LEARNING THROUGH CONTACT? THE EFFECTS ON EARNINGS OF IMMIGRANT EXPOSURE TO NATIVE POPULATION

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Abstract. Factors influencing immigrant labour market outcomes have received increased scholarly attention lately. A recent research focus has been the effects of residential setting on labour market outcomes. This study brings a new dimension to this emerging body of research, introducing the role played by workplace composition, in addition to place of residence, in immigrant earnings. Based on Swedish longitudinal register data, OLS regression is used to examine effects of previous exposure to natives on earnings in three immigrant cohorts (1990, 1995 and 2000) five years after arrival. Besides controlling for individual characteristics and various labour market attributes, a two-step Heckman correction procedure is applied to take into account the selectivity of entering the Swedish labour market. The main finding of the study is that exposure to the native population at the workplace is more important than residential exposure for predicting immigrant earnings.

Keywords: immigrants, exposure, native population, learning, earnings

INTRODUCTION

Newly arrived immigrants earn on average less than do natives with comparable human capital and work experience (Chiswick, 1978). The initial earnings gap has widened considerably for more recent immigrant cohorts (Frenette and Morissette, 2005), and there are a number of important factors behind this initial wage penalty. Some scholars argue that different mechanisms of exclusion like stereotypical thinking, ethnically segregated networks and institutional setup discriminate against immigrants on the labour market (Becker, 1957; Rydgren, 2004). Others emphasize that the value of education and previous experiences is less for immigrants since they lack the key resources for being competitive on the labour market, notably language skills and knowledge about country-specific norms and attitudes (Hayfron, 2001; Reitz, 2001). This is especially the case when they originate from countries far away (Buzdugan and Halli, 2009). However, as immigrants become more familiar with the language, customs and operation of the host country's labour market, the earnings gap between them and natives gradually decreases (Chiswick, 1978; Chiswick et al., 2005). In other words, immigrants start to accumulate country-specific tacit knowledge as they establish themselves in the new society.

If this is a well-founded proposition, we expect immigrants who have established contact with natives and interacted with them in their everyday lives, i.e. have had a high degree of exposure to the native population (Massey and Denton, 1988), to be more successful on the labour market compared to those who have remained in minority-dense settings. Most of previous studies focus on the effects of residential segregation on labour market outcomes, motivated by the high spatial clustering of immigrants into ethnic neighbourhoods (Borjas, 1995, 1999; Edin et al., 2003a; Musterd et al., 2008). A great number of important daily

activities are influenced by residential patterns, including contact with neighbours (Peach, 2007). However, there are other important domains or places where people meet and interact on a daily bases (cf. Hägerstrand, 1982) where knowledge exchange and learning may take place more effectively. Therefore, the tide of recent research on ethnic segregation and contact is increasingly turning towards its attention from residential area to other important domains. From our point of view, working life (Ellis et al., 2004; 2007; Kmec, 2003; Hou, 2009; Wang, 2010) and family (Dribe and Lundh 2008; Buzar et al., 2005; Houston et al., 2005; Meng and Gregory, 2005; Meng and Meurs, 2009) are two additional candidates for further scrutiny as they provide a supplementary portrayal of daily social interaction and learning processes.

The aim of this paper is to investigate and analyse the importance of exposure to natives within different domains of everyday life. In particular, we examine the effects of the neighbourhood and work domains on immigrant labour market outcomes as expressed by their earnings. In addition to these domains, we also recognize the significance of the family domain as a vital catalyst for entering the labour market. We address these issues by setting up three research questions to be answered using Swedish longitudinal register data:

1) Does a higher degree of exposure to the native population in the neighbourhood and work domains exert a positive effect on immigrant earnings?
2) What is the effect size of neighbourhood and workplace exposure to the native population, compared to formal education, on immigrant earnings?
3) Does the effect size of neighbourhood and workplace exposure on immigrant earnings differ between immigrants originating from more developed countries (MDCs) and less developed countries (LDCs)?

Data used in our study stem from Sweden for three particular reasons. First, Sweden has register data with explicit relational information, which makes it possible to measure the extent and effect of immigrant exposure to natives in all three important domains that structure the everyday life of working-age people. Moreover, Sweden clearly represents the group of more developed countries with a rapidly growing immigrant population. In addition, Sweden has a long judicial tradition of striving for equality between natives and immigrant groups. Since the mid-1970s there have been strong political intentions to improve the labour market position of immigrants in Sweden. From then on, a number of legislations have been passed aiming to counteract discrimination and ethnical harassment on the labour market (Rydgren, 2004). Nevertheless, problems persist (Pred, 2000) and statistics show that there is not only a significant but also continuously widening income gap between natives and foreign-born people (Ekberg and Hammarstedt, 2002). On the basis of this situation it is not uninteresting to further explore factors that may have the potential to act against the seemingly ongoing development towards a widening divide between different groups in society. We do this by focusing on the role of exposure of immigrants to native population in places of residence and work, as well as within the family.

LITERATURE REVIEW

Our study focuses on labour market outcomes of immigrant exposure to the native population in the domains of residence, work and family, respectively. According to Massey and Denton (1988) residential exposure refers to spatial proximity or to the degree to which immigrants share neighbourhood with native population. Exposure thus measures the potential contact, or the probability of interaction, between immigrants and natives within populated areas (Wilkes

and Iceland, 2004). Within the field of social psychology, contact with native population within the same time and space is considered the most important prerequisite for the acculturation of immigrants in the host country (Sam, 2006). For example, greater contact generally leads to lower levels of ethnic prejudice and stereotyping (Pettigrew, 1998; Pettigrew and Tropp, 2008), both being potentially important for improving the labour market outcomes of immigrants. Within the field of economic geography it is also a well-known fact that spatial proximity generates contact, knowledge spillover and learning (Audretsch and Feldman, 1996; Boschma et al., 2009; Glaeser, 1999). However, immigrants get in contact to natives not only in the residential neighbourhood setting. Indeed, other domains of everyday social interaction—such as work and family—are arguably of at least equal significance (Hägerstrand, 1982; Houston et al., 2005; Ellis et al., 2004; 2007; Wang, 2010; Wellman, 1996). Next, we will review the results of previous studies that have examined the importance of neighbourhood, workplace and family for immigrant labour market outcomes.

Neighbourhood effects on immigrant earnings

In Western societies, residential segregation is viewed as a fundamental structural feature that shapes the evolution of neighbourhoods and potentially affects the life opportunities of their residents (Blasius et al., 2007; Fong and Chan 2010; Friedrichs et al., 2003; Iceland and Scopilliti 2008; Peach, 2009; Wilson, 1987). Especially immigrants from less developed countries are more likely to live in segregated ethnic neighborhoods (Borjas 1999; Edin et al., 2003a). The emergence and persistence of ethnic residential segregation are often attributed to three main complementary explanations: immigrants' lack of economic resources in order to live in the same neighbourhoods as natives; discriminatory practices in the housing market

imposed by the host country; and residential preferences of the minorities themselves (Semyonov and Glikman, 2009). Residential patterns are of importance for a large number of daily activities. Not only does the residential structure have an impact on accessibility to functions such as schools, workplaces and shops, it also influences the conditions for interaction between neighbours (Peach, 2007). The literature on neighbourhood effects argues that otherwise similar individuals may experience different socio-economic outcomes (concerning, for instance, health, education, work and family) depending on the neighbourhood characteristics they have experienced throughout their life course (Andersson and Subramanian, 2006; Beggs et al., 1997; Propper et al., 2007; Borjas, 1995; Durlauf, 2004; Van Ham and Manley, 2009).

Several studies focus specifically on the ethnic composition of neighbourhoods and its relationship to immigrant labour market outcomes. Most of them report negative effects of ethnic concentration on immigrant earnings. Parcel (1979) as well as Wilson and Portes (1980) found that considerable parts of the observed earnings inequalities could be attributed to residential ethnic minority concentrations. Galster et al. (1999) and Clark and Drinkwater (2002) report that higher degrees of exposure to co-ethnics are associated with lower gains in employment. "However, the effects vary across immigrant groups and over time. For example, previous research shows that immigrants with lower levels of education could gain more in terms of earnings from living in co-ethnic areas relative to better educated immigrants (Borjas, 1999; Edin et al. (2003a).". The ethnic social capital also seems to be of greater importance for disadvantaged immigrant groups compared to advantaged immigrant groups (Borjas 1999). A recent longitudinal study by Musterd et al. (2008) shows that the positive effect of living in areas of high ethnic concentration is very short-term and it turns negative after about two years of residence for both women and men.

Workplace effects on immigrant earnings

Although previous studies show negative effects of living together with co-ethnics, they tend to explain a small amount of the variation in immigrant earnings (Brännström, 2005; Andersson and Musterd, 2006). One reason for the limited explanatory power of residential ethnic context is probably related to the low intensity of social interaction taking place in residential areas. The situation is likely to be different in most workplaces, where social interaction is expected or even a necessity. In line with Catanzarite and Aguilera (2002) we further argue that, due to the close link between earnings and workplace-level conditions and resources, workplace indicators are generally better suited for testing the effects of ethnic composition on minority wages than are traditional studies focusing on the ethnic composition of geographic areas. Further, the laws that regulate discrimination by promoting equal opportunity and affirmative action have diversified the ethnic makeup of workplaces (Houston et al., 2006; Estlund, 2003). Ecological studies in US present clear evidence that ethnic segregation by work tract is smaller than by residential tract (Ellis et al., 2004). Research on inter-ethnic contact further shows that the chances to meet and interact with people with different ethnic background are bigger in workplaces relative to neighbourhoods of residence (Houston et al., 2005; Wellman, 1996). Thus, immigrants are more exposed to natives at workplaces than at residential areas on the one hand, and a more frequent contact and daily inter-ethnic interaction takes place at workplaces on the other. In this light, it comes as a surprise that workplace ethnic composition is rarely included in studies dealing with immigrant labour market outcomes.

The few existing studies are based mostly on survey data, and rely on questions of the workplace ethnic setup (Carrington and Troske, 1998; Catanzarite and Aguilera, 2002; Hou, 2009; Kmec, 2003; Reskin et al., 1999). In general, they report that a higher degree of exposure to natives exerts a positive effect on immigrant earnings. The study by Carrington and Troske (1998) found that, as the share of black workers at a company increases, the wages of black workers tend to fall whereas the wages of white workers increase. Catanzarite and Aguilera (2002) examined earnings penalties for Latino immigrants in the US. They found that an average male earns $7.38 and a female $5.86 per hour if employed at a Latino worksite, while the same workers make $8.49 and $6.48, respectively, if their co-workers are primarily from other ethnic groups (Catanzarite and Aguilera, 2002). Kmec (2003) and Kmec and Trimble (2009) analyse the relationship between working in Black-, Latino- and White-dominated workplaces and immigrant work incomes. Both studies report that higher exposure to a White population is positively correlated with immigrant earnings.

Intermarriage effects on immigrant earnings

Intermarriage is often considered to play a crucial role in immigrant incorporation into the host society. It is not only a measure of economic integration, but also a factor that potentially influences integration processes (Dribe and Lundh, 2008; Kantarevic, 2005; Qiang and Lichter, 2007). Having a native partner makes it easier for immigrants to learn the new language and pick up unwritten rules of society. Essential information about the labour market may also be more accessible in such family situations. However, the literature suggests that immigrants who are married to natives constitute a highly selective group (Kantarevic, 2005). Immigrants originating from more developed countries, having higher

education, with longer residence in the host country and living outside the larger cities are more likely to be married to natives (Dribe and Lundh, 2008). The selectivity could also be due to some unobserved characteristic that is relevant to the marriage and labour markets, such as physical appearance (Kantarevic, 2005) or willingness to accept cultural differences (Meng and Gregory, 2005).

The effects of intermarriage on immigrant labour market outcomes are only beginning to be studied. Dribe and Lundh (2008) found a strong positive association between intermarriage and employment for both men and women. The main results of the research by Kantarevic (2005) in a US context show that earning gains of intermarried immigrants completely vanish once the selection effects have been taken into account. The studies by Meng and Gregory (2005) and Meng and Meurs (2009), utilizing census data from Australia and France, respectively, present contrasting results. Without controlling for selection effects, it is found that intermarried immigrants earn more than endogamously married counterparts (Meng and Gregory, 2005; Meng and Meurs, 2009). When they control for endogeneity, the intermarriage premium increases significantly in both countries. Although there is a gain in earnings for both intermarried immigrants and intermarried natives, the effect is much stronger for immigrants than for natives (Meng and Gregory, 2005). Likewise, women gain more from intermarriage in terms of earnings than men (Meng and Meurs, 2009)

DATA AND METHODS

Previous research on the relationship between exposure to the native population and earnings tends to focus on one domain only: either neighbourhood, workplace or family. This study

contributes to the existing literature by (1) taking into account all these three important domains of daily interaction, and (2) applying a longitudinal research framework, capitalizing on the richness of Swedish register data. Our empirical analysis is based on the extraction from the ASTRID database hosted at the Department of Social and Economic Geography at Umeå University.

The Research Population

Our study focuses on immigrants to Sweden during the years 1990, 1995 and 2000. In the preparation for the study, a dataset containing information on individuals who immigrated during the years in question was compiled. More precisely, the extraction criteria specified that the immigrants should: be born outside Sweden; not be a Swedish citizen the year of immigration; be aged 18–62 the year of immigration; not be reported deceased during the following four years; and not have immigrated during a previous study year. In total, these criteria matched 86,190 individuals (1990: 34,901; 1995: 23,513; 2000: 27,776), for which annual information on demographic and socio-economic characteristics relevant to the study was retrieved. This initial research population was classified in seven groups according to region of origin: 1) North—the Nordic countries, 2) West—Western Europe, the US, Canada, Australia, New Zealand and Japan, 3) East—Eastern Europe and former Soviet Union republics, 4) Middle East—including North Africa, 5) Asia, 6) Africa and 7) South America—including Central America.[1]

[1] In the register data, country of origin is specified as one of 17 categories, normally comprising groupings of adjacent countries. There are some idiosyncrasies in the original country grouping. For instance, Armenia and Kazakhstan are coded as 'Asia' rather than 'former Soviet Union'. A small number of immigrants were found to lack a specified country of origin, and were therefore dropped from the study.

The earnings of the immigrants were examined five years after arrival, i.e. 1995, 2000 and 2005, respectively.[2] At that time, 24% of the original population was found to have left the country. Thus, 76% of the population (65,522 persons) were still residing in Sweden the year of analysis. North and West immigrants were more likely to leave the country (with 42% and 61% remaining in Sweden, respectively), compared to the other groups, of which 86–95% were present five years after arrival. Of those immigrants still in Sweden five years after arrival, 35,810 individuals (55%) were on the labour market, i.e. had an income from employment or their own company. In order to address a causal relationship between exposure to natives and earnings, a time lag in the measurement of exposure variables is called for— current earnings need to be related to prior exposure. In our approach we err on the side of caution, using a conservative lag that only takes into account neighbourhood and workplace exposure prior to last job. One important consideration behind this modelling strategy is that, otherwise, workplace choice—and, hence, initial wage—will precede subsequent exposure. With this definition of the exposure variables, we also do not have any statistically significant interaction effects between neighbourhood and workplace exposure. The drawback is that the main research population, included in the final earnings regressions, is reduced to 22,357 individuals. In this context, it should be noted that our results concerning effects of exposure are robust to these varying definitions of the research population.

The outcome variable of the study, work income of immigrants, exhibits considerable differences depending on region of origin. In the analysis, a distinction is therefore made between immigrants originating from more developed countries (MDCs)—North, West and East—and less developed countries (LDCs)—Middle East, Asia, Africa and South America. The work income of immigrants from North, West and East is above the median (annual

[2] Before commencing with the study, income data were corrected for inflation (base year 2005).

income of 131,000 SEK), while immigrants who originate from other world regions earn less than the median (**Figure 1**). This finding is consistent with previous studies that show significantly higher incomes for immigrants who originate in countries that have abundant human capital and higher levels of per capita income (Borjas, 1987; 2001). Immigrants from MDCs form 57% and immigrants from LDCs 43% of the population.

FIGURE 1 ABOUT HERE

In a comparison between MDC and LDC immigrants (**Table 1**), some important differences in population composition are revealed. First, immigrants from LDCs are equally distributed across the three main educational categories, whereas upper secondary school and university education dominate among immigrants from MDCs. Second, immigrants from MDCs are overrepresented in the economic sectors of high-skilled financial and business service, mining, manufacturing and construction, while immigrants from LDCs are overrepresented in low-skilled financial services and hotels, and restaurants. Third, LDC immigrants are more concentrated to the Stockholm metropolitan area, with almost half residing in the Stockholm metropolitan area compared to about a third of the MDC immigrants.

TABLE 1 ABOUT HERE

The three immigrant cohorts (1990, 1995 and 2000) can be related to different labour market contexts recent immigrants were faced with. At the beginning of the 1990s, a dramatic economic downturn made it difficult for the newly arrived immigrants to enter the labour market (Bergmark and Bäckman, 2004). The economy of Sweden started to improve in the mid-1990s, easing labour market access for the newly arrived. Earnings of employed

immigrants tend to increase over time, with decidedly lower earnings five years after arrival for the 1990 cohort (**Table 1**), reflecting overall increases in productivity and wages. Compared to LDC immigrants, MDC immigrants appear to have higher returns on formal education. LDC immigrants also earn less in all economic sectors, as well as in all parts of the settlement system.

Modelling Approach

Work income five years after arrival to Sweden is used as the outcome variable indicating labour market success of immigrants, while the family, neighbourhood and workplace domains are considered important for explaining variations in labour market outcomes. The family domain is represented by a measure of *Swedish partner years*, which shows the number of years the immigrant has lived with a native partner. Changes between Swedish partners are not taken into account, because any native partner can potentially contribute to knowledge dissemination and learning processes within the family.[3] The second aspect of main interest is exposure to the native population in neighbourhoods. This is primarily represented by a variable showing the *share of Swedes in neighbourhood*, where

neighbourhood is defined as the SAMS area of residence.[4] Since immigrants are likely to change neighbourhoods over time, the variable corresponds to the average annual exposure to natives. In addition, the average population in the concerned SAMS areas is also included in

[3] It should be noted that, in the Swedish population register, cohabiting couples without children are treated as single. In other words, the partner year variable comprises a subset of all actual partnerships, i.e. those involving legal marriage or cohabitation with children.

[4] SAMS is a spatial subdivision of Sweden, based mainly on municipal planning zones and voting districts, which aims to define homogenous residential areas. In total, there are 9,208 such neighbourhoods in Sweden. For comparison, there are currently 290 Swedish municipalities.

the analysis, but other conceivable measures of neighbourhood exposure (e.g. density of the native population) are not used, as they tend to correlate with the share of Swedes. The third area of main interest is exposure to Swedes in workplaces, which is primarily represented by the variable *share of Swedes in workplace*. This variable is constructed similarly to the neighbourhood exposure variable, but in this case the entire Swedish population is substituted for working population and its particular linkages to geo-referenced workplaces. Mean values are used here as well, but only take into account years in employment with available and unambiguous workplace data.

The theoretical importance of exposure to the native population in family, residence and workplace relates to the process of tacit knowledge building in the host society, but also the acquisition of skills in the native language of the host country. Based on this learning-through-contact line of reasoning, we expect that having a native partner and being more residentially exposed to the native population increase the probability that immigrants will gain access to the labour market. We also assume that a higher share of the native population in the neighbourhood and workplace have a positive impact on the future earnings of the immigrants. Moreover, we expect that workplaces are more important than neighbourhoods in language acquisition and knowledge accumulation about the host society, since interpersonal communication is likely to be more intense at places of work. It is also expected that the

effects of exposure variables are more important for LDC than for MDC immigrants. This notion is based on the assumption that cultural and linguistic barriers may be more or less difficult to overcome, depending on region of origin. It follows that exposure to the native population at workplaces has a stronger effect on income than does exposure to natives in neighbourhoods, and that exposure effects on income are more substantial for LDC

immigrants. When modelling earnings, it has to be considered that wage functions estimated on the group of employed individuals may suffer from sample selection bias in relation to the population (Heckman, 1979). In this case, it is likely that immigrants who are employed five years after arrival do not represent a random sample of the initial immigrant cohort due to selective return migration, spatial variations in job offers, matching of formal education and skills of immigrants in the labour market, the motivation of the individual to work, etc. (Axelsson and Westerlund, 1998; Borjas, 1987; Pailhé and Solaz, 2008).

In order to correct for such possible non-random biases, a two-step Heckman correction procedure is applied (Heckman, 1979). The basic idea of the Heckman model is that the outcome variable, Y_i, is only observed if some criterion, defined with respect to a variable Z_i, is met. Z_i is the realization of the latent continuous variable Z^*_i, e.g. the propensity to work, in the form of a dummy variable—in this case, indicating whether a person works ($Z_i = 1$) or not ($Z_i = 0$). Therefore, the first step of the model is the selection equation (Z^*_i), which should take the form of a probit model. In this study, the estimation concerns the probability of immigrants to work or not five years after arrival to Sweden. In the selection equation, it is important to incorporate one or several instrumental variable(s), which are additional variables that strongly predict the selection process, yet are uncorrelated with the main outcome of interest (Briggs, 2004). We specify our selection equation in the following probit model:

$$Z^*_i = \sum \gamma W_i + e_i \qquad (1)$$

$Z_i = 1$ if $Z^*_i > 0$, $Z_i = 0$ otherwise

where Z^*_i is the continuous latent variable, the propensity of an individual $i = 1, \ldots I$ to work; Z_i is a dummy variable indicating whether an immigrant is working (1)—i.e. has income from employment or self-employment—or not (0) five years after arrival to Sweden; W is a set of variables representing the individual i; γ denotes the parameter estimates that describe the effects of these variables; and e_i is a normally distributed, independent error term with zero mean and variance σ^2_e.

The probability to work is modelled separately for MDC and LDC immigrants. The selection models include the following explanatory variables: *Immigrant cohort* distinguishes between the immigrants depending on year of arrival (1990, 1995 or 2000). Personal characteristics incorporated in the models include *sex*, *age* (23–34, 35–49 or 50–67) and *education* (compulsory school, upper secondary school or university). *Region of origin* consists of three categories for MDC immigrants (North, West or East) and four categories for LDC immigrants (Middle East, Asia, Africa or South America). Since local labour market conditions vary, *place of residence* is included in the models. This spatial subdivision distinguishes between five levels in the urban hierarchy: the three metropolitan areas of Stockholm, Gothenburg and Malmö, large regional centres, and the rest of Sweden.[5] At the residential neighbourhood level, *average population* and *average share of Swedes* are part of the models. In this case, these continuous neighbourhood covariates consist of the historical average prior to the year of analysis. Finally, *Swedish partner years* functions as the instrumental variable in the selection equations. While the variable is not entirely unrelated to earnings (**Table 1**), its relationship to the probability of working appears stronger than its

[5] The spatial subdivision is based on a 2005 classification of 72 labour market regions in five so-called region families. The region families are: 1) metropolitan regions, 2) large regional centres, 3) small regional centres, 4) small regions characterized by private employment, and 5) small regions characterized by public employment. In the construction of the place of residence variable, the region family 'metropolitan regions' was subdivided into the metropolitan areas of Stockholm, Gothenburg and Malmö, the category 'large regional centres' was used as is, and the remaining region families were grouped together to represent the rest of Sweden.

impact on income levels. As a matter of fact, among unemployed immigrants, 15% of MDCs and 7% of LDCs have had a Swedish partner in the course of a five-year stay in Sweden. In the main—working—research population, the corresponding figures are 31 and 22%, respectively.

The probit equations yield estimates of γ that can be used for calculating $\Phi(\gamma W_i)$ and $\phi(\gamma W_i)$, the cumulative distribution and probability density functions. The inverse Mills' ratio (λ_i) for each individual is then obtained:

$$\lambda_i = \frac{\phi(\gamma W_i)}{\Phi(\gamma W_i)} \qquad (2)$$

Since the selection problem is essentially a problem of omitted variable bias, with λ being the omitted variable, and since the true λ in equation (3) is usually unknown, it is replaced by its estimated values calculated on the basis of the probit model (2). Thus, as the second step of the Heckman model, we fit the following OLS earnings regression, conditional that $Z = 1$ and taking into account the selection bias (λ):

$$Y_i = \beta X_i + \alpha \lambda_i + u_i \qquad (3)$$

where Y_i is the annual earnings from work income of an individual $i = 1, \ldots I$ five years after arrival to Sweden; β denotes the parameter estimates of the variables X for the individual i; α stands for the parameter of the selection effect λ for the individual i; and u_i is a normally distributed, independent error term with zero mean and variance σ^2_u. If the unobserved characteristics of immigrants working five years after arrival to Sweden are correlated with

the unobserved characteristics of earnings, the parameter estimates (α) of λ will be significantly different from zero, thus confirming and correcting selection bias.

There are separate earnings models for immigrants originating from MDCs and LDCs. A common approach in modelling wages is to use a natural logarithm of earnings ($\ln Y_i$) in order to correct for a positively skewed income distribution (Chiswick, 1978; Musterd et al., 2008). The drawback of this approach relates to the difficulties of intuitively interpreting the parameter estimates of the OLS regression. While $\ln Y_i$ was used in the preliminary analysis, final results are presented using estimates for Y_i. The skewness was even more reduced by simply removing rare outliers (immigrants with annual income exceeding 1,000,000 SEK), and this facilitates a better communication of the results of the study. Two areas of central theoretical interest, exposure to Swedes in neighbourhood and workplace, are included in the earnings regressions. *Average share of Swedes* in neighbourhood and workplace prior to last job constitute the key exposure variables. In addition, *average neighbourhood population* and *average number of colleagues* at work prior to last job, also related to the issue of exposure, are included in the models. A number of the other variables—*immigrant cohort*, *sex*, *age*, *region of origin* and *place of residence*—are the same as in the selection models.[6] In addition, the earnings regressions contain variables related to current employment and supplementary incomes, as well as work history. There are three additional variables concerning current employment: sector, trade and entrepreneurship. *Sector* distinguishes between private and public employment; in the latter case, the employer can either be a municipality or the state. *Trade* distinguishes between different types of workplaces according to main economic

[6] The two continuous neighbourhood variables are included in the selection equations as well, but here they are measured prior to last job rather than just being an historical average.

activity.[7] *Entrepreneurship* is a dummy variable, signifying whether the immigrant has income from a company he/she owns. The supplementary income variables are the annual amounts of *unemployment benefits*, *early retirement pension*, *study allowance* and *parental leave income* received the year of analysis. Work history is included in the models by measures of *number of years in employment* and *number of workplace changes* since the year of arrival.

In checking the assumptions of the earnings models, we find that the residuals exhibit seemingly normal distributions with zero mean. While the plots of predicted values in relation to the residuals reveal similar variance levels for the most common, mid-income ranges, variance increases somewhat for high predicted incomes. The models also fail Koenker's studentized Bruesch-Pagan test for homoscedasticity. In light of this outcome and since the Heckman approach carries a risk of inflated standard errors, statistical significance is reported using robust standard errors. In addition to presenting parameter estimates and significance levels, we use partial eta squared (η_p^2) to trace the relative importance of the independent variables on immigrant earnings. An important argument for using η_p^2 is that when working with large register datasets, many parameter estimates tend to be statistically significant, even when their importance in explaining the outcome variable is small. The variance inflation factor (VIF) test does not reveal problems with multicollinearity between the variables. Tests for spatial autocorrelation using Moran's *I* measure reveal statistically significant clustering of high and/or low residual values for both the MDC ($p < 0.01$) and the LDC ($p < 0.05$) earnings

[7] The original trade definition in the database is the Swedish Standard Industrial Classification. This detailed classification of over 700 trades was grouped into eight main trades: 1) mining, manufacturing and construction, 2) wholesale and retail, 3) hotels and restaurants, 4) transport and communication, 5) low- and 6) high-skilled financial and business services, 7) public administration, 8) education and 9) health, social and other services.

models.[8] The degree of clustering, however, is small (Moran's $I < 0.05$), and thus of minor concern in evaluating model outcomes.

RESULTS

The modelling of employment and earnings of immigrants five years after arrival takes into account personal characteristics as well as residential contexts. Among LDC immigrants, it seems that the likelihood of working is higher for the 1990 and 1995 cohorts (**Table 2**). Males are more likely to work than females, especially among LDC immigrants, and the probability of labour market participation decreases with increasing age. The probability of having employment increases with higher education, and there are also differences in employment related to region of origin. Within the MDC group, immigrants from the Nordic countries have the highest chances of being employed. Within the LDC group, this is the case for immigrants from South America. For both LDC and MDC immigrants, the probability of having a job peaks in the Stockholm metropolitan area, whereas the chances are at their worst in the Malmö metropolitan area. Being more exposed to the native population, especially having a Swedish partner, exerts a positive effect on immigrant labour market participation. These results confirm our assumption of positive effects of being exposed to natives in the neighbourhood and within the family.

With regard to immigrant earnings, the analyses yield the following preliminary results: First, and in line with previous studies (e.g. Musterd et al., 2008), there is evidence that increased

[8] The spatial proximity weights were defined as an inverse distance squared function of the Euclidian distance between the residuals, with the cut-off value set so that each residual value has at least one neighbour.

exposure to the native population in neighbourhoods has a positive impact on immigrant earnings (**Figure 2**). Second, in line with our expectations, the results also indicate that exposure to Swedes at workplaces has a stronger positive effect on immigrant earnings than does neighbourhood exposure of natives. The gains in earnings with increased workplace exposure are more evident compared to the corresponding neighbourhood effect. For instance, the increase of earnings tapers off as the share of the native population in the neighbourhood exceeds the 70–79% level.

FIGURE 2 ABOUT HERE

The positive effects of neighbourhood and workplace exposure on income remain in the OLS earning regressions. With adjusted R^2 values of 0.460 (MDC model) and 0.466 (LDC model), the models account for almost half of the variation in immigrant earnings five years after arrival. Controlling for personal characteristics, current employment, supplementary incomes and work history, we find that every percentage point of prior workplace exposure to natives increases annual work income by 564 SEK for MDC immigrants and 368 SEK for LDC immigrants (**Table 3**). The respective neighbourhood effects are 366 SEK and 262 SEK annually. This confirms the notion of positive workplace and neighbourhood effects on immigrant earnings. Personal characteristics such as sex and education are also important in explaining immigrant earnings. There is a substantial wage gap in favour of men for both MDC (44,331 SEK) and LDC (36,145 SEK) immigrants. This is in line with previous research that shows that women are more sensitive to labour market segmentation (Wang, 2008). Several reasons such as different motives of immigration, lower levels of entrepreneurship, different networks and related flows of information in the host country,

being over-represented at flexible jobs with no career progression, etc. are responsible for lower wages of immigrant women compared to men (Schrover et al., 2007).

The returns on formal education are also considerably higher for immigrants from MDCs, but in both immigrant groups there is an expected positive relationship between education level and earnings. The earnings of MDC immigrants exhibit a clear relation to the levels in the urban hierarchy, with the highest income in the Stockholm metropolitan area. For LDC immigrants, earnings are also the highest in Stockholm, but otherwise a more mixed pattern emerges. Among the control variables directly related to current employment, the trade of the workplace stands out as particularly influential. Employment in mining, manufacturing and construction is associated with the highest wages, except for immigrants from MDCs employed within high-skilled financial and business services. While an increase in the number of years in employment is positively related to work income, high job mobility exerts a negative impact on earnings. Finally, the parameter estimate for λ is significant for both MDC and LDC immigrants, confirming the suitability of using the two-step Heckman correction procedure to account for selection bias.

TABLE 3 ABOUT HERE

Regarding the impact of neighbourhood and workplace exposure in relation to formal education, and variations in exposure effects depending on immigrant origin, the partial eta squared (η_p^2) measure is used to address these issues. The results follow our expectations. Workplace exposure contributes more to immigrant earnings than does neighbourhood exposure. Although there is a positive neighbourhood effect as well, it is relatively unimportant in comparison (**Table 4**). The MDC and LDC earnings models exhibit similar

effect sizes for the exposure variables, in both cases smaller than that of formal education. However, since the role of formal education is more important for MDC immigrants, the relative gains from exposure to Swedes are greater for immigrants from LDCs.

TABLE 4 ABOUT HERE

SUMMARY AND DISCUSSION

This study focuses on the effects of exposure to the native population in three important domains of everyday interaction—neighbourhood, work and family—on immigrant labour market outcomes. The results show that having a Swedish partner is strongly related to labour market participation, but weakly related to immigrant earnings. Thus, having a native partner seems to provide valuable information on host country labour market opportunities for immigrants, whereas it appears to be of less significance for wage negotiations with the employer. A higher degree of exposure to Swedes in both neighbourhoods and workplaces exerts a statistically significant positive impact on immigrant earnings. However, prior exposure to natives at workplaces is much more important for current earnings than is previous neighbourhood exposure. When MDC and LDC immigrants are compared, the effects of both neighbourhood and workplace exposure are similar and of smaller importance than that of formal education. However, immigrants coming from LDCs face higher obstacles in converting formal education into decent income than do immigrants originating from MDCs. Thus, the relative role of exposure to the native population is more important for LDC immigrants.

We interpret our results as follows: It is likely that some type of learning process and tacit knowledge accumulation starts once immigrants come into contact with the native population, and this process is of greater importance for LDC immigrants. We acknowledge that previous studies also show that immigrants from LDCs can gain from participation in co-ethnic networks (Edin et al., 2003b; Borjas, 1987). For example, such networks often provide valuable information on housing and job opportunities for immigrants. However, we do not see the options of maintaining ethnic networks and coming into contact with the native population as being mutually exclusive paths for immigrants. According to Berry (1997; 2006), a feasible strategy for immigrants is to try to maintain their own cultural identity and co-ethnic contact, and at the same time strive towards establishing contact with the native population. Our study provides evidence that a higher degree of contact with native population, especially having a native partner (getting a job) and working together with natives (earnings), contributes to the labour market success of immigrants.

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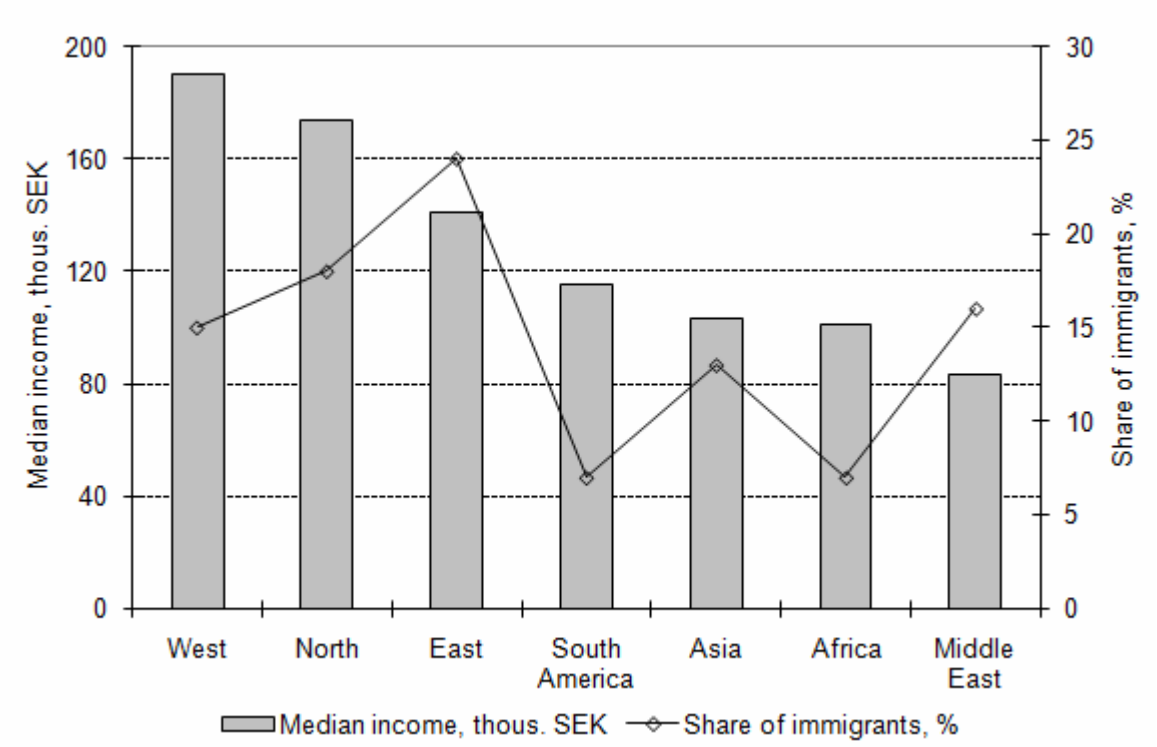

Figure 1. Distribution by region of origin (%) and median annual income (SEK) five years after arrival to Sweden of the main research population.

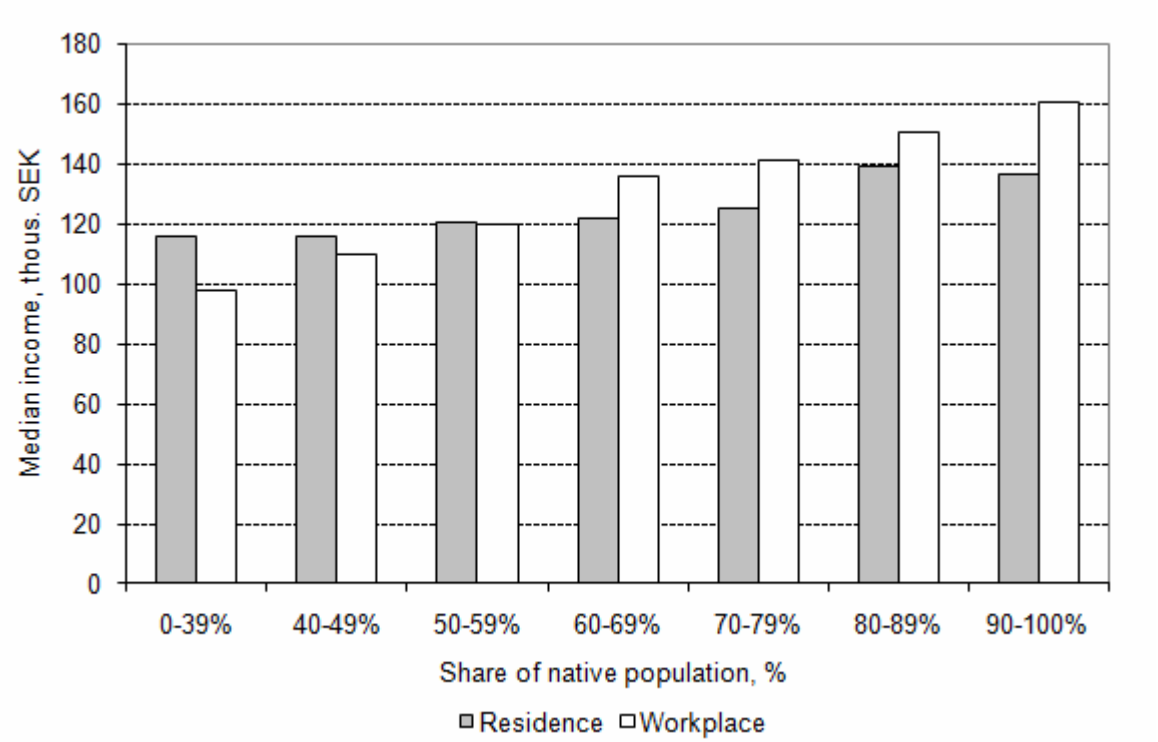

Figure 2. Median annual income (SEK) of the main research population five years after arrival to Sweden by average share of native population in places of residence and work prior to last job.

Table 1. Main research population by characteristics (%) and median annual income five years after arrival to Sweden (thousand SEK).

		All immigrants		MDC immigrants		LDC immigrants	
		Share	Income	Share	Income	Share	Income
Year of immigration	1990	40	99	39	132	40	69
	1995	26	155	28	183	23	118
	2000	34	154	33	187	37	120
Sex	Female	46	113	49	131	41	87
	Male	54	152	51	199	59	103
Age	23–34	59	120	57	153	60	86
	35–44	30	145	29	179	32	111
	45–67	11	155	14	170	8	119
Education	Compulsory school	23	100	15	129	33	86
	Upper secondary school	36	127	38	152	32	93
	University	41	160	47	189	35	112
Place of residence	Stockholm metropolitan region	43	144	38	185	49	109
	Gothenburg metropolitan region	13	132	13	169	13	92
	Malmö metropolitan region	11	111	13	134	8	71
	Larger regional centre	25	121	26	148	23	87
	Rest of Sweden	9	125	10	148	7	84
Sector	Private	68	152	70	182	66	114
	Public (municipality)	25	116	22	140	27	89
	Public (state)	7	165	8	188	7	131
Trade	Mining, manufacturing & construction	21	197	25	212	15	165
	Wholesale & retail	9	148	9	183	9	102
	Hotels & restaurants	12	76	7	91	19	72
	Transport & communication	6	156	6	184	6	123
	Financial & business services (LS)*	10	107	8	124	13	93
	Financial & business services (HS)*	8	199	11	219	5	157
	Public administration	3	128	3	167	3	74
	Education	9	103	10	127	8	74
	Health, social & other services	22	129	21	146	22	110
Entrepreneur-ship	No	94	136	94	167	93	99
	Yes	6	84	6	106	7	68
Swedish partner years	None	73	149	69	176	78	118
	Some years	17	157	20	176	13	119
	All years	10	158	11	178	9	127

* 'LS' stands for low-skilled trades, 'HS' for high-skilled trades.

Table 2. Results of the selection models.

		MDC immigrants		LDC immigrants	
		B	Sig.	B	Sig.
Year of immigration (Ref.: 1990)	1995	-0.018		0.257	***
	2000	-0.008		0.216	***
Sex (Ref.: Female)	Male	0.228	***	0.447	***
Age (Ref.: 23–34)	35–44	-0.036	**	-0.06	***
	45–67	-0.532	***	-0.494	***
Education	Upper secondary school	0.317	***	0.229	***
(Ref.: Compulsory School)	University	0.407	***	0.3	***
Region of origin	West	-0.362	***		
(Ref.: North)	East	-0.221	***		
(Ref.: Middle East)	Asia			0.348	***
	Africa			0.235	***
	South America			0.455	***
Place of residence	Gothenburg metropolitan area	-0.1	***	-0.214	***
(Ref.: Stockholm metropolitan area)	Malmö metropolitan area	-0.408	***	-0.42	***
	Larger regional centre	-0.142	***	-0.223	***
	Rest of Sweden	-0.123	***	-0.049	
Continuous neighbourhood	Average population	6.2E-6	**	-1.8E-6	
variables	Average share of Swedes	0.006	***	0.006	***
Swedish partner years	Some years	0.311	***	0.369	***
(Ref.: None)	All years	0.276	***	0.431	***
Intercept		-0.057		-0.916	***

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table 3. Results of the OLS regression.

		MDC immigrants		LDC immigrants	
		β	Sig.	β	Sig.
Year of immigration	1995	44,735	***	49,098	***
(Ref.: 1990)	2000	54,589	***	65,044	***
Sex (Ref.: Female)	Male	44,331	***	36,145	***
Age (Ref.: 23–34)	35–44	18,644	***	4,805	***
	45–67	5,506		-9,605	**
Education	Upper secondary school	12,537	***	10,925	***
(Ref.: Compulsory School)	University	52,548	***	34,165	***
Region of origin	West	933			
(Ref.: North)	East	-929			
(Ref.: Middle East)	Asia			10,198	***
	Africa			7,172	***
	South America			16,288	***
Place of residence	Gothenburg metropolitan area	-9,291	***	-11,948	***
(Ref.: Stockholm)	Malmö metropolitan area	-13,403	***	-20,840	***
metropolitan area)	Larger regional centre	-13,372	***	-9,231	***
	Rest of Sweden	-15,217	***	-7,209	**
Sector (Ref.: Private)	Public (state)	6,325	**	3,104	
	Public (municipality)	-5,097		-679	
Trade	Wholesale & retail	-9,782	***	-28,365	***
(Ref.: Mining, manufacturing	Hotels & restaurants	-60,278	***	-57,352	***
& construction)	Transport & communication	-19,070	***	-27,524	***
	Financial & business services (LS)*	-36,270	***	-45,500	***
	Financial & business services (HS)*	11,368	***	-517	
	Public administration	-30,459	***	-38,808	***
	Education	-54,230	***	-48,467	***
	Health, social & other services	-28,304	***	-22,451	***
Entrepreneurship (Ref.: No)	Yes	-46,641	***	-43,481	***
Continuous neighbourhood	Average population	1.6	***	0.02	
variables	Average share of Swedes	366	***	262	***
Continuous workplace	Average number of colleagues	9.3	***	5.5	***
variables	Average share of Swedes	564	***	368	***
	Number of years in employment	24,175	***	16,802	***
	Number of workplace changes	-10,484	***	-6,616	***
Lambda (λ)		23,405	*	50,540	***
Intercept		2,708		6,555	

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.
* 'LS' stands for low-skilled trades, 'HS' for high-skilled trades.
Control variables not shown: unemployment benefits, early retirement pension, study allowance and parental leave income.

Table 4. Values of partial eta squared ($\eta_p^{2)}$.

	MDC immigrants	LDC immigrants
Education	0.026	0.021
Neighbourhood exposure	0.001	0.001
Workplace exposure	0.014	0.014