Internal Migration of Young Adults – Heterogeneity in Effects on Labour Income by School Grades*

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Abstract

The present paper estimates the relationship between migration across labour-market regions and the subsequent changes in earnings in Sweden by using the individual's grade point average (GPA) from the final year of comprehensive school as a proxy for ability. This measure aims to capture heterogeneity in the effects of mobility on earnings for individuals conditional on educational attainment and other observed traits. Register data from Sweden, including two whole cohorts of individuals, is used. A difference-in-difference propensity score matching estimator is applied to estimate the relationship between income and migration up to seven years after migrating. The results show variation between different ability groups with respect to the return to regional migration. There are indications of larger gains for individuals holding top grades, while the bottom half seems to benefit less, or have slightly negative returns. The difference in return to migration across GPA quartiles is larger for women than for men.

Keywords: Human capital; income; internal migration; propensity score matching
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1. Introduction

The decision to migrate is viewed by economists as an investment in human capital. Individuals, with respect to their personal characteristics are assumed to migrate when the utility of migrating to another location is higher than the utility of remaining in their present location (see, e.g., Sjaastad, 1962; Davies *et al*., 2001). The differences in the utilities across locations typically reflect changes in income and consumer prices, but can also include non-monetary elements, such as some location-specific amenities and place attachment. All else being equal, the model predicts that on average migration leads to higher earnings, usually through better job matches. The main question to be addressed in the present study is whether regional migration at young age will increase the individual's gross labour income and, particularly, whether the pecuniary returns to migration are influenced by individual's ability as measured by the individual's Grade Point Average (GPA) from comprehensive school. Acknowledging the potential heterogeneity in pecuniary returns, two additional and more specific questions are addressed: Is there a difference in the returns to migration with respect to individuals' GPA from their final year of comprehensive school, when conditioning on educational attainment? If so, are the differences between individuals position in the GPA distribution the same for males and females and across education groups?

Earlier research on the returns to migration for single people generally finds positive and significant effects of migration on the subsequent income. However, the size and significance of these effects differ between different groups, where the economic gain is usually larger for the highly educated. In a study by Ham (2011) the effect is negatively significant for those with low education (here: high-school dropouts) but positively significant for the highly educated. On the other hand, Yankow (2003) finds that the timing of benefits differs between education groups: the low-educated experience an immediate positive return, whereas the highly educated experience a two-year time lag before reaping positive income effects. The total gain for the highly educated is still larger compared to the high-school dropouts. Nakosteen and Westerlund (2004) find that the effect for already employed individuals is larger compared to that for the previously unemployed. Many studies include single men only, excluding females, for whom the income effect is more difficult to correctly estimate, due to the fact that they are more likely to work part-time. In the few studies done on gender differences, the effects for men are positive and significant, while the results for women are more ambiguous (see, e.g., Nilsson, 2001). Civil status and the presence of children seem to matter for women. In studies on educational levels and gender differences, the highly educated single women experience a positive, but smaller, income gain from migration compared to comparable men (see, e.g., Jacobsen and Levin, 1997;

Eliasson *et al*., 2007). This study will consider the differences in effects that exist between genders and educational levels, and estimations will be executed for each group separately. In a study by Pekkala (2002) on Finnish regional migration that considers the destination of the migrants, the results show that income effects are larger for migrants moving to more prosperous regions. Similar results are found by Lehmer and Ludsteck (2011), indicating that young rural-to-urban migrants seem to benefit the most in terms of income. The present study will not directly study the effects of the chosen location but instead control for regional characteristics before migration and give a brief description of differences in the location choices of the migrants.

The vast majority of studies on the effects of migration measure human capital and skills by the level of individuals' formal educational attainment, treating individuals at a given level of education as a homogenous group. In reality, this is not the case. Individuals display a wide spectrum of skills and abilities also within educational levels. It is nonetheless difficult to accurately measure what determines the ability or skill level of an individual. A central problem in the existing literature is unobserved heterogeneity (e.g., abilities) which may lead to bias in the estimated returns to migration. The present paper incorporates one such measure of ability, namely the GPA from the individual's 9^{th} and final year of comprehensive school. It is expected to control for productive abilities not fully reflected in the usual indicators of human capital, e.g. levels of educational attainment. An underlying assumption is that the GPA serves as an indicator of individual abilities/skills that influence the probability of migration and the return to migration of young adults. The GPA measure used includes the individual's grades in all school subjects in the last year of compulsory school. In Sweden, the curriculum for comprehensive school up to grade nine is centrally regulated, with some room for variation on the local level. For the core subjects (Swedish, Math and English), grades are based on standardised tests. The grades are measured on a scale from 1 to 5, with 5 being the highest. There are previous studies using different indicators of ability to explain outcomes such as income later in life, non-academic success and returns to schooling. Some studies measure latent cognitive ability by using test scores when explaining different labour-market outcomes (see, e.g., Boissiere *et al*., 1985; Heckman *et al*., 2006). In a manner similar to that of the present study, Wikström and Wikström (2011) study the return to education for Swedish students using the same measure of GPA as in this study. They find that the return to education for university graduates is higher for students who belong to the top two quintiles of the GPA distribution. Moving down the GPA distribution, the return to education decreases. Further, the descriptive statistics indicate that incomes are on average higher in the top quintiles compared to those in the bottom quintiles, both for university entrants and for non-entrants. Studies on returns to education using GPA

scores from U.S. colleges confirm that individuals with higher GPA scores reap larger returns to education (see, e.g., Wise, 1975; Jones and Jackson, 1990; Loury and Garman, 1995). This suggests that the GPA reflects some form of ability affecting productivity. Glaser and Maré (2001) study the relationship between ability, measured by military test scores, and income among city residents and residents of rural areas. When controlling for the test scores, they find that the test scores reflect about one-third of the city wage gap, suggesting that there is more behind the results than just the urban wage premium.

By comparison with the earlier literature discussed above, the present paper contributes in primarily two ways: Firstly, in addition to estimating the returns to migration by gender and formal level of educational attainment, this study examines heterogeneity in returns to migration by ability level (as indicated by the GPA from comprehensive school). Secondly, the follow-up period of the effects is longer than in previous studies, resulting in more information on income trajectories after migration. In many studies mentioned above, changes in income are observed for only up to four or five years after migration (see e.g., Nilsson, 2001; Pekkala, 2003)

When estimating income effects of migration, the main problem that arises is that the migration decision is not randomly assigned to individuals, that is, there may be systematic self-selection. This implies that migrants might differ from non-migrants in ways that would affect also their income for reasons other than migration. Therefore, comparing the returns to migration between migrants and non-migrants might render biased estimates (Nakosteen and Zimmer, 1980). Other studies have dealt with the selection problem in different ways: some studies use a "selection on unobservables" approach – for example, a Heckman two-step estimator (see, e.g., Borjas *et al.*, 1992; Nakosteen and Westerlund, 2004) while others use a "selection on observables" approach (see, e.g., Ham, 2011; DiCintio, 2011). This study uses data on a rich set of observed characteristics and will apply the latter, i.e. difference-in-difference propensity score matching, which controls for observed attributes as well as for time-invariant unobserved heterogeneity of the individual. The applied estimator is discussed further in section 3.

The remainder of the paper is structured as follows: in section 2, a short discussion of the migration decision is followed by a description of the estimator and empirical strategy. Data is presented in section 3. Section 4 presents the results, while section 5 forms the conclusion of the paper.

2. The migration decision and empirical method

2.1. Who migrates and why?

As stated in the introduction, migration takes place if the utility of moving to another location exceeds the utility of remaining in the present location less the cost of migration. Consider that this decision is made over a lifetime of future utilities discounted to present value. The utility maximisation can be expressed formally as:

$$PV_{i0} = max \int_0^T e^{-rt} \left[\mathrm{U}_{im}(\mathrm{x}_{im}(t)) - \mathrm{U}_{ip}\left(\mathrm{x}_{ip}(t)\right) \right] dt - \mathrm{C}_{im} \qquad (1)$$

where PV_{i0} is the net present value of expected utility for individual i measured in the beginning of the planning period. The instantaneous utility of residing in the present location is given by U_{ip} and is determined by individual and regional characteristics, $x_{ip.}$ U_{im} is the corresponding utility of migrating to another location. C_{im} reflects the personal migration costs of the individual and r is a discount rate. Migration takes place if $PV_{i0} > 0$.

Variables that influence the utility function and the migration costs differ depending on the type of move – for example, international migration, regional migration or residential migration. In the setting of this paper, the migration decision pertains to mobility between labour-market regions within a country of individuals aged 26-28. This means that here, this type of migration is typically (although not always) associated with a change of workplace, transition into employment or and/or job search at the new location (i.e., "speculative migration", see e.g., Jackman and Savouri, 1992). As individuals are heterogeneous, their utility functions differ with respect to personal, regional and social attributes, and they will therefore experience different benefits and costs when living in different regions. The underlying assumption of the specification of the empirical model in the following section is that the net benefits are reflected in the characteristics of the individuals and the regions. They include age, educational level, labour-market experience, labour-market conditions and local ties.

Typical findings of the effect of personal attributes include that the propensity to migrate increases with educational levels and unemployment experiences, and decreases with age and higher incomes (see, e.g., Antolin and Bover, 1997; Greenwood, 1997; Ritsilä and Ovaskainen, 2001). Regional factors in the initial location such as high regional unemployment rates, low population densities and low employment opportunities are examples of factors that encourage migration (see, e.g., Greenwood *et al.,* 1991; Westerlund, 1997; Tervo, 2000; Détang-Dessendre *et al.,* 2008). Previous literature has also found that amenities, local ties and family members' locations are all factors that will influence this decision (see, e.g., Florida 2002; Fisher and

Malmberg, 2001; Mulder, 2007). Past migration has also been found to positively affect the probability of subsequent migration (see, e.g., Kodrzycki, 2001; Haapanen and Tervo, 2012). Tano (2014) studies the role of the Year 9 GPA in the migration decision, and find that university graduates with a higher GPA are generally more likely to migrate after graduation.

2.2. Description of empirical method

The estimation method used to identify the returns to migration is a difference-in-difference propensity score matching estimator (PSM). This means that the earnings outcomes for treated individuals (i.e., migrants) are compared to the earnings outcomes of comparable non-migrants matched on their propensity scores. Due to the unavailability of experimental data, this study is based on a non-experimental strategy and, more specifically, a selection-on-observables approach, but one that considers time-invariant heterogeneity in unobserved individual characteristics.

Selecting on observables is suitable when dealing with particularly rich and accurate data.[2] The data presented in more detail in the next section allow controlling for a large number of observed characteristics, including an ability measure in the form of the GPA, measured at age 16. A systematic difference in unobserved characteristics, such as ambition, drive and productivity between migrants and non-migrants may still exist. However, some of the ambition and productivity may be captured by matching on income prior to migration and on GPA scores.

McKenzie *et al.* (2010) compare different non-experimental approaches and find the difference-in-difference PSM estimator outperforms the difference-in-difference OLS estimator in terms of bias. In addition, matching on income before migration corrects the bias even further. Using a PSM estimator offers flexibility in the form of fewer parametric assumptions, and controls for common support – that is, there is no extrapolation of results for migrants with different characteristics than those of the control group. The parameter of main interest to be estimated is the average treatment effect of the treated (ATT) – that is, the average earnings effect of migration for the migrants – and can be expressed as:

$$ATT = E[Y_1 - Y_0 \mid D=1] = E(Y_1 \mid D=1) - (Y_0 \mid D=1) \quad (2)$$

where Y_1 is the outcome of interest for the treatment group, and Y_0 is the hypothetical outcome for the treatment group in the absence of migration. D denotes migration status and equals 1 for migration and 0 for non-migration. Since only one outcome can be observed for each individual

[2] Although taken from a different context, comparison studies between experimental and non–experimental data for estimation of returns to education indicate that if the quality of the non–experimental data is of high quality , using a selection on observables approach the bias is small (see e.g.Heckman *et al.*, 1999; Smith and Todd, 2005).

the counterfactual outcome, that is, $(Y_0 \mid D=1)$, needs to be constructed in order to find the ATT. The estimation of the ATT is performed in two steps: first the propensity score is estimated using a logit model for selection into treatment – regional migration in this case. The second step is to compare the difference in incomes before migration and incomes a number of years later between migrants and non-migrants who are close matches in their propensity scores (i.e., selection into treatment). This will produce an estimate of the ATT.

The ATT can only be identified and causally interpreted if the following three identifying assumptions hold (Rosenbaum and Rubin, 1983). One is that conditional on the selected covariates the outcome of non-treated individuals is independent of treatment assignment. A second assumption states that a match must exist in the control group for each treated individual. Lastly, treatment of one individual cannot prohibit treatment of another individual, that is, treatment cannot be mutually exclusive. Matching on common support ensures that for every treated individual, a comparable non-treated counterpart exists, i.e. the second condition is met. The third condition is also fulfilled, since the decision of one individual to migrate does not prevent another individual from making the same decision. The choice of what variables to include in the matching estimator to satisfy the first condition is discussed in the section 2.3, below. To reduce within sample heterogeneity and allow different parameters across subsamples, separate estimates of the ATT by education group, by gender and by GPA quartiles have been carried out. The nearest neighbour matching procedure is used, where an individual who migrated is matched with four of the closest non-migrants in propensity scores.[3] By increasing the number of matched neighbours, the bias is increased but the variance is reduced. The sample is also trimmed by 7%, that is, 7% of the tails of the propensity score sample distribution are eliminated from the estimates of ATT.[4] This allows for better control of common support and will leave out the extreme values in the tails, where the eventual remaining selection bias is larger. Matching with replacement is carried out, meaning that the different treated individuals are allowed to share the same neighbours, which reduces bias and makes the order of matching unimportant.[5]

The outcome variable in this study is the change in labour income between the base year and 2005, up to the change between the base year and 2009. The base year income is defined as the average labour income for the individual during 2001 and 2002. The reason for this is to avoid the influence of a temporary income decrease in 2002, which could be a cause of migration and hence render upward biased estimates. Measuring labour income changes up to seven years after

[3] There are many non–treated with propensity scores very close to the treated which makes it relevant to compare each treated to more than only one non–treated individual.

[4] Alternative estimations were done by changing number of neighbours, changing the trimming level and using a Kernel estimator. For comparison of results by estimators, and trimming levels, see the result section and Appendix E.

[5] Since the pool of non-treated is large, the risk of only a few of the non-treated being a neighbour to the treated is small.

migration allows for an adjustment to the new labour market affecting income over time. Previous studies indicate that income gains are not always realised immediately after migration but rather up to five or six years after the relocation (see, Yankow, 1999; Borjas *et al*., 1992). The outcome is measured in real annual gross earnings of labour with no information about working hours or hourly wages. However, the covariates in the propensity score estimator include variables that should capture a substantial share of heterogeneity in work hours (e.g., previous earnings, children, sector of work). Furthermore, since estimations are carried out separately for men and women, the systematic difference in hours worked that exists between the genders should not be a problem. Since the individuals are of child-bearing age (i.e., 25–32), it will have an effect on the (female) labour supply. But descriptive statistics for matched samples show no significant difference between the migrants and non-migrants with respect to having children, in either the years before migration or the years after.

2.3 Estimating the propensity score

Generally, the variables in the empirical model are considered to be potential determinants of individual and regional attributes affecting the migration decision via individual's utility of locations and/or migration costs as discussed in Section 2.1. In order to correctly identify treatment effects, choosing the variables for the matching estimator is therefore very important: the unobserved characteristics cannot influence both the selection into treatment and the outcome.[6] Previous literature suggests that a specification that is inaccurate in that it includes irrelevant variables in the propensity score estimator can yield biased estimates (see, e.g., Heckman *et al.*, 1998; Dehejia and Wahba, 1999; Waernbaum, 2008). Only variables that affect both the selection into treatment and the outcome should be included in the propensity score estimation. Therefore, insignificant variables are dropped from the estimation, except when important for balancing the matched samples. This issue is discussed further in section 4.1.

As mentioned above the matching variables should not be affected by the anticipation or decision of the migration decision. This implies that the matching variables need to be measured before the time of migration, that is, in 2002.[7] Possible systematic differences in the productivity of migrants and non-migrants are an impediment to correct identification, even when using the difference-in-difference estimator. Matching on income prior to migration is one way to capture differences in productivity. In the PSM estimator used here, individuals are matched on their average income, two and three years prior to migration.[8] Another issue that might arise is the

6 Unless the unobserved characteristics have the same distribution for treated as for non-treated.

7 The variables are measured on December 31st for the respective year, this guarantees that variables measured in 2002 pertains to the "old" location.

8 Matching on the income change before migration was also tried which gave the same results.

potential negative income shocks that would influence the migration decision and render upward bias estimates of the ATT, known as Ashenfelter's dip (see, Ashenfelter, 1978). If this income change is temporary controlling for the average income during the years before the migration decision is made will reduce the bias. On the other hand, if the income shock is of a more permanent nature, controlling for the change in income would be needed to avoid understating the income effects of migration. Including change in income 1999–2001 when estimating the propensity score was also tested, but turned to be insignificant and had no substantial effect on the estimates of ATT. The reason for not matching on income further back in time relates to the more volatile incomes and observations of zero or very small incomes for this young population. This is particularly relevant as regards the highly educated who were enrolled in education, during which their observed incomes might not give an accurate picture of their true productivity. The variables included in the propensity score are presented in more detail in the next section.

3. Data

The data is individual register data from the Linnaeus database at Umeå University.[9] The sample consists of two entire cohorts born in 1974 and 1976 who were registered as residents of Sweden between 2002 and 2009. The reason for selecting these cohorts is that the 1974 cohort is the first cohort for which all information on the individuals' Grade 9 GPA is available. The second cohort is included to add more observations, for variation in the data and for stability checks. The sample is restricted to individuals who are registered as single at the time of migration, that is, in 2002.[10] This is done for two reasons. First, the vast majority of the individuals in this age group (26–28) are single.[11] Second, when looking at the underlying decision problem, it is easier to correctly estimate the singles' decisions. For couples, one or both of the partners may be a "tied" mover or a "tied" stayer (see, e.g., Mincer, 1978; Eliasson *et al*., 2013). This implies that the location choice may result in decreased personal income for one of the individuals, even though the household income increases. Further, location decisions for a dual earner household can result in a suboptimal choice for both partners (as compared with optimum would they have been singles, see e.g., Lundberg and Pollak, 2003). Therefore, since the role of an individual's GPA is of interest in this study, estimating the returns to migration for individuals without partners will allow a more straightforward interpretation of the estimates.

[9] For further description of the database see Bonita *et al.* (2011).

[10] The individual is neither married not cohabiting with a child. The limitations in coding of the register data causes cohabiting individuals without children to be observed as singles.

[11] In this sample, 85 % of the individuals are single at this point in time.

The sample is divided into subsamples by educational level and gender. Two classifications of educational level are used in this study. The first includes all individuals who do not have a degree from post-secondary education by the year 2002, amounting to 74,537 individuals. The second consist of all individuals who have at least two years of post-secondary education by 2002, totalling 44,201 individuals.[12] The first sample will be referred to as the "low-educated" and the latter will be referred to as the "highly educated". These education groups are then subdivided by gender. This leaves us with 20,634 men and 23,567 women holding a post-secondary education and 46,595 men and 27,942 women without such education. Finally, the four subsamples are divided by GPA quartile to identify differences across the GPA distribution. The cut-off points for the respective quartiles for each subsample are shown in Appendix A. The rich number of observations makes it possible to stratify the sample into smaller groups, thus also permitting the identification of heterogeneous effects between groups (e.g., Heckman *et al.*, 1997).

The treatment is defined as migration across labour market regions (LMA) between the December 31st 2002 and December 31st 2004. Since the data is only available up to 2009, to ensure a long follow-up period after migration the point of migration must be measured a sufficient number of years before 2009. Also, measuring migration when the individuals are too young is not meaningful, as their earning levels have not yet stabilised. Therefore, measuring migration when the individuals are 26 and 28 years old, allows observation of income levels that are closer to the individuals' permanent incomes, which will be needed to correctly estimate the effects of migration on their subsequent income. Allowing for a two-year time span for observing migration increases the number of moves and gives sufficient variation in the data. Individuals in the control group do not migrate between 2002 and 2004 or any time thereafter. The reason for not allowing migration after the studied period is to avoid comparing migrants to individuals who migrate shortly after.[13] Using migration across labour market areas is an attempt to target job-related migration instead of mere changes of residence, since the variable of interest is the change in labour income. There are 87 LMAs in Sweden, all based on the observed commuting patterns between the Swedish municipalities.[14]

[12] This is the official definition of a post–secondary degree from the Swedish Statistics (SCB).

[13] Generally it is not advised to consider things happening after the "treatment". On the other hand, this will ensure that migrants are compared to non–migrants only. Furthermore, the exclusion of late-migrants do not change the results and have no further implication for conclusions.

[14] This is based on the division of Local Labour Markets in 2003 by Statistics Sweden. For further information see Håkansson (2010).

Table 1. Descriptive averages of the low educated group by gender and treatment status, matched and unmatched samples.

	Females					Males				
	Unmatched		Matched			Unmatched		Matched		
	Migrants	Non-Migrants	Migrants	Non-Migrants	*P*-value	Migrants	Non-Migrants	Migrants	Non-Migrants	*P*-value
Individual Attributes										
Base year	116647	137692	119800	121140	.374	158921	188675	162330	165653	.431
Outside labour force	0.13	0.11	0.14	0.13	.637	0.15	0.10	0.16	0.16	.656
Students	0.20	0.13	0.17	0.17	.843	0.14	0.06	0.09	0.09	.860
Children	0.12	0.15	0.12	0.13	.830	0.01	0.01	0.01	0.01	.370
Previous migration	0.42	0.11	0.37	0.38	.663	0.43	0.09	0.38	0.38	.768
Cohort 1976	0.55	0.52	0.54	0.53	.784	0.56	0.51	0.55	0.55	.941
Commuters	0.23	0.05	0.18	0.17	.520	0.28	0.07	0.23	0.23	.780
Industry	0.09	0.10	0.09	0.08	.813	0.21	0.27	0.22	0.21	.292
Farming	0.01	0.01	0.01	0.01	.597	0.02	0.02	0.02	0.02	.931
Construction	0.00	0.01	0.00	0.00	.672	0.09	0.12	0.09	0.09	.583
Retail	0.22	0.23	0.22	0.23	.760	0.23	0.25	0.23	0.23	.650
Finance	0.12	0.14	0.12	0.12	.968	0.13	0.12	0.12	0.13	.434
Education	0.06	0.07	0.06	0.06	.999	0.03	0.02	0.03	0.03	.945
Health care	0.19	0.20	0.19	0.18	.465	0.04	0.03	0.04	0.04	.746
Service	0.14	0.11	0.14	0.14	.959	0.10	0.07	0.09	0.09	.938
Year 9 GPA	3.00	2.97	2.99	2.98	.755	2.75	2.76	2.75	2.75	.731
Avinc9900	103560	113680	103670	102870	.760	135360	159120	138190	135770	.365
Regional Attributes										
Tax base	118.1	121.1	118.3	118.6	.500	117.0	119.8	117.3	117.4	.674
High unemployment	0.21	0.16	0.21	0.21	.854	0.24	0.18	0.23	0.24	.311
Density	171.1	236.8	175.7	179.6	.604	146.4	210.5	152.7	156.3	.541

Note: The attributes are measured in 2002 unless stated otherwise. Income is measured as real annual gross labour income in SEK, where €100 is approximately SEK 870 (2002).

Table 2. Descriptive averages of the highly educated group by gender and treatment status, matched and unmatched samples.

	Females					Males				
	Unmatched		Matched			Unmatched		Matched		
	Migrants	Non-Migrants	Migrants	Non-Migrants	*P*-value	Migrants	Non-Migrants	Migrants	Non-Migrants	*P*-value
Individual Attributes										
Base year	130055	169609	136535	140437	.792	164008	129246	190636	144490	.871
Outside labour force	0.17	0.13	0.17	0.15	.697	0.07	0.04	0.08	0.06	.619
Students	0.38	0.24	0.34	0.34	.826	0.41	0.21	0.37	0.37	.726
Children	0.01	0.02	0.01	0.01	.911	0.01	0.01	0.01	0.01	.806
Previous migration	0.55	0.31	0.51	0.51	.400	0.52	0.30	0.49	0.49	.701
Cohort 1976	0.60	0.50	0.59	0.58	.302	0.56	0.47	0.55	0.54	.469
Commuters	0.37	0.11	0.32	0.33	.715	0.35	0.09	0.31	0.31	.714
Industry	0.08	0.09	0.08	0.09	.423	0.18	0.19	0.18	0.18	.863
Farming	0.01	0.00	0.01	0.01	.497	0.01	0.01	0.01	0.01	.879
Construction	0.00	0.01	0.00	0.00	.460	0.09	0.12	0.09	0.09	.914
Retail	0.10	0.10	0.10	0.10	.974	0.12	0.11	0.11	0.11	.775
Finance	0.14	0.17	0.14	0.14	.819	0.21	0.29	0.21	0.22	.680
Education	0.19	0.24	0.20	0.20	.375	0.13	0.13	0.14	0.14	.811
Health care	0.22	0.19	0.22	0.22	.162	0.09	0.06	0.09	0.09	.882
Service	0.10	0.07	0.09	0.09	.619	0.07	0.05	0.07	0.07	.914
Year 9 GPA	3.82	3.80	3.83	3.83	.810	3.62	3.66	3.63	3.63	.709
Avinc9900	70620	94225	73235	74240	.962	73015	106170	75729	77540	.978
Regional Attributes										
Tax base	118.4	123.5	118.9	119.2	.459	117.5	123.5	118.0	117.9	.714
High unemployment	0.17	0.11	0.16	0.15	.385	0.21	0.11	0.19	0.19	.445
Density	181.4	290.3	192.0	198.6	.737	159.3	290.7	168.4	168.9	.897

Note: The attributes are measured in 2002 unless stated otherwise. Income is measured as real annual gross labour income in SEK, where €100 is approximately SEK 870 (2002).

Table 1 and 2 provide descriptive statistics of the variables by gender, migration status and educational level. The tables show the means for each sample before and after matching.[15] Formal definitions of the variables are found in Appendix B. The migration rates range between 5.4% for the low-educated to 13.4% for the highly educated. The matching variables include sector of work, education status (*Student*), having children (*Children*), cohort group (*1976*), previous migration status (*Previous migration*), and commuting status (*Commuters*) and previous gross income. The income measure used in this study is gross labour income measured in SEK.[16] Individuals are matched on their average labour income in 1999 and 2000 (*Avinc9900*). Further, the individuals are matched on three regional characteristics of their region of residence in 2002: *Density* (the population density in the region), *Tax base* (the average tax base per capita) and *High unemployment* (dummy if the unemployment rate is larger than 6% in the LMA of residence). An unemployment level of 6% captures the most severe regions of unemployment, which is believed to be a push factor for out-migration.[17] The variables *Avinc9900, Tax base* and *Density* are continuous, while the rest of the variables are coded as dummies, equal to one if a particular characteristic applies and zero otherwise. For unmatched samples, the sample means indicate substantial differences between migrants and non-migrants in some attributes. As expected individuals migrate to a larger extent if they are studying, commuting, have previously migrated and have a lower prior income. The regional attributes of the initial location also seem to have an impact on the propensity to migrate. Individuals migrate to a larger extent from areas with lower *Density* and *Tax base*, while initial location in regions with lower unemployment rates seems to discourage migration. The p-values indicate the significance level of the difference in sample means between migrants and non-migrants for matched samples. As can be seen from the tables, the samples of migrants and the matched comparisons are balanced, that is, they were not significantly different in their average characteristics. The earnings trajectories of the matched samples of migrants and non-migrants before and after the time of migration can be seen in Figures 1 (a-d). It can be noted that the income paths are similar for all samples up to 2001, but for the low educated, incomes start to diverge around 2002. This may indicate problems with self-selection, which can lead to bias in estimated of the returns to migration for this group.[18] In the sample of highly educated, there is no significant difference in incomes between migrants and non-migrants up to the point of migration. After 2002 the income for the migrants is slightly higher, indicating a positive return to migration.

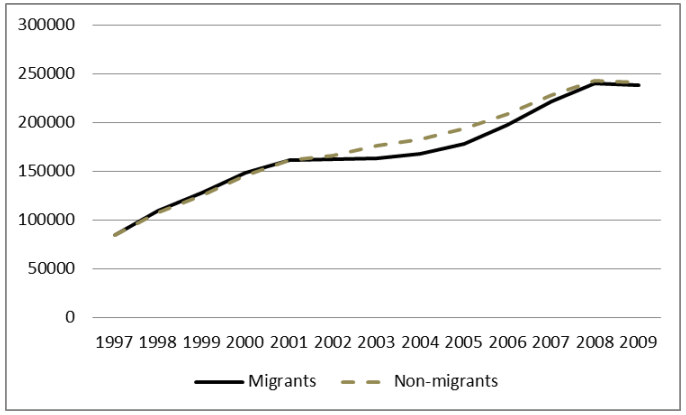
[15] In the sample after matching observations of non-migrants are only included if they serve as a neighbor to at least one migrant.

[16] The exchange rate varies between 8.5–10.5 SEK per Euro during this time period.

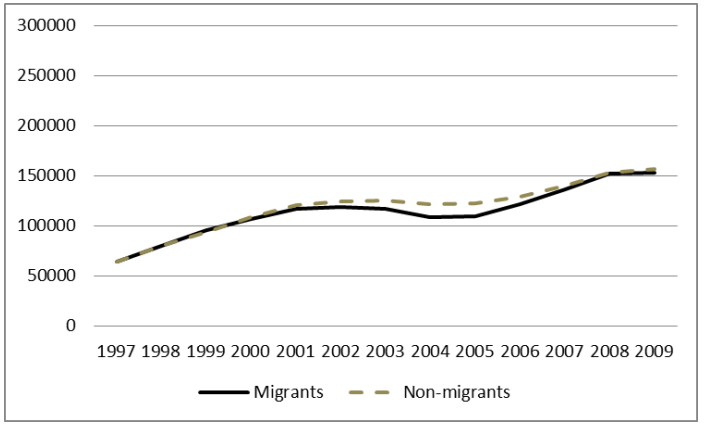
[17] This unemployment level corresponds to a quarter of the LMAs.

[18] This will give an upward bias of the results if the shock is temporary or a downward bias if it is permanent.

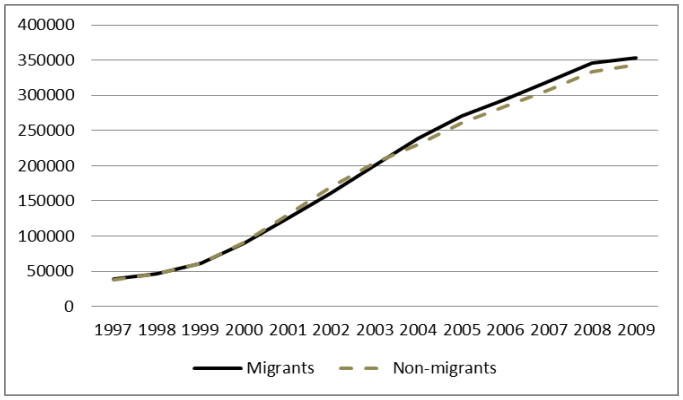
Figure 1. Income trajectories of matched samples.



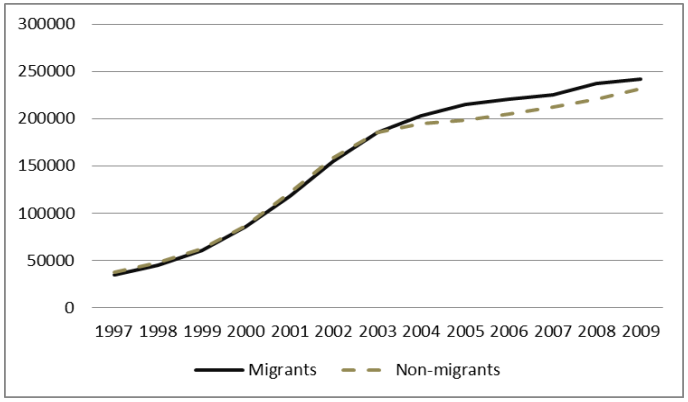
a. Low-educated females



b. Low-educated males



c. Highly educated females



d. Highly educated males.

4. Results

The propensity scores are estimated with logit, and the results for each sample are given in Appendix C. This section begins with a presentation of the ATT estimates for the four samples stratified by education and gender followed by tests of heterogeneity in effects and robustness checks. The results for the samples of low-educated and highly educated are given in Tables 3a and 3b, respectively. The ATT estimates are expressed in terms of gross labour income, in Swedish Krona (SEK). The standard errors are estimated by bootstrapping with 500 repetitions.[19] For comparison, the ATT is presented for estimates of the probability of migration both including and excluding the GPA (as a continuous variable).[20] The differences between results conditioning on GPA in the propensity scores and those not conditioning on GPA are relatively small.

Table 3a. Estimates of the average treatment effect (ATT) of the low-educated, by gender.

Difference in labour income	**Males**		**Females**	
Δ base – 2005	**-14,934*** **	**-14,169*** **	**-7,852 *** **	**-8,213*** **
	(-6.36)	**(-6.08)**	**(-2.57)**	**(-2.69)**
Δ base – 2006	**-8,996*** **	**-9,688 *** **	-1,944	-3,893
	(-3.62)	**(-3.90)**	(-0.60)	(-1.20)
Δ base – 2007	-3465	-3,495	2,090	-1,641
	(-1.29)	(-1.31)	(0.62)	(-0.49)
Δ base – 2008	586	326	4,055	-68
	(0.19)	(0.11)	(1.16)	(-0.02)
Δ base – 2009	1,386	1188	779	-1,650
	(0.46)	(0.40)	(0.22)	(-0.46)
Matching on GPA	YES	NO	YES	NO
Untreated	46,331	46,338	28,376	28,376
Treated	3,191	3,191	2,213	2,213

Note: The estimations were done with 4 nearest neighbours, and only include observations with "common support". *,**,*** indicates significance on 10%, 5% and 1% respectively. The standard errors are bootstrapped with 500 repetitions.

[19] In general, the standard errors are not different to the ones computed from the PSM estimator or with fewer repetitions.

[20] Other variations of GPA were also tried e.g. GPA quartile and GPA^2, producing similar results.

Table 3b. Estimates of the average treatment effect (ATT) of the highly educated, by gender.

Difference in labour income	**Males**		**Females**	
Δ base – 2005	**20,957 *** **	**19,966*** **	**20,215*** **	**21,419*** **
	(6.05)	**(5.75)*** **	**(6.13)**	**(6.48)**
Δ base – 2006	**21,490*** **	**20,667 *** **	**19,331*** **	**21,822*** **
	(5.76)	**(5.49)**	**(5.38)**	**(6.06)**
Δ base – 2007	**21,779*** **	**22,217*** **	**17,086*** **	**19,668*** **
	(5.44)	**(5.51)**	**(4.50)**	**(5.16)**
Δ base – 2008	**22,638*** **	**22,873 *** **	**20,721*** **	**18,190*** **
	(5.42)	**(5.43)**	**(5.31)**	**(4.68)**
Δ base – 2009	**21,156*** **	**19,853 *** **	**14,256*** **	**15,368*** **
	(4.82)	**(4.48)**	**(3.68)**	**(3.96)**
Matching on GPA	YES	NO	YES	NO
Untreated	18,235	24,785	28,378	27,151
Treated	2,239	2,239	2,261	2,483

Note: The estimations were done with 4 nearest neighbours, and only include observations with "common support". *,**,*** indicates significance on 10%, 5% and 1% respectively. The standard errors are bootstrapped with 500 repetitions.

The results clearly show that the economic gain from migration differs by level of education. For the samples of individuals with low education, there is no indication of significant positive earnings increases from migration. The highly educated experience a positive and significant economic gain following migration and this applies to both genders. Estimated ATT varies between 14,000 and 23,000 SEK over the years of follow up. Different trends are shown for males and for females, in that the earnings gain for the former seems to be more or less stable over time. For the females on the other hand, there is a stable increase up to six years after migration. Thereafter, the return to migration decreases somewhat, but still remains positive. Larger positive effects for the highly educated are consistent with previous studies (e.g., Ham, 2011; Eliasson *et al*., 2007) and with *a priori* expectations. A possible explanation for these results is that individuals with higher formal education have specialised skills and match with jobs in thin labour markets being more spatially dispersed and with larger wage dispersion because of more individual/decentralised wage setting.

Overall there's is no significant positive effect on income for the low-educated although there's a trend that the point estimates increases over time. However, the results suggests that in the long term migrants with no post-secondary education are neither better nor worse off compared to their non-migrant counterparts in terms of income. The short-run negative earnings outcome of migration and the absence of positive returns may be due to adjustment costs and smaller wage dispersion for individuals with less formal education, indicating that the economic gains that can be achieved from moving are low. The estimates in Tables 3a and 3b only show the average general effects by gender and educational attainment. The main focus of this study is to examine the heterogeneity in effects across the individuals' Year 9 GPA.

Since there seems to be no difference in results whether or not GPA matching is done, each sample (e.g., low-educated males) was therefore divided into four subsamples by GPA quartiles. The results from these estimations are presented below, where Table 4a displays the results for the low-educated and Table 4b ditto for the highly educated. The first column shows the ATT for the lowest quartile (Q1) and the last column shows the results for the highest quartile (Q4). Generally for the low-educated group, no solid evidence of positive returns to migration is found, even when splitting up the sample by GPA quartiles. The only positive and borderline significant result is found for females in the highest GPA quartile, seven years after migration. Negative returns to migration were found for some of the quartiles in the low education group. These remained significant only up to 4 years after migration, and are consistent with previous findings (see, e.g., Borjas *et al.,* 1992). The negative estimates seem to be somewhat more persistent for the males and not present at all for females in the top half of the GPA distribution.

Table 4a. Estimates of the average treatment effect (ATT), of the low-educated, by gender and GPA quartile.

Difference in labour income	GPA Q1	GPA Q2	GPA Q3	GPA Q4
Males				
Δ base – 2005	**-12,625*** **	-6,526	**-11,297*** **	**-12,143*** **
	(-2.57)	(-1.10)	**(-2.16)**	**(-2.17)**
Δ base – 2006	**-16,734*** **	2,475	**-13,036*** **	-3,109
	(-3.23)	(0.42)	**(-2.71)**	(-0.52)
Δ base – 2007	-8,586	7,312	-7,429	-1,643
	(-1.58)	(1.22)	(-1.33)	(-0.34)
Δ base – 2008	-3,353	9,432	-3,567	5,667
	(-0.59)	(1.48)	(-0.59)	(0.89)
Δ base – 2009	-1,167	9,586	910	4,501
	(-0.20)	(1.41)	(0.14)	(0.67)
N	11,331	10,081	12,156	12,763
Migrants	561	466	589	614
Females				
Δ base – 2005	**-8,636***	**-20,654*** **	-7,758	30
	(-1.66)	**(-3.60)**	(-1.22)	(0.00)
Δ base – 2006	-2,264	**-13,772** **	-1,705	1,246
	(-0.40)	**(-2.15)**	(-0.25)	(0.19)
Δ base – 2007	1,980	-4,908	-8,095	4,201
	(0.34)	(-0.78)	(-1.14)	(0.60)
Δ base – 2008	7,561	-8,369	7,466	7,018
	(1.24)	(-1.26)	(1.03)	(0.95)
Δ base – 2009	-1,464	-7,767	1,988	**12,467***
	(-0.23)	(-1.18)	(0.27)	**(1.69)**
N	6,309	7,748	6,589	7,705
Migrants	357	442	387	498

Note: Q4 is the top quartile of GPA. The t-stat is given in parenthesis. The estimations were done with 4 nearest neighbours, and only include observations with "common support". *,**,*** indicates significance on 10%, 5% and 1% respectively. The standard errors are bootstrapped with 500 repetitions.

Again, the results for the highly educated generally indicate substantial gains from migration. There is no clear time trend in the point estimates. For the men the estimated returns are stable over time after migration, and with a tendency of higher returns to migration for quartile 4. For males, positive and significant returns to migration can be found for all GPA quartiles. The estimates for quartiles 1 and 2 indicate relatively lower returns for the first years after migration. . For the women on the other hand, the patterns across GPA quartiles differ more. Strong indications of positive significant effects can only be found for the sample in the top GPA quartile, where the estimated return to migration is the highest, amounting to SEK 25,000–46,000 per year.[21] For women in the other three quartiles we find insignificant estimates of ATT, although the point estimates remains positive and borderline significant in two cases for the third quartile.

Table 4b. Estimates of the average treatment effect (ATT) of the highly educated, by gender and GPA quartile.

Difference in labour income	GPA Q1	GPA Q2	GPA Q3	GPA Q4
Males				
Δ base – 2005	**17,471*** **	**15,445** **	**20,724*** **	**25,626*** **
	(2.15)	**(2.05)**	**(2.97)**	**(3.47)**
Δ base – 2006	**18,144*** **	11737	**30,927*** **	**29,755*** **
	(2.12)	(1.46)	**(4.09)**	**(2.79)**
Δ base – 2007	**22,392*** **	**15,012***	**22,638*** **	**30,523*** **
	(3.32)	**(1.72)**	**(2.77)**	**(2.53)**
Δ base – 2008	**26,489*** **	**18,312** **	**19,678** **	**29,138*** **
	(3.74)	**(1.99)**	**(2.30)**	**(2.40)**
Δ base – 2009	**25,384*** **	**16,887***	**21,140** **	**24,935*** **
	(3.39)	**(1.75)**	**(2.36)**	**(2.62)**
N	4,765	3,767	4,823	6,622
Migrants	649	481	558	552
Females				
Δ base – 2005	9,739	9,939	9,228	**46,032*** **
	(1.08)	(1.08)	(1.05)	**(6.70)**
Δ base – 2006	8,369	13,314	**14,505***	**43,529*** **
	(1.19)	(1.59)	**(1.82)**	**(4.85)**
Δ base – 2007	7,712	10,532	**11,605***	**37,119*** **
	(0.75)	(1.17)	**(1.76)**	**(4.64)**
Δ base – 2008	7,187	13,230	9,564	**33,717*** **
	(0.69)	(1.39)	(1.48)	**(3.89)**
Δ base – 2009	4,423	12,627	4,916	**25,393*** **
	(0.59)	(1.29)	(0.42)	**(2.96)**
N	5,037	6,136	4,701	5,079
Migrants	580	682	622	600

Note: Q4 is the top GPA quartile. The t-stat is given in parenthesis. The estimations were done with 4 nearest neighbours, and only include observations with "common support". *,**,*** indicates significance on 10%, 5% and 1% respectively. The standard errors are bootstrapped with 500 repetitions.

[21] This corresponds to approximately 2500–5000 Euros.

The general pattern of estimates across all samples is that the individuals in the top GPA have the largest return to migration compared to the other quartiles. The income gains are largest for individuals in the highly educated sample and slightly positive or at least non-negative for the low-educated sample. The differences for women across the GPA quartiles are larger compared to men. The difference is most evident for highly educated women, where substantial evidence of positive and significant effects is only found for the top GPA quartiles.

Can the differences in returns to migration be explained by differences in the chosen location of the migrants? Descriptive statistics show that 40% of the top GPA quartile of low-educated female migrants chooses a metropolitan region (i.e., Stockholm, Gothenburg or Malmö). For individuals in the bottom GPA quartile, the share is only 25%. There is also a difference regarding location in rural regions, where 7% of the females in the bottom GPA quartile and only 5% of the females in the top GPA quartile chooses this type of region. This is similar to the other sub-samples, except for the highly educated men, where the pattern is slightly different compared to the other groups. Here it is the individuals in the second-lowest GPA quartile who locate in a metropolitan area to the largest extent (49.2%) and only 2% in a rural region. On the other hand, similar to the other groups the lowest percentage of individuals who choose a metropolitan area (40%) can be found in the bottom GPA quartile. In general, a larger share of the highly educated chooses a metropolitan location (43–46%) compared to the low-educated (30–31%). The opposite goes for the rural regions, where 6.5% of the low-educated and approximately 3.5% of the highly educated chose this type of location. Comparing this to the ATT from the estimations, the location choice patterns are consistent with the findings that the returns to migration for the highly educated and for the top GPA are higher. We cannot say anything about in which direction the causation goes, if it is only an urban wage premium or if individuals in the top GPA quartiles hold characteristics that allow for better job matching. On the other hand, the relationship between GPA quartile and migration to metropolitan regions is not consistent across the groups and does not fully explain the differences in the returns to migration. This indicates that the location chosen does not fully explain the differences in returns to migration found across the GPA quartiles. Nonetheless, there seems to be a tendency toward a somewhat systematic regional clustering of human capital by educational level as well as by GPA levels.

4.1 The propensity score and robustness checks.

The logit estimates of the propensity score are at large as expected and consistent with previous studies (see Appendix C). However, one result that stands out is the negative parameter estimate on the indicator of being outside the labour force for the sample of highly educated females. In

general, labour market conditions seem to have a smaller impact on the migration decision for the females. Although some of the estimates are not significant in any of the samples, they were kept in the regression to ensure balanced samples between the migrants and the non-migrants. The matched samples of migrants and non-migrants balance with respect to all the covariates included in the propensity score. In general, the propensity scores are low when estimating the probability of migration and are typically higher for migrants. To make sure that there are comparable matches to the migrants, the common support condition was used, which excluded around 3% of the treated individuals. Appendix D contains graphs of the propensity scores by migration status for each of the subsamples. As expected, as the propensity score increases, the number of non-treated matches decreases compared to the number of treated. Eventual remaining selection bias may hypothetically be more pronounced in the tails of the propensity score distribution, the ATT have been re-estimated using trimming by 7%. Changing the trimming levels did not change the results significantly, as can be seen in Appendix E.

A number of different robustness checks were performed to ensure the stability of the results. Some were associated with the matching estimator – for example, changing the trimming level as mentioned earlier, changing the number of nearest neighbours, and using a kernel estimator of different bandwidths. The results of these estimations can be found in Appendix E. Changing the type of matching estimator and trimming yield very moderate differences in the results. Other robustness checks were primarily associated with the specification of the propensity scores. Alternative specifications including labour market programme participation and unemployment benefits were tested, but these variables were not significant in explaining the migration decision and did not significantly change the results. It was also tested to match on change in income the years preceding migration giving very similar results to those presented above. Further, excluding individuals with children and individuals still studying only marginally changes the results, in that the point estimate increases slightly but does not change the overall results or the main conclusions.

5. Conclusions

This study examines the effects on labour income of regional migration. It adds to the earlier literature by considering heterogeneity in latent ability by controlling for individuals' GPA from comprehensive school. The richness of data allows us to match migrants and non-migrants on a large set of observable characteristics and allow examination of heterogeneity in effects. Further, changes in labour incomes were compared up to seven years after migration, showing dynamic effects on the returns to migration.

The main results clearly indicate that the effects on labour income are different across GPA levels. This applies also when conditioning the samples on educational attainment and gender. For the higher-educated, the top GPA quartile obtained the largest positive gains from migration. Individuals in the two lowest GPA quartiles show low or insignificant returns to migration. In the sample having low education, most of the estimates were insignificant, indicating income gain of migration. Instead, migration was associated with lower incomes up to four years after migration, suggesting that other reasons for migration were more important and/or adjustment effects to the new location for this group. The difference across GPA quartiles is generally more striking for women, where the effects for the top quartile are substantially larger compared to the other three quartiles. A small difference in incomes between migrants and non-migrants at the time of migration was observed for the low educated, suggesting that the selection problem is larger for that group. This difference was not present for the highly educated. The results are robust for changing the specification of the matching estimator, type of estimator and trimming. Changing the sample by exclusion of individuals with children and those who were still studying did not change the overall results.

The systematic difference in returns to migration for different GPA quartiles may be due to omitted variables measuring compensating differential factors affecting the utility of locations. Descriptive statistics on differences in types of location chosen with respect to GPA quartile show a tendency of the top GPA quartiles in both education groups to choose metropolitan areas to a larger extent. However, future research modelling the location choice and the cost of living and other location attributes for these individuals may give a better understanding of the results presented in this study.

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Appendix

Appendix A. Distribution of GPA by Quartile

	Males		Females	
	Highly educated	Low-educated	Highly educated	Low-educated
GPA Q4	4.0–5.0	3.2–5.0	4.2–5.0	3.4–4.9
GPA Q3	3.7–3.9	2.8–3.1	3.9–4.1	3.1–3.3
GPA Q2	3.4–3.6	2.4–2.7	3.5–3.8	2.6–3.0
GPA Q1	1.0–3.3	1.0–2.3	1.0–3.4	1.0–2.5

Note: The GPA ranges from 1–5, where 5 is the highest.

Appendix B. Definitions of variables

Dependent variables	**Definition**
Migration0204	Binary variable, equal to one if changing LA region between 2002 and 2004; zero otherwise.
Diff_200X	Change in gross income between the average of incomes in 2001 and 2002 (base year) and in 200X, where X=5,6,7,8 and 9.
Individual attributes	**Definition**
Cohort 1976	Equal to one if born in 1976; otherwise zero.
GPA	The individual's Grade 9 averages in Swedish, English and Mathematics. Ranges from 1–5.
GPA^2	The Grade Point Averages squared.
Children	Equal to one if individual has at least one child; otherwise zero.
Student	Equal to one if the individual is currently a student; otherwise zero.
Commuters	Dummy variable indicating the individual is commuting between LA regions (long distance commuters); otherwise zero
Previous migration	Equal to one if individual changed LA region any time between 1996 and 2002; otherwise zero.
Sector	Equal to one if the individual belongs to a specific sector; otherwise zero. The 9 sectors include: farming, industry, construction, retail, finance, public sector, education, health care, and service.
Outside labour force	Equal to one if the individual is not part of the labour force; otherwise zero.
Avinc9900	The average gross labour income between the years 1999 and 2000.
Regional attributes	**Description**
Density	The average population density (persons/km^2) of the municipalities in an LMA.
High unemployment	The average unemployment rate per capita of the municipalities in an LMA.
Tax base	The average tax base per capita of the municipalities in an LMA.

Note: Observations pertain to year 2002 unless otherwise stated. Incomes are measured as the real annual gross labour income in SEK.

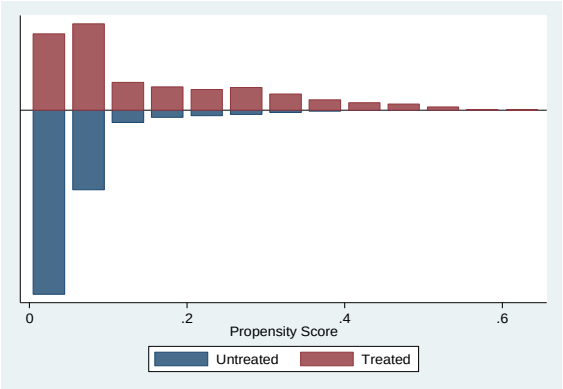
Appendix C. Logit estimates of the propensity score by gender and education

Dependent variable: Migration between 2002 and 2004.

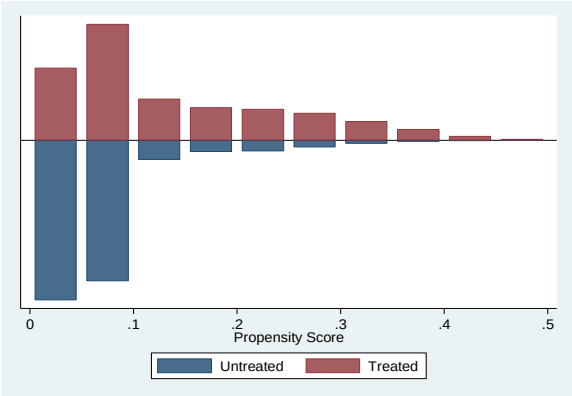
	Male		**Females**	
	Low-educated	Highly educated	Low-educated	Highly educated
GPA	0.047	0.127	0.039	0.235***
	(0.037)	(0.048)	(0.044)	(0.047)
Outside labour force	0.244***	0.359***	0.190**	-1.131***
	(0.094)	(0.109)	(0.100)	(0.123)
Student	0.509***	0.676***	0.336 ***	0.539***
	(0.069)	(0.053)	(0.067)	(0.049)
Children	-0.297	-0.038	-0.211***	-0.024
	(0.295)	(0.624)	(0.082)	(0.191)
Previous migration	1.919***	0.871***	1.491***	0.887***
	(0.046)	(0.047)	(0.055)	(0.044)
Cohort 1976	0.144***	0.006	0.039	0.112**
	(0.044)	(0.050)	(0.052)	(0.047)
Commuters	1.232***	1.398***	1.278***	1.379***
	(0.041)	(0.054)	(0.070)	(0.052)
Industry	-0.424***	-0.232***	-0.212**	-0.283***
	(0.081)	(0.081)	(0.109)	(0.091)
Farming	-0.456***	0.161	0.026	0.149
	(0.179)	(0.249)	(0.287)	(0.321)
Construction	-0.343***	-0.230	-0.847*	0.112
	(0.096)	(0.165)	(0.473)	(0.219)
Retail	-0.285***	-0.021	-0.121	-0.262***
	(0.078)	(0.091)	(0.085)	(0.084)
Finance	-0.195**	-0.145*	-0.183*	-0.193**
	(0.088)	(0.078)	(0.098)	(0.076)
Education	-0.097	-0.100	- 0.291**	-0.360***
	(0.148)	(0.086)	(0.120)	(0.069)
Health care	-0.042	0.085	-0.152*	-0.081
	(0.124)	(0.101)	(0.088)	(0.068)
Service (ref)				
*Avinc9900**	-0.012***	-0.024***	-0.008**	-0.021***
	(0.003)	(0.003)	(0.004)	(0.004)
*Tax base**	-0.005	-0.166***	-0.073	-0.201***
	(0.049)	(0.060)	(0.062)	(0.057)
High unemployment	0.137**	0.315***	0.127*	0.102
	(0.057)	(0.070)	(0.072)	(0.068)
*Density**	0.172***	-0.146***	-0.111**	-0.090***
	(0.026)	(0.031)	(0.032)	(0.029)

Note: Standard errors are given in parenthesis. * The estimates show the effect by increasing the income by SEK 10,000, the tax base by SEK 1,000/capita and density of 100 persons/km^2.

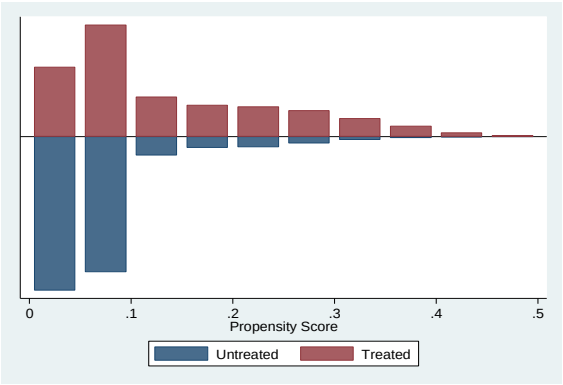
Appendix D. Propensity scores by migration status.



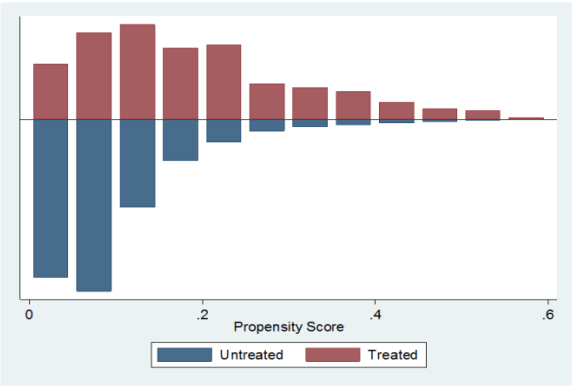
a. Low-educated males



b. Low-educated females



c. Highly educated females



d. Highly educated males

Appendix E. Comparing the ATT of different specifications

	Males		**Females**	
	Highly educated	Low-educated	Highly educated	Low-educated
Matching 4:1				
Trim 0%	**21,621*** **	4489	**13,146*** **	2418
Trim 7%	**21,156*** **	1386	**14,202*** **	779
Trim 10%	**19,816*** **	1141	**13,650*** **	2172
Matching 1:1				
Trim 0%	**24,333*** **	2426	**12,871*** **	1970
Trim 7%	**24,043*** **	987	**14,286*** **	253
Trim 10%	**23,079*** **	515	**13,244*** **	1552
Matching 6:1				
Trim 0%	**21,689*** **	3260	**12,256*** **	608
Trim 7%	**21,703*** **	1520	**14,055*** **	445
Trim 10%	**20,273*** **	582	**12,915*** **	583
Kernel				
Bandwidth 0.01	**21,162*** **	889	**13,113*** **	259
Bandwidth 0.005	**21,320*** **	973	**12,969*** **	295
Bandwidth 0.001	**21,581*** **	999	**12,287*** **	-80

Note: This table shows ATT, in SEK for seven years after migration, where the PSM includes the GPA.