proves that the model is statistically significant overall. One might claim that low R-squared should be the main decisive factor to test whether the model is a good one. However in panel studies overall R-squared is not a criterion as in the social sciences, low R-squared in regression equations are not uncommon especially for cross-sectional analyses (Wooldridge, 2006: 44). When using longitudinal data for a large time span, R-squared might be found to be much lower. Still more variables could have been included in the analysis as they find their places in the literature review such as social capital. Although social capital has been used in previous studies, its measurement is still of question.

Regarding the fixed effects model, the model may suffer from multicollinearity as the variable, share of low educated Swedes in the specific labour market used as a proxy for the supply of labour in the market may be correlated highly with the explanatory variables; share of OECD and non-OECD country born individuals in a specific labour market. Therefore an auxiliary regression is run, which is summarized in the Appendix. The high overall significance of the regression suggests that there may be multicollinearity in the model.

However when the explanatory variable, share of low educated Swedes in the labour market is excluded from the regression, the results do not differ much. Therefore although one can argue that the model suffers from multicollinearity, I believe that it would not cause a considerable problem regarding the estimated and the model.

As panel models control for time invariant variables, gender was not included in the model as an independent variable. Therefore it may be interesting to see the fixed effects regression for two separate populations: Males and females. The results are summarized in the Appendix. The only difference for the two populations is that the statement “as share of Sweden born supply of labour increases wages go down” is satisfied within the female population. However the coefficient is significant at 0.05 level instead of 0.01 for this case. The signs of the rest of the coefficients and their significance, on the other hand, do not differ between the two regressions.

7 Conclusion

This study has put the research one step forward to analyze how migration affects the wages of the population in the bottom parts of the income distribution for Sweden. Previous studies have indicated mixed results: A recent study by Korpi (2006) found that total affect of migration decreased 50/10 percentile ratio improving the inequality measure. However in a more recent study Korpi (2008) indicates slight decreases in the 5th and 10th percentiles in the wage distribution as result of migration. None of the studies for Sweden had analyzed the impact of migration focusing on this vulnerable part of the population according to the income distribution. Therefore the results presented in Section 6 are critical in understanding the links between migration and wage levels of the population in the bottom parts of the income distribution in Sweden.

Low educated Swedes represent the natives with relatively lower wages well, and the population used in this study is therefore this subgroup. As the data covers the whole population between 1993 and 2003, the results should be taken as representative of the whole population and the regressions do not suffer from sampling errors.

Two findings of the study are interesting regarding the first two hypotheses namely that; (i) a high share of foreign born (with a differentiation between OECD and non-OECD immigrants) at the specific labour market is associated with a low wage level of the low educated Swedish population and; (ii) moving from one labour market to another (internal migration) is associated with an increase in wages for the low educated Swedes. Both these statements are falsified according to the fixed effects regression results. The hypotheses have their grounds in the theory; however this study could not find evidence for them, at least for the case of Sweden. The low educated natives seem to gain more as the share of foreign born increases in the labour market. The reason for this could be that immigrants, especially the ones from non-OECD countries are just assigned to a labour market on their arrival and are mostly composed of refugees or asylum seekers. Therefore they do not compete with low educated Swedes in the labour market. On the other hand, natives are found to lose as a result of internal migration from one labour market to another. The reason for this could be that low educated Swedes' migration from a labour market to another are due to some other reasons than higher wages. This result needs further analysis, where determinants of labour market switches for individuals can be investigated.

Other findings suggest that the third hypothesis that macro variables, like supply of labour and employment level, affect the wages of the low educated natives cannot be rejected. However a positive relationship between supply labour and wages is suggested contradicting with the neoclassical theory.

On the other hand human capital variables such as years of education, age and days unemployed are found to be associated with the wages of the low educated natives with their expected signs; positive, positive and negative, respectively, providing evidence for the last hypothesis.

The interesting results for the variables of international and internal migration need further analysis. The positive relationship between supply of labour and wages could be an outcome of the data problems, where an unbalanced panel is used. Moreover the proxy variable to measure for supply can be changed from a share variable to a total size variable, which may contribute to this work further.

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Appendix

Between Effects Model

```
Between regression (regression on group means)  Number of obs    =   15448009
Group variable: lpnr                          Number of groups   =    3690626

R-sq:  within  =  0.1146                      Obs per group: min =         1
        between =  0.1260                                avg  =        4.2
        overall  =  0.1338                                max  =         7
```

sd(u_i + avg(e_i))=	1.056187	F(9,3690616)	=	59121.17
		Prob > F	=	0.0000

logwage	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
shareOECD	1.416457	.0409133	34.62	0.000	1.336269	1.496646
shareNONOECD	8.246171	.0724374	113.84	0.000	8.104196	8.388145
OECD_NONOECD	-34.33192	.7879798	-43.57	0.000	-35.87633	-32.78751
sizeLowEduc	1.740326	.0170357	102.16	0.000	1.706936	1.773715
employment	3.491397	.0249261	140.07	0.000	3.442542	3.540251
MGRNT	-.4629268	.003257	-142.13	0.000	-.4693104	-.4565432
ALosDag	-.0070159	.0000126	-557.06	0.000	-.0070406	-.0069912
age	.0101983	.0000465	219.09	0.000	.010107	.0102895
educdummy	.224022	.0013633	164.33	0.000	.2213501	.226694
_cons	3.031551	.0218011	139.05	0.000	2.988821	3.07428

Fixed Effects Model

Fixed-effects (within) regression	Number of obs	=	15448009
Group variable: lprnr	Number of groups	=	3690626
R-sq: within = 0.1202	Obs per group: min =		1
between = 0.1009	avg =		4.2
overall = 0.1203	max =		7

corr(u_i, Xb)	= -0.0210	F(9,11757374)	= 178460.68
		Prob > F	= 0.0000

logwage	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
shareOECD	.479189	.0473249	10.13	0.000	.3864338	.5719442
shareNONOECD	1.408036	.1013865	13.89	0.000	1.209322	1.60675
OECD_NONOECD	18.04027	1.062077	16.99	0.000	15.95863	20.1219
sizeLowEduc	.1633523	.0119657	13.65	0.000	.1398999	.1868047
employment	1.250601	.0208915	59.86	0.000	1.209655	1.291548
MGRNT	-.0210553	.0014182	-14.85	0.000	-.0238349	-.0182757
ALosDag	-.0051387	4.76e-06	-1079.50	0.000	-.005148	-.0051294
age	.0184168	.0001312	140.38	0.000	.0181597	.0186739
educdummy	.2618434	.0023637	110.78	0.000	.2572106	.2664762
_cons	5.255906	.0132007	398.15	0.000	5.230033	5.281779
sigma_u	1.071324					
sigma_e	.75185058					
rho	.67000904	(fraction of variance due to u_i)				

F test that all u_i=0: $F(3690625, 11757374) = 5.13$ Prob > F = 0.0000

Random Effects Model

Random-effects GLS regression
Group variable: lprnr

Number of obs = 15448009
Number of groups = 3690626

R-sq: within = 0.1195
between = 0.1198
overall = 0.1332

Obs per group: min = 1
avg = 4.2
max = 7

Random effects u_i ~ Gaussian
corr(u_i, X) = 0 (assumed)

Wald chi2(9) = 2.11e+06
Prob > chi2 = 0.0000

logwage	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
shareOECD	.5737269	.029754	19.28	0.000	.5154101	.6320437
shareNONOECD	5.275998	.0499226	105.68	0.000	5.178151	5.373844
OECD_NONOECD	-19.6359	.5818162	-33.75	0.000	-20.77624	-18.49556
sizeLowEduc	.5650764	.009265	60.99	0.000	.5469172	.5832355
employment	2.004385	.0147832	135.58	0.000	1.97541	2.033359
MGRNT	-.0923689	.0012941	-71.38	0.000	-.0949053	-.0898325
ALosDag	-.0054273	4.42e-06	-1226.82	0.000	-.005436	-.0054186
age	.0113634	.0000385	294.92	0.000	.0112879	.0114389
educdummy	.2224363	.0011471	193.92	0.000	.2201881	.2246845
_cons	4.720107	.0106068	445.01	0.000	4.699318	4.740896
sigma_u	.95669807					
sigma_e	.75185058					
rho	.61819655	(fraction of variance due to u_i)				

Hausman Specification Test

---- Coefficients ----				
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
shareOECD	.479189	.5737269	-.0945379	.0368015
shareNONOECD	1.408036	5.275998	-3.867962	.0882438
OECD_NONOECD	18.04027	-19.6359	37.67616	.8885371
sizeLowEduc	.1633523	.5650764	-.4017241	.0075722
employment	1.250601	2.004385	-.7537832	.0147617
MGRNT	-.0210553	-.0923689	.0713136	.0005801
ALosDag	-.0051387	-.0054273	.0002886	1.76e-06
age	.0184168	.0113634	.0070534	.0001254
educdummy	.2618434	.2224363	.0394071	.0020667

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 26328.23
Prob>chi2 = 0.0000

Auxiliary Regression to test for Multicollinearity in the Fixed Effects Model

```

Fixed-effects (within) regression      Number of obs      =   15448014
Group variable: lprn                  Number of groups    =    3690629

R-sq:  within  = 0.4686                Obs per group: min =         1
      between  = 0.8187                  avg   =         4.2
      overall  = 0.7981                  max   =         7

corr(u_i, Xb)  = 0.2480                F(2,11757383)      =   5.18e+06
                                          Prob > F           =    0.0000

```

sizeLowEduc |	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
shareOECD |	-1.268282	.000657	-1930.54	0.000	-1.269569	-1.266994
shareNONOECD |	-1.375243	.0005014	-2742.65	0.000	-1.376226	-1.374261
_cons |	.813048	.0000564	14426.87	0.000	.8129375	.8131585
sigma_u |	.03912041					
sigma_e |	.018694					
rho |	.81410141	(fraction of variance due to u_i)				

F test that all u_i=0: F(3690628, 11757383) = 14.40 Prob > F = 0.0000

Fixed Effects Model for the Male Population

```

Fixed-effects (within) regression      Number of obs      =    8137992
Group variable: lprn                  Number of groups    =   1936243

R-sq:  within  = 0.1549                Obs per group: min =         1
      between  = 0.1018                  avg   =         4.2
      overall  = 0.1341                  max   =         7

corr(u_i, Xb)  = -0.0293                F(9,6201740)      = 126323.92
                                          Prob > F           =    0.0000

```

logwage |	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
shareOECD |	.5186104	.0577778	8.98	0.000	.4053679	.6318529
shareNONOECD |	2.097311	.1253474	16.73	0.000	1.851635	2.342987
OECD_NONOECD |	16.28452	1.311804	12.41	0.000	13.71343	18.85561
sizeLowEduc |	.3577071	.0149098	23.99	0.000	.3284843	.3869299
employment |	1.407626	.0259025	54.34	0.000	1.356858	1.458394
MGRNT |	-.0275548	.0017569	-15.68	0.000	-.0309983	-.0241114
ALosDag |	-.0052146	5.76e-06	-904.56	0.000	-.0052259	-.0052033
age |	.0184483	.0001623	113.64	0.000	.0181301	.0187665
educdummy |	.2441818	.0033295	73.34	0.000	.2376561	.2507074
_cons |	5.252392	.0164232	319.82	0.000	5.220203	5.284581
sigma_u |	1.0811203					
sigma_e |	.68099367					
rho |	.71593783	(fraction of variance due to u_i)				

F test that all u_i=0: F(1936242, 6201740) = 6.06 Prob > F = 0.0000

Fixed Effects Model for the Female Population

Fixed-effects (within) regression
Group variable: lprnr

Number of obs = 7310017
Number of groups = 1754414

R-sq: within = 0.0920
between = 0.1210
overall = 0.1300

Obs per group: min = 1
avg = 4.2
max = 7

corr(u_i, Xb) = 0.0187
F(9,5555594) = 62508.39
Prob > F = 0.0000

logwage	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
shareOECD	.4368643	.0773424	5.65	0.000	.285276	.5884526
shareNONOECD	.6845891	.1632895	4.19	0.000	.3645474	1.004631
OECD_NONOECD	19.75618	1.71259	11.54	0.000	16.39957	23.1128
sizeLowEduc	-.0488468	.019092	-2.56	0.011	-.0862665	-.0114271
employment	1.070387	.0335184	31.93	0.000	1.004692	1.136082
MGRNT	-.0138525	.0022774	-6.08	0.000	-.0183161	-.0093888
ALosDag	-.005037	7.86e-06	-640.74	0.000	-.0050524	-.0050216
age	.0183276	.000211	86.87	0.000	.0179141	.0187411
educdummy	.2793545	.0033845	82.54	0.000	.272721	.285988
_cons	5.26125	.021114	249.18	0.000	5.219867	5.302633
sigma_u	1.0020495					
sigma_e	.82366665					
rho	.59678177	(fraction of variance due to u_i)				

F test that all u_i=0: F(1754413, 5555594) = 3.68 Prob > F = 0.0000