Immigrant Careers - Why Country of Origin Matters

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2010

Lund Studies in Economic History 53

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Printed In Sweden
Media-Tryck Lund

ISSN 1400-4860
ISBN 978-91-7473-015-9

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Acknowledgements

"Can I run a regression with a single observation?"
With that far from impressive display of knowledge in quantitative analysis, I introduced myself to my future assistant supervisor sometime in 2005. It can be difficult to summarize the progress that I have made during the four and a half years of my writing this PhD-thesis. Therefore, I am happy that I remember that question, as that fact tells me it has been a great deal of learning.

I am indebted to Tommy Bengtsson, my main supervisor, for giving me the opportunity to take part in such a stimulating and productive environment that is the research group in Economic Demography. Tommy has motivated me with his interest in my progress and has helped me to identify fruitful areas to study. By always challenging my ideas, especially at an early stage, Tommy pushed me to constantly try to improve my work and analytical thinking. Furthermore, Tommy has had an amazing ability to offer encouragement and support when it has been needed the most, an arguably as important quality.

While Tommy has been managing on the macro-level, my assistant supervisor, Kirk Scott, has undoubtedly been the micro-manager. Kirk has always – voluntarily or otherwise – been available to answer any question, no matter how irrelevant it may have been. I am fully aware that I on numerous occasions may have been more than a tad annoying, which is why I appreciate his patience and contribution all the more. I am fortunate to have had someone who could always point me in the right direction, regardless of whether it concerned substantial methodological matters or more abstract theoretical reasoning. Kirk's contribution is however considerably more far reaching, having become a very good friend and a partner in crime in making life at the office much more fun.

I would like to thank the Swedish Council for Working Life and Social Research whose research grant *Inträde och utträde. Regionala studier av invandrares arbetskraftsdeltagande i ett livscykelperspektiv (dnr: 2004-1985)* financed my doctoral studies. I have also had the privilege to participate in numerous conferences and courses, something that has been made possible thanks to generous contributions from the Linnéaus Centre for Economic Demography (Vetenskapsrådet, dnr 2006-79/2008-6588), as well as from Crafoordska Stiftelsen and the Swedish Council for Working Life and Social Research. The ICPSR also deserves a thank you for the opportunity to spend a month in Ann Arbor back in the summer of 2006. Last but definitely not least, the Department of Economic History has also provided me with financial support as well as with a great work environment.

In the course of my PhD-studies, I have had the pleasure to present and get feedback on my work on numerous occasions. Therefore, I would like to thank participants at the seminars at the Department of Economic History and the Centre for Economic Demography for their valuable input. The same naturally applies to conference participants, in Sweden and elsewhere

At my final seminar, Anders Böhlmark and Anders Nilsson provided me with very valuable comments for which I thank you very much. I am also indebted to several other people who have taken the time to discuss my research and provided me with comments on earlier versions of the chapters in this dissertation, without being obliged in any way to do so (in no particular order): Wolfgang Hess, Martin Nordin, Martin Lindström, Petter Lundborg, Kajsa Holmberg, Martin Dribe, Maria Stanfors, Martin Klinthäll, Dan-Olof Rooth, Benny Carlson, Kent Johansson, Michael Rosholm, Panagiotis Mantalos and Farrukh Javed.

Madeleine Jarl, Birgit Olsson and Ingrid Prødel-Melau also deserve a big thank you, for very patiently catering to all possible administrative needs.

The PhD-student community at the Department of Economic History has offered plenty of laughter and has furthermore become an increasingly dynamic environment over time. Thank you all! A special mention goes to Mats Persson, Susan Niknami, Tina Hannemann, Kerstin Enflo, Åsa Ljungvall and Tobias Karlsson.

To my roommate Magnus Bohman: Thank you. We may not be able to read each other's dissertations without falling asleep, but you have always shown a genuine interest in my well-being, which I truly appreciate.

I clearly had no idea what I was getting myself into when I started this project 4.5 years ago. Had I not had parents who have always encouraged me to find my own way, I would have probably never started this. As I am immensely happy that I did, I want to thank my folks, Anneli and Stefan.

Finally: Thank you, Mia, for always making me look forward to coming home.

Lund, September 2010

Chapter 1.

Introduction

1.1. Aim, contribution and relevance

Substantial migration flows across political borders are not a recent phenomenon. Until the first decades of the 20th century, abundance of land and superior opportunities offered in the United States and Canada caused mass migration from numerous countries on the European continent. According to estimates presented by Borjas (1990), in the period from 1860 and until the outbreak of World War I, 30 million migrated from Europe to the United States. Whereas the U.S. has continued to be an important destination for migrants, from the end of the Second World War many European countries became increasingly affected by the immigration of individuals originating from poorer countries outside the European continent (Castles & Miller: 2003). As a result, many of the wealthiest Western countries are today characterized by sizeable non-native populations. Compared to a country traditionally viewed as a country of immigration like the United States, Sweden has for more than a decade hosted a share of foreign born that equals the American, in 2008 amounting to 14 percent (SOPEMI: 2010). Changes in the labor market structure as well as the composition of immigrants have caused immigrants in Sweden to experience quite a multifaceted disadvantage. More specifically, the immigrant labor market disadvantage that has emerged since the late 1970s is illustrated by several indicators, such as unemployment[1], earnings[2] and occupational attainment[3]. An equally striking pattern from previous research is that the disadvantage is closely linked to the individual's country of origin, suggesting the existence of factors determined already prior to migration that conditions the individual's outcome.

This thesis examines the labor market outcomes of a population of natives and immigrants in Sweden from 1968 and until 2001. The aim of the thesis is to improve the understanding regarding *why country of origin matters*. The motivation of the thesis originates from previous research consistently showing that the immigrant's labor market outcome is strongly linked to their country of origin. A range of hypotheses regarding why this is the case have however

[1] Bevelander (2000, 2001), Bevelander & Skyt Nielsen (2001) Arai & Vilhelmsson (2004)
[2] Edin & Åslund (2001), Ekberg & Andersson (1995), Le Grand & Szulkin (2002), Scott (1999)
[3] Ekberg (1991)

essentially remained untested using empirical data. By exploiting unique individual-level information relating to labor market relevant characteristics determined prior to migration, the thesis examines the influence of a few such mechanisms on the immigrant's post-migration labor market career in Sweden.

The thesis therefore contributes to the existing body of research by providing empirical estimations of the influence of a number of pre-migration characteristics on the immigrant's labor market outcome. Using a career perspective, it furthermore not only provides evidence of the relevance of pre-migration characteristics on the immediate transition to the Swedish labor market, but also on the long-term career trajectory.

Countries in the Western hemisphere which, alike Sweden, today are characterized by substantial shares of immigrants to a large extent share similar experiences. More specifically, whereas the initial post World War II migration flows in Europe mainly consisted of intra-European migration, the dominant motive has during the last decades been family reunification migration and refugee migration (Brücker et al: 2002). At the turn of the millennium, few Western countries states hosted a share of immigrants less than five percent of the population. At the same time, the origin of the dominant non-Western immigrant nationality varies considerably, as displayed in Table 1.1. Thus, while the most sizeable non-Western immigrant groups in Sweden consist of Iranian and Iraqi citizens, the United Kingdom hosts sizeable immigrant populations originating from India and Pakistan.

Table 1.1: Share of foreign born in selected countries, 1999-2005

Country	Share foreign born	Major Non-Western contibutors of immigrants	Year
Belgium	11.7	Morocco	2004
Canada	18.4	China, India	2001
Denmark	6.3	Turkey, Iraq	2003
France	7.3	Morocco, Algeria, Turkey	1999
Germany	12.8	Turkey	2002
Ireland	10	Nigeria	2002
Netherlands	10.7	Turkey, Suriname, Morocco, Indonesia	2003
Norway	7.4	Pakistan	2002
Portugal	6.7	Angola, Mocambique, Brazil, Cape Verde	2003
Spain	6.4	Morocco, Ecuador, Colombia	2001
Sweden	11.6	Iraq, Iran	2001
United Kingdom	8.2	India, Pakistan	2001
Unied States	13	Mexico, Phillipines, India, China, Vietnam	2005

Sources: Share foreign born: SOPEMI (2010), Major Non-Western Contributors of immigrants: Migration Policy Institute

Today's countries of immigration in the Western hemisphere host sizeable shares of individuals originating from countries that differ in many respects. More specifically, the distance between origin and destination for many immigrants is not only considerable geographically, but also institutionally, socially and culturally. Therefore, an Iraqi immigrant to Sweden could arguably experience a similar distance to the destination country in terms of culture, language and traditions as a Philippine or Vietnamese immigrant does in the United States. Therefore, the relevance of the results of this thesis should translate to the majority of Western contexts that in the post-War period has experienced an increasing non-Western immigrant population. Such an assumption is supported by the fact that immigrants' declining labor market success during the final quarter of the 1900s appears remarkably consistent across countries of destination[4].

The immigrant disadvantage in Sweden emerged alongside substantial labor market changes, with an increasing dominance of high-skill service occupations. This feature represents another commonality among the countries of immigration, potentially suggesting similar emerging mechanisms as driving the immigrant disadvantage. Thus, despite substantial differences between countries in terms of the importance of labor unions, the public sector as an employer or the prevalence of collective wage bargaining, empirical research on the experiences of immigrants in Sweden would emerge as relevant also on other contexts. The importance of a better understanding regarding the underlying mechanisms of the immigrant disadvantage therefore emerges as a key challenge for many Western countries.

1.2. Sweden becoming a country of immigration

Sweden is today recognized as a country hosting one of the world's largest population of foreign born. This situation has, however, essentially emerged during a relatively limited period of time following the Second World War (Statistics Sweden: 1999). Before then, migration flows into Sweden mainly consisted of return migrants from the massive Swedish emigration to North America during the second half of the 19th century (Rooth & Scott: 2007). Whereas Sweden in 1945 was a country whose population almost entirely

[4] (For Canada: Green & Worswick (2002), Baker & Benjamin (1994), Reitz (2001, 2007), for the United States: Borjas (1985), Chiswick (1978, 1985), Lalonde & Topel (1992), for Sweden: Ekberg (1990, 1994), Scott (1999), Le Grand & Szulkin (2002), Edin & Åslund (2001), Rosholm, Scott & Husted (2001), for Germany: Dustmann (1993), Licht & Steiner (1994), Constant & Massey (2003), Fertig & Schurer (2007), for the United Kingdom: Blackaby et al (2002), Clark & Drinkwater (2005), Dustmann & Theodoropoulous (2010).

consisted of native born, the share of first generation immigrants today approaches 15 percent (SOPEMI: 2009). Taking into account the second generation immigrants, representing a 10 percent share (Nordin & Rooth: 2007), Sweden has clearly become an ethnically heterogeneous country.

During the World Wars, Sweden remained neutral and became a refuge for individuals from neighboring countries fleeing the war. Sweden's position during the Second World War also translated into a very favorable economical situation by 1945, as major parts of the European industry were torn by the destruction of the World Wars. Resulting from a massive demand from the reconstruction in the European continent, Swedish industry was unable to satisfy the demand for labor domestically, causing the Swedish authorities to recommend a yearly net inflow of 10,000 labor migrants (Bengtsson, Lundh & Scott: 2005).

A number of procedures intended to facilitate the labor immigration were therefore implemented, where Danes and Norwegians during the 1940s became exempt from the requirement of applying for special work permits prior to arrival in Sweden (ibid). Starting from the end of the 1940s, the initial cohorts of actively recruited labor migrants to Sweden also arrived, primarily from Italy, Hungary and Western Germany. In the beginning of the 1950s, the procedure of labor immigration became increasingly formalized, when companies demanding labor were commissioned to forward their request to the Swedish employment agency. Provided the request was given the go-ahead from relevant Swedish labor unions and authorities, the employment agency would arrange for the transfer of labor migrants to Sweden in cooperation with their foreign counterpart (Lundh & Ohlsson: 1999).

From 1954, the establishment of a Common Nordic Labor Market further facilitated the intra-Nordic migration of labor by waiving the need for a work permit. While this formally facilitated the movement of labor migrants from Denmark, Norway and Iceland, the policy, however, primarily stimulated the inflow of Finnish immigrants. The same policy also made it easier for non-Nordic citizens to come to Sweden as labor migrants, as they no longer had to obtain a work visa prior to arrival in Sweden. Instead, they were able to enter Sweden on a tourist visa and subsequently apply for a work permit once they had a concrete job offer. While the Swedish authorities formally had the mandate to reject an application for such a permit, should they perceive the necessary labor supply as already available on the domestic labor market, the total share rejected is not likely to have exceeded 5 percent until the end of the 1960s (Lundh & Ohlsson: 1999).

The extensive labor division and vertically organized work situation in the industrial sector implied a relative lack of requirements for destination country specific skills in performing typical tasks. Furthermore, the demands for formal

qualifications were typically very limited, which was also reflected in the skill composition of the typical labor migrant (Lundh: 1996). Primarily originating from countries on the European continent, roughly 500,000 individuals had come to Sweden either as labor migrants or as accompanying family members by 1967 (Lundh & Ohlsson: 1994). Considering that the total population of Sweden at that time totaled around eight million (Statistics Sweden: 1999), it underlines the magnitude of the inflow of labor migrants which during that phase was virtually unrestricted.

From the middle of the 1960s, Swedish labor market unions started to voice concerns that the employers were using foreign labor as a means to hold down wages. As a result, from 1967, labor migrants faced the requirement to arrange for work permit, employment and housing prior to migration. Failing to do so would result in refused entry into Sweden (Lundh & Ohlsson: 1999). From 1972, it became even more difficult for non-Nordic citizens to obtain a work permit, resulting from the Swedish Trade Union Confederation's recommendation to reject all applications from non-Nordic citizens (Bengtsson, Lundh & Scott: 2005). At around the same time, unrelated events outside of Sweden also meant a paradigm shift in Swedish immigration history. Following Sweden's having formally committed to aid political refugees in the early 1950s, events in Greece and Czechoslovakia in 1967 and 1968 caused a substantial inflow of refugees (Scott: 1999).

In the wake of the global recession of the early 1970s, refugee migration has ever since come to characterize the Swedish migration experience. Whereas refugees arriving in Sweden from 1950 through the late 1960s on average amounted to no more than 1,500 per year, the subsequent period was characterized by a gradually increasing inflow of asylum seekers (Lundh & Ohlsson: 1999). The refugees had, until the early 1970s, almost exclusively been individuals from other European countries, but this was to become considerably different. Unsurprisingly, since the refugee migrant primarily can be expected to be motivated by push rather than pull factors, the geographical pattern of immigration increasingly came to follow events such as wars and other forms of unrest.

In connection with the military coup in Chile in 1973, and political unrest followed by a civil war in El Salvador, the majority of refugees during the 1970s were of South and Latin American origin. For the first time in Swedish history, the country now faced the challenge of integrating a sizeable population of immigrants arguably characterized by not only a substantial geographical but also socio-cultural distance. Furthermore, whereas labor migrants enjoyed a strong connection to the Swedish labor market, refugees' labor market prospects were considerably less favorable. During the 1980s, the inflow of immigrants also became increasingly heterogeneous, due to the immigration of Vietnamese

and Ethiopian refugees. Displaced by the war between Iran and Iraq, the most substantial group of immigrants during the 1980s was, however, represented by immigrants from these fighting nations. The gradual increase in the yearly number of refugees is vividly illustrated by the number of yearly asylum seekers, amounting to between 20,000 and 30,000 individuals during the last years of the decade (Lemaître: 2007).

In the beginning of the 1990s, the Civil War in Yugoslavia broke out, causing an unprecedented number of asylum seekers to Sweden. In 1992 alone, the number of applicants amounted to 84,000. During the second half of the 1990s and into the early years of this millennium, asylum seekers from Iraq again constituted the largest group. Sweden's joining the Common European Labor Market in 1994 opened the Swedish borders to individuals from EU/EES countries, which, however, has had a negligible impact on immigration (Bengtsson, Lundh & Scott: 2005).

Family reunification migration is associated with immigration of both labor migrants and refugees, representing a group which emerges as difficult to define in terms of their motivations for migration and to assimilate into the destination country. The more temporary character of labor migration appears to be reflected in the comparatively limited extent with which they were reunited with their spouse and under-aged children in Sweden. Instead, the major expansion of family reunification came from the second half of the 1980s. From varying between 5,000 and 10,000 residence permits being awarded to the close relatives of already immigrated individuals during the late 1970s and the 1980s, the figured soared to exceed 20,000 yearly permits from 1990 and onwards (Lundh & Ohlsson: 1999).

1.3. The Swedish economy

While this thesis primarily focuses on micro-level determinants of individuals' labor market outcomes, the emergence of a structural immigrant disadvantage during the last decades is better understood when mirrored in Swedish economic history. More specifically, by understanding how macro level changes interplay with mechanisms at the micro level, it becomes easier to understand why and how existing problems have emerged, as well as the extent to which they could be expected to remain.

1.3.1. The expansion

In 1968, at the beginning of the time period examined in this thesis, Sweden had enjoyed a period of virtually uninterrupted GDP per capita growth since the end of the Second World War (Krantz & Schön: 2007). The expansion of the

Swedish economy was driven by a considerable demand from abroad, primarily being the result of the European continent's reconstruction following the War. With a fully functioning infrastructure, the Swedish industry stood well prepared to benefit from the massive increase in the foreign demand, combined with considerable room for productivity increases (Schön: 2007). The magnitude of the demand caused employers to request foreign labor, which until the late 1960s lead to the virtually unrestricted inflow of labor migrants, as mentioned above.

A key characteristic of the labor migration period pertains to the organization of the labor-demanding manufacturing industry, and its implications for the qualities of the typical migrant. Work in the industrial sector was typically characterized by a high degree of labor division and a dominance of low-skill jobs. The *Fordist* work organization furthermore placed little or no demands on language skills (Lundh: 1996, Scott: 1999). The latter requirement suited immigrants perfectly, as the necessity for any investments into language or formal skills were next to none. The low-skill work also implied that the majority of the labor migrants only possessed very limited formal skills. Towards the end of the industrial sector's hey-day in the beginning of the 1970's, while representing about 40 percent of total employment (Lundh & Ohlsson: 1994), the manufacturing sector's share of tertiary educated labor was less than five percent (Hansson: 1996).

Occurring as a largely parallel process and initiated during the early post-War phase, a number of policies with far-reaching implications for the emergence of the Swedish welfare state were implemented. From 1955, universal health insurance was introduced, and from 1962 children became subject to nine years of mandatory schooling. The services were to be provided by the public sector and implied that the sector would have to grow considerably in order to be able to provide these services satisfactorily. Initially, the major part of the public sector growth occurred in areas such as the education and health care sectors, continuously increasing in terms of the number of individuals employed until the end of the 1970s (Ringqvist: 1996). The growing labor demand of the public sector greatly increased women's opportunities for labor market participation, which grew dramatically from the 1960s and until 1990 (Stanfors: 2007). While public child care and child support increased women's opportunities to venture out and start working in any sector on the labor market, the opportunity to work part-time in the public sector implied that women could manage combining work with family life (ibid., Pierre: 2008).

1.3.2. The Stagnation

From the end of the 1960s, labor migration policy reverted to a considerably more restrictive stance, as increasing competition experienced by several branches of the Swedish industry negatively affected their demand for labor (Lundh & Ohlsson: 1994). Whereas the Swedish industry had thrived during the reconstruction of the European industrial infrastructure, this phase was now essentially completed. Therefore, not only the European industry but also the Japanese and that of the NIC-countries began to put pressure on numerous segments of the Swedish industry (Schön: 2007). While Sweden's industry for many years had enjoyed high returns to a system which was organized around large scale production of standardized products and a far reaching division of labor and specialization, the emergence of more advanced production technologies made Swedish industry increasingly uncompetitive (Lundh: 1996). Furthermore, the emerging NIC-countries enjoyed another competitive advantage, through their considerably lower costs for labor. As a response to the increased pressure from abroad, increasing investments in machinery in order to raise productivity also implied a gradually lower demand for labor.

While the need for labor migrants had effectively been halted, individuals working within the industry still enjoyed high wages well into the 1970s as a result of financial subsidies for branches of the industry considered of particular importance by the Swedish government. Hence, despite increasing oil prices in 1973 and its severe repercussions on the global economy, the Swedish industry was maintained in a largely artificial situation created by the Swedish government (Schön: 1999).

From the end of the 1970's, the existing industrial structure finally began to succumb to the pressure from foreign competition and the emergence of financially more viable production methods. Parallel with the efforts to rationalize industrial production, new technologies started to emerge, which from the beginning of the 1980s led to the gradual reorganization of the work situation in most sectors. In the industrial sector, where work previously had been characterized by an extensive division of labor in a rather strict hierarchy, new opportunities to computerize considerable parts of the production process implied a consistently diminishing demand for labor to carry out the tasks requiring the least skills. Furthermore, the increasing use of computer and information technology across all segments of the labor market allowed the individual to handle and process unprecedented amounts of information, leading to greater responsibilities being delegated further down the hierarchy and also a flattening out of the organizational structure (Lundh: 1996).

The decline of the manufacturing industry in terms of its share of the workforce started during the early 1960s, and industry had already by 1965 been

overtaken by the rapidly increasing service sector. As a result of the diminishing importance of the industrial sector, a non-negligible proportion of previously immigrated labor migrants went back to their country of origin when they found their services no longer to be needed (Klinthäll: 2003). While the share of employed in the service sector in 1970 exceeded 50 percent of the work force, its growth by more than 10 percentage points up until the early 1980s – was primarily due to the expansion of the public sector. Whereas the growth of the service sector continued for approximately ten more years, the latter phase of the expansion was due to jobs in the private sector. Regardless of the principal contributor to the growth of the service sector, its increasing share of the employed population mirrored the educational upgrading of the Swedish labor force that had taken place. At the beginning of the 1990s, more than 35 percent of those employed in service occupations possessed tertiary education (Hansson: 1996), suggesting that formal qualifications had become increasingly important.

While the female labor force participation rate continued to rise during the 1980's, it became increasingly apparent that the stock of immigrants' skills was associated with a gradually worsening fit vis à vis the Swedish labor market. Not only were the jobs labor immigrants typically had been recruited to perform existing to a considerably lower extent, but the increasingly horizontal work-place organization implied greater demands on informal country specific skills, which immigrants for obvious reasons possessed less of.

During the major part of the 1980's, the economic policy of the Swedish government was characterized by an expansive monetary policy. While the growth of the public sector as well as the direct support of the industry had been halted, an additional devaluation of the Swedish currency in 1982 helped maintain export revenues at a high level. Despite Sweden enjoying unemployment rates considerably below those of the majority of other European countries throughout the 1980's, immigrants' labor market outcomes in terms of relative earnings (Aguilar & Gustafsson: 1994) and employment rates (Bevelander: 2001) were observed to continuously deteriorate.

This period of time also indicates a definitive break with the previous regime where immigrants on average can be observed to experience systematically worse labor market returns than natives. In 1990, the male employment rates of immigrant nationalities typically associated with refugee migration, such as Iran, Iraq, Vietnam and Ethiopia, ranged between 45 and 64 percent. Diminishing employment rates could be observed for all but every immigrant nationality, but were increasingly accentuated for the more recently arriving migrants. While the Italian immigrant in 1970 enjoyed an employment rate amounting to 92 percent, the corresponding figure twenty years later had dwindled to 70 percent. This is to be compared to an employment rate of almost

90 percent for the native born, underlining the increasing labor market difficulties experienced by immigrants (Scott: 1999).

1.3.3. The crisis and recovery

At the end of the 1980s, the Swedish labor market enjoyed a historically low rate of open unemployment as well as booming stock markets. Within a few years during the early 1990s, however, Sweden would experience one of its most severe economic crises of all time, translating into a massive increase in unemployment. Sweden's employment rate had since the late 1960s fluctuated around 2.2 percent and until 1990 never exceeded 3.5 percent (LABORSTA). This was at least partly the result of the Swedish government prioritizing low unemployment rather than keeping inflation at bay (Holmlund: 2006). As a comparison, during roughly the same time period, neighboring Denmark[5] and West Germany[6] experienced unemployment rates averaging at 7.4 and 6.5 percent, respectively. While enjoying an overall very low unemployment rate, the experiences of individuals differed noteworthily depending on their region-of-origin already in 1990, before the crisis. With the total population experiencing an unemployment rate of 1.6 percent, this figure is biased upwards by the Non-Nordic immigrants, characterized by an unemployment rate of 5 percent (Holmlund: 2006).

Swedish companies had, during several decades, been helped to remain competitive by numerous devaluations, something which was possible as a result of the Swedish exchange rate being fixed. From the mid-1980s, the economy was about to become even more overheated as a result of a number of deregulations on the banking- and credit market (Holmlund: 2006). By abolishing the banks' liquidity ratios as well as lifting the interest and lending ceilings, a massive credit expansion followed, illustrated by a 73 percent increase in lending from 1986 until 1990. The borrowed capital largely went into real estate, causing a construction boom, as well as increasing the average household debt (Englund: 1999).

During the beginning of the 1990s, a series of events – foreign as well as domestic - conspired to cause the Swedish bubble to burst. Major tax reforms implemented during 1990 and 1991 changed how income from capital was to be taxed, which was one of the factors causing the real after-tax interest rate to rise from -1 percent in 1989 to +5 percent in 1991 (Englund: 1999). Also affecting the interest rate, the Swedish government in the early 1990s performed a major policy redirection, indicating a low inflation rate as the prime objective of Swedish monetary policy (Holmlund: 2006). With an inflation rate at the time

[5] Own calculation, based on unemployment rates for the time period 1973-1990 (LABORSTA)
[6] Own calculation, based on unemployment rates for the time period 1976-1990 (LABORSTA)

standing at about six percent, an increasing interest rate became a means to cool down the economy. Resulting from the increased interest rate, demand for as well as prices of real estate decreased, in downtown Stockholm by as much as 35 percent in 1991 (Englund: 1999).

As a step in signaling the Swedish intention to join the European Union, an attempt to stabilize the Swedish currency was undertaken in 1991 by fixing the exchange rate to the ECU. The over-valued Swedish crown, combined with the contemporaneous worldwide recession, acted to further slow down the Swedish economy. Lasting until the end of 1992, the Swedish crown was subject to numerous speculative attacks, causing the Swedish central bank to gradually increase the interest rate, leading to financial unrest regarding what would happen in a longer run. As a final desperate move to protect the value of the currency, in September 1992, the central bank increased the interest rate to 500 percent, causing wide-spread financial panic and a dramatic and immediate effect, initiating Sweden's worst crisis in decades. Shortly thereafter, the fixed exchange rate was abandoned and the Swedish crown was allowed to float, causing an immediate depreciation of 15 percent vis à vis the ECU.

The crisis, culminating in the mid 1990s was associated with unemployment rates that post-war Sweden had previously never experienced. From 1993 and for five successive years, the unemployment rate hovered around eight percent according to the calculations of the International Labor Organization, based on the Swedish Labor Force Survey[7]. The increasing unemployment affected immigrants disproportionally, with rates among non-Nordic immigrants in 1995 amounting to 30 percent compared with 7.7 for the entire population (Holmlund: 2006). While unemployment rates were higher among individuals with less formal education, the crisis of the 1990s was not associated with any major structural changes, as the service sector already before the crisis was dominating. Instead, immigrant's skills in general appear to have been considered to be more expendable, explaining why individuals from Middle Eastern and Asiatic countries in particular increasingly lost their jobs.

Despite the persisting unemployment rates at – for Sweden – historically high levels during the mid-1990s, the economy started recovering very quickly. Resulting from the Swedish depreciation, Sweden's export instantaneously became increasingly competitive. Foreign trade was also promoted, directly as well as indirectly from joining the European Union in 1995, leading to exports' share of GDP increasing from 28 percent in 1992 to 45 percent at the turn of the millennium (Jonung, Kiander & Vartia: 2009). From 1997 and until the end of the period examined in this thesis, unemployment continuously decreased, bearing evidence to Sweden's post-crisis recovery.

[7] Information gathered from LABORSTA

1.4. Conceptualizing the immigrant's labor market career

The outlined Swedish economic history and the associated structural labor market changes provide an illustration into how demand-side mechanisms have changed over time. Of particular importance is the emerging dominance of *Toyotaism* as a concept of work place organization, combined with the increasing share of occupations demanding more advanced formal skills (Lundh: 1996). Associated with this, Klinthäll (2003) identifies *Toyotaism* as associated with higher cost of hiring immigrants due to difficulties in assessing their formal qualifications, and thereby serving as a mechanism underlying the emerging immigrant disadvantage. Furthermore, as the flatter organization with more focus on client interaction and team work implies greater demands on informal destination country specific skills, like language, this is believed to further depress the utility of an immigrant's skill set.

Representing an adjusted human capital approach, the à priori conceptualization of immigrants' labor market career outlined for this thesis follows an adjusted human capital approach, as proposed in Barry Chiswick's seminal article *The Effect of Americanization on the Earnings of Foreign-born Men* (Chiswick: 1978). As proposed according to the *Immigrant Assimilation Hypothesis*, a migrant's career in terms of remuneration from work can be expected to follow a U-shaped trajectory, influenced by factors both prior to and after migration. Originally, the concept was designed to illustrate the short- and long-term post-migration adjustment in terms of earnings. Such a trajectory can and have been illustrated in terms of other measures of rewards from labor, such as occupational status.

As postulated by the hypothesis, immediately following migration, an immigrant is believed to experience difficulties in obtaining a return to skills similar to that prior to migration. As a result, the individual's remuneration in terms of wages or occupational status may be affected negatively, translating to a downward transition in terms of labor market rewards. Typically, the main mechanism underlying an immigrant auto mechanic or engineer's failure to obtain employment in the same occupation immediately subsequent to migration is identified as resulting from the individual's human capital not being fully transferable from the country of origin to the country of destination (Chiswick & Miller: 2009). Such difficulties have been linked to a range of factors, such as institutional differences between the countries' educational systems as well as objective differences in the quality of schooling (Hanushek & Zhang: 2009). Hence, depending on the demands for formal qualifications or various types of informal skills associated with an occupation, the set of skills possessed by the immigrant at migration may be linked to a more or less problematic transition to the destination country labor market.

The expansion of the private service and public sectors in Sweden was associated with a considerable growth of the share of occupations requiring formal education obtained at an advanced level. Thus, the comparatively higher demands for appropriate formal credentials and proven theoretical competence in order to obtain access to a growing segment of the labor market emerges as one of the mechanisms driving the size of the downward transition to which immigrants are subjected after migration. It also points to why the earlier, predominantly low-skill, immigrant cohorts of the 1950s and 1960s were observed to largely avoid such a downward transition.

Whereas the individual's formal degree arguably represents the most commonly used and tangible parameter gauging the individual's human capital, the concept in a broader sense also includes other characteristics which may either complement or reinforce the utility of the individual's formal competence. As will be illustrated, a range of such characteristics are likely to have become increasingly important over time. Furthermore, since the immigrant's possession of such skills is typically very limited immediately subsequent to migration, this would increasingly accentuate the initial downward transition in terms of labor market rewards.

Belonging to the individual's skill set, destination country specific skills such as knowledge of the language, familiarity with the institutional setting as well as with existing customs and traditions could be believed to reinforce the utility of a given set of formal skills. Knowledge of the language in the destination country increases the individual's potential to signal their productivity as well as their ability to function in a work situation requiring communicative abilities (Chiswick & Miller: 1995, 2003, 2003, Dustmann & Fabbri: 2003). Furthermore, being able to communicate in the destination country language increases the individual's ability to interact with natives and thereby getting access to potentially valuable networks, empirically shown to have become an increasingly important channel in the job-search process (Behtoui: 2008).

Labor market experience, or on-the-job training, is commonly assigned a role almost as important as formal education in signaling an individual's productivity (Mincer: 1962). This emerges as intuitively reasonable, as one of the employer's main concerns when making a hiring decision is linked to their uncertainty regarding the potential employee's productivity. Whereas a formal qualification may be a necessary requirement for becoming eligible for employment in a given occupation, the testimony of having successfully performed relevant tasks may be even more attractive to an employer, as it signals the individual's *actual productivity*. Previous research has however suggested the applicability of foreign obtained labor market experience as limited (Friedberg: 2000). This could either be linked to differences between the

practice of a given occupation across countries or the destination country employer's inability to inquire into the productivity of a potential employee.

Focusing instead on characteristics typically not associated with the individual's human capital, empirical research has shown a strong association between various health- and socioeconomic outcomes (Mackenbach et al: 2008), potentially suggesting the existence of a mutually enforcing link. The immigrant-native gradient according to both outcomes could therefore suggest that immigrant's less than impressive post-migration labor market outcomes may be linked to an inferior health status, negatively affecting the individual's performance in the labor market in terms of labor supply and productivity. An increasing literature has found support for such a mechanism (Currie: 1998, 2009, Case et al: 2005, Palloni et al: 2009), likely to remain important well into the future. More specifically, this would seem to be the case, considering the differences in health conditions at birth between birth cohorts born in immigrant receiving Western countries and individuals born in countries typically associated with emigration (Abouharb & Kimball: 1999).

Whereas the initial transition to the destination country labor market is represented by the downward sloping part of the U-shaped mobility trajectory, the immigrant is subsequently expected to enjoy a period of catching up with their pre-migration status. Heterogeneities between the typical requirements for employment between occupations as well as in terms of the individual's characteristics may, however, affect both the size of the initial downward transition as well as the trajectory of catching up. To the extent that high status occupations are characterized by more stringent demands for destination country specific formal as well as informal skills, this may increase both the size of the downward transition as well as the amount of post-migration human capital investments necessary to obtain a similar job in the country of destination. As a result, the slope of the catch-up trajectory may be influenced by the same characteristics underlying the initial downward transition.

An inherent weakness associated with the immigrant assimilation hypothesis pertains to the implicit assumption that a downward status adjustment, particularly when combined with a failure to complete the process of catching up, is considered to be a suboptimal outcome. A downward adjustment in the majority of cases implies that the immigrant is working in a post-migration occupation requiring less formal skills than that actually possessed. Therefore, it is true that it also to some extent represents not obtaining a full return to the individual's pre-migration educational investment. When taking additional factors linked to the immigrant's experience in the country of origin and the country of destination into account, the conclusion pertaining to its result on the individual's well-being may become different. Between-country differences in access to health or child care or between-

country income differentials may lead to the individual choosing to settle for a less advanced position in the occupational hierarchy, yet enjoying a higher standard of living than prior to migration. While it remains important to recognize that an immigrant working in an occupation for which they are over-qualified in some cases may be the result of a conscious choice by the individual, a key assumption of this thesis remains that this situation is the exception.

1.5. Data

The findings of this thesis are the based on the analysis of Swedish register data, merged into the Swedish Longitudinal Immigrant database (SLI) [8]. The SLI was created during the latter half of the 1990s in order to address research questions pertaining to the increasing problems of economic and social integration of immigrants to Sweden. For the initial construction of the database, random samples of 2,600 immigrants in the ages 0-65 were drawn from the 1970 census, stratified by sex and five-year immigration period from each of the 16 quantitatively most important immigration countries to Sweden. This immigrant sample was extended with a random sample of almost 7,000 citizens from each immigration country according to the same stratification logic for the immigration period 1968 through 1993. For the immigrant sample, children living in the same household as their immigrant parents were also added to the original selection. As a result, the immigrant sample was at the time of the creation of the SLI close to representing the total population of the chosen nationalities. As a control group, the database also included stratified random samples of native Swedes selected from the 1970 and 1980 censuses, generating a total of 110,000 unique individuals in the original SLI database.

In 2005, the amount of subjects included in the SLI was increased considerably, with natives as well as foreign-born individuals. Among natives, a sample of individuals stratified by sex and age-group and born between 1971 and 1987 were added to the database. Also expanding the number of immigrants, about 300 individuals were selected, again stratified by age-group and sex for each of the nationalities already included in the database and for each immigration year between 1994 and 2001. The major expansion of the SLI, however, consisted of linking the individuals to their children, children's children, parents and spouses, provided that they at some point in time between 1968 and 2001 resided in Sweden. A result of the linking procedure was the increase in the heterogeneity of the sample in terms of its country of birth

[8] This section is based on the documentation of the SLI database.

composition, where the updated SLI contains individuals born in over 150 different countries, albeit in some cases only represented by a very small number. The updated SLI used in this thesis represents a considerably more extensive database, containing information on roughly 550,000 unique individuals.

Similar to other longitudinal or panel datasets with Swedish micro data, various types of register data, primarily administrated by Statistics Sweden were attached to the individuals, gathered at varying intervals and covering different time periods. Whereas the taxation register with yearly observations covers the entire time period from 1968 until 2001, the precision of the information provided varies considerably over time. Other sources of information include the censuses, taken every five years between 1970 and 1990, as well as the population register which provides highly detailed information on internal migration and childbearing, for example. The major way in which the SLI differs from longitudinal datasets with Swedish micro data, such as LINDA (Edin & Fredriksson: 2000) and LISA[9], is that pre-migration information obtained from the records of the Swedish immigration authority was linked to a subsample of approximately 22,000 individuals. Immigrants selected for the subsample originate from 16 countries and arrived between 1966 and 1994. To this date an under-investigated feature of the SLI, the pre-migration data includes information on the individual's language skills, home country labor market experience, education and occupation when emigrating to Sweden. Regrettably, full pre-migration information on all available parameters covers far from all individuals in the subsample. Hence, the amount of individuals used from the sample varies quite considerably depending on which pre-migration parameters the sampling is based.

1.6. Summary of the chapters

1.6.1. Pre- to Post Migration Mobility of Immigrants to Sweden 1970-1990 – A Panel Data Sample Selection Approach

The chapter analyzes a sample of roughly 3,000 immigrants from seven different countries of origin, examining their transition from the country of origin to the Swedish labor market. Using information on the individual's occupation, the outcome is measured as the change in occupational status when comparing the last occupation prior to migration with the first obtained after arrival in Sweden, according to the International Socio Economic Index (Ganzeboom, De Graaf & Treiman: 1992, Ganzeboom & Treiman: 1996, 2003). The occupational

[9] See http://www.scb.se/LISA for more information. Retrieved September 10, 2010.

classification is designed to gauge the typical education and earnings potential of an occupation, and is intended to be useful in cross-country comparisons.

The choice to gauge the individual's labor market outcome in terms of their pre- and post-migration occupational status conditions the time period and population investigated in the chapter. Pre-migration information is gathered from the SLI subsample, which does not represent all nationalities of the main database, yielding seven immigrant nationalities which were included, selected on the criteria of not having immigrated later than 1990. Furthermore, as the individual's pre-migration occupation had to be coded into the NYK78[10] classification, some occupations reported were too unspecific to be of any use. Post-migration occupation is obtained from the censuses, undertaken every five years between 1970 and 1990, thereby setting the boundaries for when the individual's post-migration occupation can be observed. While all individuals included in the sample are observed with an occupation both prior to and subsequent to migration, a share of those included was not considered to have completed the transition to the Swedish labor market. In order to account for selection into employment being a non-random process and likely to be driven by unobserved characteristics, the analysis applies an econometric method aiming to take such selection into account. More specifically, the chapter analyzes the data by using a two-step sample selection estimation method, specifically designed to account for the problem of non-random selection in a panel data setting.

The contributions of the chapter pertain to extending the study of a highly interesting segment of the immigrant's labor market career to a previously unstudied time period, using Swedish data. More importantly, the influence of the region of origin effect is estimated with better precision due to the ability to control for language skills as well as labor market experience obtained prior to migration.

Previous research has typically estimated the influence of pre-migration labor market experience measured with considerable imprecision. Whereas the approximation may be close to accurate for male labor migrants, having migrated voluntarily and likely to have enjoyed an uninterrupted pre-migration career, this is not likely to be the case for refugees. The chapter uses the immigrant's actual labor market experience, estimating its influence on the process determining employment as well as the post-migration occupational status obtained. The results consistently suggest such characteristics as irrelevant in determining employment, regardless of how its influence is modeled. While controlling for selection into employment, only highly-skilled immigrants are observed to enjoy a more beneficial transition in terms of the

[10] Statistics Sweden (1999)

status of the occupation attained in Sweden from country of origin labor market experience. This effect remains robust across a range of model specifications, indicating highly-skilled immigrants as comparatively more able at signaling such skills, complementary to formal human capital.

High–skill occupations are typically associated with the performance of tasks characterized by a considerable extent of theoretical skills as well as a horizontal work place organization, placing an emphasis on team work. As a result, such occupations are considered to rely more extensively on destination country specific informal skills, such as language. The results indeed strongly suggest differences in terms of the post-migration occupation obtained between immigrants depending on their linguistic distance. The importance of such skills increase with the pre-migration occupation's skill level, highly consistent with the à priori expectations. Among immigrants in low-skill occupations prior to migration, no advantage in the transition to the Swedish labor market can be observed for individuals with a closer linguistic distance to Sweden. Hence, the results suggest employers for low-skill jobs are indeed placing a very small focus on linguistic skills in becoming eligible for employment. Among immigrants in high-skill occupations prior to migration, the influence of language skills is, however, far from negligible. Particularly regarding the transition to a post-migration occupation, predicted outcomes suggest a substantial disadvantage that is particularly accentuated among immigrants without familiarity with neither a language belonging to the same language family as the Swedish nor the Latin writing system. While a theoretically expected result, the previous lack of empirical results estimating its actual effect makes the finding highly relevant from a policy perspective.

The chapter particularly underlines the importance of here examined personal characteristics when explaining the outcomes of highly-skilled immigrants. The general good would arguably benefit considerably from being more successful in integrating highly-skilled immigrants in the labor market. The results therefore suggest that considerable gains would be associated with rapidly providing immigrants with a range of destination country specific informal skills, where the Swedish language arguably represents a comparatively easily implementable policy.

1.6.2. Thou Shalt Not Pass? Examining the Existence of an Immigrant Glass Ceiling in Sweden 1970-1990

An empirical observation from contemporary western societies is the over-representation of immigrants in disadvantaged positions in the labor market. The chapter represents a period of time when this disadvantage was emerging, along with a dramatically changing labor market structure. The glass ceiling represents

a theoretically appealing concept in describing immigrants' exclusion from the most elevated positions in the labor market, primarily explained by demand side factors. More specifically, such an exclusion has in this chapter been examined in terms of differences in the probability of upward mobility into higher status occupations, where the native man advantage theoretically is believed to accentuate at high status origins.

The glass ceiling is examined by analyzing upward transitions in occupational status, measured according to the International Socio-Economic Index. Information on occupation is provided by the censuses, undertaken every five years between 1970 and 1990. Furthermore, the data allows distinguishing between upward transitions into the public, private service or private manufacturing sector using data on industrial classification. The chapter uses a sample of 70,000 natives and immigrants in Sweden, with the contribution being that it delves deeper into how the labor market sector-specific opportunities for upward mobility vary across individuals depending on their linguistic distance, formal education and sex. While immigrants to a varying extent are observed to be disadvantaged in all three sectors, the overall pattern clearly does not comply with an orthodox representation of a glass ceiling. Instead, the most common situation seems to be one of a somewhat consistent pattern across status origins, with the most substantial real differences in career opportunities at low-status origins.

The private service sector, characterized by a comparatively large share of high-status occupations, becomes the largest sector during the time period examined in the chapter. The data furthermore indicated the sector as characterized by the most evident pattern according to linguistic distance, suggesting that this sector as likely to be characterized by substantial differences in terms of probabilities of upward mobility. The results however show a consistent immigrant disadvantage across status origins, suggesting the peripheral group as about equally disadvantaged in advancing past a position in the low- or the medium-part of the occupational hierarchy. An explanation for such a pattern is that private service occupations at almost every level of occupational status are associated with demands for destination country specific skills. Thus, regardless of an individual applies for the job as a cashier, bank teller or financial analyst, knowing the Swedish language represents an advantage.

The private service sector was viewed as most likely to exclude peripheral groups as a result of favoring the use of informal recruitment channels. However, the private manufacturing sector appears to be characterized by the most accentuated distributional differences according to linguistic distance at high status levels. From the results, a general immigrant and specific female disadvantage in attaining upward mobility into the private manufacturing sector

emerges. The disadvantage suggests accentuated disadvantages at low- and medium-high status origins, indicating that peripheral groups are less likely to be recruited for medium-level and management positions.

Such results can tentatively be understood more easily while considering the shrinking private manufacturing sector over time, combined with an increasing within-sector share of high-skill occupations. To the extent that management positions are also in this sector associated with greater demands on destination-country specific skills, this would support the expected increasing disadvantage with linguistic distance. Furthermore, the sector's male dominance is also evident, potentially suggesting a structural disadvantage for women. Despite the sector being characterized as comparatively low-skill, the labor market changes occurring over time also affected the organization of work in the private manufacturing sector, introducing a more horizontal work place organization. Hence, an increasing horizontal organization with a greater emphasis on team work also characterized less-skilled workplaces. As a result, positions further down in the hierarchy may also have become increasingly inaccessible for immigrants, thus explaining their disadvantage at lower status origins.

The public sector emerges as the least advantageous sector for native males, consistent with how the demand mechanisms were expected to vary across sectors. Characterized by a substantial growth over time, particularly in high-status occupations, the public sector was not expected to be associated with a similar exclusion of peripheral groups from high-status positions. More specifically, a greater reliance on the part of the employers on formal recruitment methods as well as a generally more transparent employment process could result in peripheral groups enjoying a comparably good access to career opportunities in the public sector. The results would appear largely consistent with such a situation, as several groups experience non-negligible advantage of upward mobility into occupations in the public sector. The results suggest that the peripheral groups' advantages are most accentuated from the lowest status origins, indicating the public sector as a particularly common destination for an immigrant experiencing a process of post-migration occupational status catch-up. At higher status origins, the results confirm the peripheral groups' advantageous situation compared to other sectors, while at the same time indicating that their advantage compared to the native male has disappeared. Also in the public sector, individuals with the greatest linguistic distance are observed to be disadvantaged, suggesting mechanisms causing their exclusion from equal opportunities as seemingly consistent on the Swedish labor market. While the results would suggest that no group is effectively excluded from the formal recruitment methods used to a greater extent by the public

sector, the disadvantage of the linguistically most distant group may be driven by such unobserved characteristics as health or motivation.

1.6.3. Post-migration human capital investments and immigrants' income assimilation in Sweden, 1983-2001

The chapter examines the income assimilation process of a small but well-defined sample of formally high skilled immigrants to Sweden. Using pre-migration information on occupation and formal education, the chapter distinguishes between the income trajectories of immigrants with formal degrees belonging to four different educational types. More specifically, 678 immigrants with advanced formal skills are selected, all of whom have their pre-migration degree within the educational types *Health Care*, *Science and Technology*, *Education and Teaching* and *Social and Computer Science*. Apart from examining their differing income assimilation trajectories, the chapter attempts to identify formal post-migration human capital investments of relevance to the individual's pre-migration degree. This is primarily done using information on the receipt of student assistance, information that becomes available from 1983 and onwards.

The sample selected for the chapter is as of particular interest, due to their sizeable supply of formal skills which, if used properly, could benefit the Swedish labor market substantially. The chapter generally confirms this group's poor opportunities to achieve income assimilation, consistent with findings from previous research. Furthermore, the chapter examines the influence of formal post-migration human capital investments, by exploiting longitudinal data and individual fixed effect regression to cancel out the potential influence ability bias.

The results support the bleak prospects for labor market assimilation of formally high-skilled immigrants as also proposed by previous research. With a mean relative income ranging between 50 and 70 percent, the results however suggest substantial differences in the applicability of various types of skills in the Swedish labor market. Despite being an educational type not hosting occupations associated with the highest incomes, immigrants with advanced degrees within Education and Teaching are observed to be the least likely to attain an income equal to their comparable native. Thereby, this suggests this type of skills is suggested to be the least applicable in the Swedish labor market. The other side of the coin is represented by immigrants whose skills belong to the educational type *Health Care*, including nurses, physicians and veterinarians, enjoying comparatively favorable outcomes.

The differences in results suggested by cross-sectional OLS and individual fixed effect regression suggest the former as affected by bias to a substantial

extent. The problems primarily pertain to the issues involved in estimating an unbiased effect from formal human capital investments conducted subsequent to migration. Consistently, the influence from such investments is negatively biased in the OLS specification, tentatively suggesting individuals choosing to conduct such investments as selected from the lower end of the skill distribution. Here, it is argued to reflect the typical individual in the sample unlikely to be exposed and encouraged to making any formal human capital investments until after having failed an initial attempt to assimilate into the labor market. Furthermore, if the immigrant's intention is to return to the country of origin as soon as the opportunity presents itself, this is likely to diminish any intention to transfer their formal human capital to the Swedish labor market. Therefore, the most able immigrants who manage to gain a foothold in the Swedish labor market rapidly are unlikely to consider or even be introduced to the option of investing in Swedish schooling.

Directing a particular focus towards netting out the influence of unobserved heterogeneity on the estimated effect of investing in relevant Swedish schooling subsequent to migration, parameter estimates suggest this as a highly beneficial strategy. Relying on the individual fixed effect estimates for a more accurate estimation of the true effect, the results show a substantial income premium associated with formally investing in Swedish education among individuals belonging to all educational types. From a policy perspective, efforts aiming towards encouraging immigrants to transfer their advanced formal degrees to become useful on the Swedish labor market should therefore clearly be a priority.

While acknowledging the limited size of the sample, this chapter has provided numerous indications regarding the mechanisms determining immigrants labor market outcomes while focusing on horizontal rather than vertical educational differentiation. Combining the influence from predicted relative income trajectories and formal human capital investments subsequent to migration would according to both methods of analysis, but particularly according to the fixed effect estimates, suggest skills belonging to the educational type *Health Care* as associated with the most favorable labor market return in terms of relative income. While it is beyond the scope of this chapter to determine whether the comparatively favorable outcomes enjoyed by immigrants with degrees within *Health Care* primarily is due to supply or demand factors, this naturally emerges as important. If it would be the result of a strong link between becoming introduced to and recruited into the appropriate occupation while completing the formal human capital transfer process among individuals with such formal degrees, it could present other occupational groups with indications regarding how to benefit the most from the formal skills of the immigrant population.

1.6.4. Early-life conditions and income attainment in Sweden during 1968-2001: using sibling data to further explain why country of origin should matter

There is a growing empirical literature emphasizing the lasting influence of health conditions experienced during early-life. In numerous contexts, empirical research has established a link between early-life conditions and later life health as well as socioeconomic status. Furthermore, all three parameters - early-life conditions, later life health and socioeconomic status - seem intimately related. Hence, a direct as well as indirect causal link between an individual's early-life conditions and subsequent labor market experience has been indicated as a plausible mechanism explaining differences in outcomes that cannot be explained by traditional models.

The chapter aims to examine the influence of early-life health conditions on the individual's adulthood income attainment. Income information is available throughout the entire time period represented in the SLI, and therefore the chapter is not affected by issues of data availability influencing its chronological span. The chapter examines the individual's income at a consistent age-range, excluding all individuals not observed with an income sometime between the ages 32 and 36. A major difficulty associated with establishing such a link is to isolate the existence of a causal effect. First, when examining adulthood outcomes, the time elapsed between cause and effect naturally makes any model vulnerable to the influence of a range of confounding factors. Furthermore, the results may be sensitive to issues of selection, where individuals born under especially unfavorable circumstances may share a set of unobservable characteristics driving their effect.

In order to solve such problems, the chapter examines a sample of biological siblings and exploits fixed effect modeling, canceling out shared unobserved characteristics. The method allows for viewing siblings' outcomes as counterfactual, due to individuals belonging to a given family sharing unobserved characteristics, including genetic factors, ambition, values and norms. About 11,200 biological siblings were identified, from a subset of 11 different countries of origin, conditional on accurate data on early-life conditions – measured as the infant mortality rate – for the birth cohort in question.

A second contribution of the chapter is to examine a research problem which previously has not been examined in Sweden during the time period in question, using the aforementioned econometric modeling. Measuring early-life conditions using the infant mortality rate, another advantage of the findings pertain to the individual's exposure being exogenously determined and also exposing large segments of – if not the entire – population. The results consistently suggest within-family variation in exposure to disease load as

exercising a significant influence on the predicted adult income. While typical differences between the early-life conditions experienced by individuals from the identical family typically are very small, the results nevertheless suggest an economically significant influence.

The measurement of early-life conditions explicitly is designed to be exogenous and essentially permeate the entire population. Despite this, previous research has indicated varying degrees of vulnerability to health shocks across socioeconomic status levels. The modeling was therefore extended to examine to what extent the influence from exposure to adverse early-life conditions varies depending on the resources available to the parents. The results suggest the influence of exposure to early-life conditions as associated with the greatest effect on the predicted adulthood income among children in families with the least resources. This suggests between-sibling differences within such families as leading to rather substantial differences in their later life labor market outcomes. The results also indicate the influence of such within-family differences in exposure to early-life conditions as decreasing with the parents' increasing socioeconomic status.

The existence of a socioeconomic gradient in the influence of early-life conditions strongly suggests that parents with a lot of resources appear able to redirecting resources among the siblings. As a result, the effect of the early-life conditions to which the less fortunate sibling was exposed may be at least partly offset by parental intervention. More specifically, better educated parents are more likely to possess knowledge regarding health care practices, nutrition and care. Despite the assumption that the exposure to variations in disease load affects the entire population, it is not impossible that differences in resources also potentially may affect a parent's opportunities of partially or completely shielding the child from being exposed. While impossible to observe which explanation is correct, both would arguably present the observed pattern of early-life influence on later life labor market outcomes.

This chapter concludes by confirming the existence of a link between early-life conditions and attained income in adulthood. This is done by examining a sample of natives and immigrants, suggesting the effect as consistent across contexts. Considering Sweden's history as a forerunner in health care practices, the results would suggest differences in early-life conditions between natives and immigrants as partially linked to different conditions experienced during the first year of life.

1.7. Conclusions

The problem to successfully integrate a growing and ethnically increasingly heterogeneous immigrant population is today a major problem in many Western countries. From what is known regarding the mechanisms underlying the disadvantage, it is furthermore likely to be a problem than will persist for many years to come. The disadvantages experienced by immigrants are not, however, confined to the labor market, but also evident in terms of their failure to socially integrate. Therefore, the immigrant populations' destination country outcomes may be strongly interconnected. This thesis focuses on immigrants' labor market experience, with a particular interest in the influence of characteristics determined prior to migration. The results have unsurprisingly confirmed the individual's origin as strongly associated with their post-migration outcomes, as is consistently suggested in previous research. Indicating characteristics defined prior to migration that are of empirical relevance subsequent to migration, the results point towards several policies that could improve an immigrant's prospects of labor market integration.

In the immigrant's transition to the Swedish labor market, those in low-status occupations prior to migration are observed to experience a comparatively favorable initial development in terms the status of the occupation attained. Furthermore, within this group, neither language skills nor labor market experience obtained prior to migration is observed to influence the outcome. Insofar as employers for low-skilled occupations could be expected to value language skills to a comparatively little extent, this would be indicated as supported by the results. The elementary nature of the tasks typically associated with low-skill occupations could also imply the employer's situation of imperfect information as a comparatively minor issue in the hiring process. Therefore, the utility of the productivity signal associated with labor market experience from the country of origin could be negligible, as suggested by the results.

The influence of language and pre-migration labor market experience for the initial occupation obtained after migration is instead shown to be highly important for highly-skilled immigrants. This is consistent with the expectation that communicative skills are more highly valued in occupations requiring advanced formal skills. Among individuals in high-skill occupations prior to migration, the downward status transition is predicted as being most favorable for individuals with knowledge of a language belonging to the same language family as the Swedish. Still, among immigrants in high-skill occupations prior to migration, labor market experience obtained in the country of origin is also associated with a positive effect on the status of the occupation obtained in Sweden.

The high-skilled immigrant's initial downward status transition in the destination country labor market is hence undoubtedly affected by their composition of labor market relevant characteristics, such as language skills and pre-migration labor market experience. The size of the downward occupational status transition as well as the subsequent assumed upward sloping trajectory could, according to the results of the thesis, be influenced by health conditions experienced during infancy. Establishing that health conditions at the time of the individual's birth, measured as the infant mortality rate, are associated with attained adult income thus emerges as a key finding of this thesis. Furthermore, as individuals' outcomes are observed at an age empirically shown to be a good predictor of lifetime earnings, this would indeed suggest that an individual born under comparatively adverse conditions will be permanently disadvantaged.

The infant mortality rate, measuring the health conditions to which an individual is exposed during their first year of life, has improved considerably worldwide over time. Despite this, contemporary immigrant cohorts typically have experienced relatively worse early-life conditions than birth cohorts who migrated in the 1960s or the 1970s. An extension of the results thus becomes to associate a part of the immigrant disadvantage that is observed today as resulting from being exposed to comparatively adverse conditions during early-life. More specifically, such a disadvantage may be manifested both as a greater initial disadvantage subsequent to migration, and as a less steep trajectory of recovery compared to an individual subjected to more favorable early-life conditions.

The labor market changes characterizing Sweden over the time period examined in this thesis were expected to be associated with substantial implications regarding the immigrant's career opportunities. The decline of low-skill jobs in general and the private manufacturing sector in particular implied a contraction of typical entry-jobs for immigrants in the Swedish labor market. Simultaneously, the growing share of high-skill jobs in the public and the private service sector was believed to be associated with requirements that many immigrants do not fulfill. This thesis show considerable differences in the opportunities for career progress between labor market sectors, where the shrinking private manufacturing sector indeed appears to be associated with an absence of career opportunities for immigrants, which increases with linguistic distance. Immigrants are also disadvantaged in the private service sector, which is suggested to be linked to this sector's comparatively high demands for communicative skills. Furthermore, employers in this sector could – based on other empirical evidence – be more likely to rely on informal recruitment methods to which immigrants may not be exposed. Therefore, the emergence of the public sector as a beneficial sector for immigrants' career progress is expected, given their greater reliance on formal recruitment methods. An exception to the favorable immigrant career opportunities in the public sector is,

however, represented by individuals from countries with the most distant mother tongues from the Swedish language in terms of origin and writing system.

The formal and informal human capital composition of immigrants was shown to influence the initial post-migration outcome of highly-skilled immigrants. Particularly, focusing on the determinants of this group's outcomes therefore appears relevant due to the potentially substantial pool of competence that this group could provide to the destination country, if fully utilized. Among immigrants with advanced formal qualifications obtained prior to migration, substantial differences in their income assimilation trajectories are found. In particular, immigrants with pre-migration degrees within *Health Care* are observed to experience a comparatively favorable post-migration labor market experience. Regardless of the educational type to which the individual's degree belongs, formal human capital investments are found to exert a positive effect on the individual's trajectory towards income assimilation.

While it remains evident that there are several essentially unobserved characteristics linked to an immigrant's country of origin that exercises an influence on the individual's labor market outcome in Sweden, this thesis has provided empirical estimates into the effects of a number of labor market relevant factors determined prior to migration. More specifically, the thesis has contributed to the existing body of research by empirically showing the importance of characteristics which typically become absorbed by the country of origin effect. As a result, the thesis provides policy implications regarding how to potentially improve the prerequisites for more favorable immigrant labor market outcomes in Sweden. Particularly regarding highly-skilled immigrants, there appears to exist a range of policies that would improve their initial, as well as long-term, transition to the Swedish labor market. Most evidently, the results of the thesis would suggest training in the Swedish language as key. Furthermore, the positive effect from Swedish schooling would point towards substantial gains to be made from further encouraging highly-skilled immigrants to invest in Swedish schooling.

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Chapter 2.

Pre- to Post-Migration Occupational Mobility of Immigrants to Sweden from 1970-1990 – A Panel Data Sample Selection Approach

2.1. Introduction

This chapter focuses on an analysis of immigrants' transitions from their last job prior to migration to their first job in Sweden. For this purpose, it uses a unique dataset containing rich pre-migration information regarding a multi-national immigrant population. There are many reasons why migration following labor market entry could have a negative effect on an individual's career, especially in the short term. Transferring to a new labor market frequently implies having to adjust to a set of different conditions, including adapting to a new institutional context as well as learning a new language. Before managing to do so, the restricted ability of immigrants to signal their productivity as well as to understand the demand being signaled from potential employers could result in disadvantageous labor market outcomes. More specifically, the immigrant may experience a more or less prolonged period of unemployment as well as a downward adjustment in terms of labor market rewards once employed.

The adjustment in occupational status resulting from transferring to a foreign labor market will here be analyzed among a sample of immigrants to Sweden. Using a comparatively large sample of around 2,700 immigrants arriving in Sweden in the period from 1966 to 1990, this chapter focuses on their initial post-migration labor market outcomes. The outcome variable compares the last job prior to migration with the first job afterward, and it is measured as changes in occupational status according to the International Socio-Economic Index (Ganzeboom, De Graaf & Treiman: 1992, Ganzeboom & Treiman: 1996, 2003). A particular focus is placed on understanding to what extent an individual's initial post-migration labor market outcome depends on skills and characteristics that are frequently unrecorded in other data, such as pre-migration labor market experience and language skills. This will be done while applying an econometric method designed for panel data that aims to control for

the potential influence of selection into employment being a non-random process.

2.2. Background and theoretical framework

Similar to numerous other western countries, immigration to Sweden following the Second World War has been substantial and has caused the demographic composition of the population to radically change. During the period studied in this chapter, the share of foreign born living in Sweden grew from 6.7 percent to 9.2 percent of the population (Statistics Sweden: 1999, 2010). Following the war, the inflow of migrants to Sweden was dominated by labor immigration from European countries. During the period studied herein, this inflow had been replaced by refugee immigrants, to a large extent born outside the European continent (Ohlsson & Lundh: 1999). Studies analyzing the labor market experiences of immigrants in Sweden during the period in question are abundant, with conclusions consistently pointing to worsening conditions over time. Immigrant cohorts arriving prior to and during the 1960s enjoyed a highly favorable transition to the destination country labor market. The deteriorating outcomes experienced from the late 1970s and onwards therefore largely coincided with increased family reunification migration and Non-European refugee immigration (e.g. Rooth: 1999; Scott: 1999; Bevelander: 2001; Bengtsson, Lundh & Scott: 2005; Lundh: 2005).

Previous empirical research on immigrants' labor market outcomes has generally focused solely on the immigrant's experience in the destination country. This results from the fact that data that covers the individual's labor market career both prior to and after migration are scarce. However, to better determine to what extent the immigrant's experience in the country of destination should be considered disadvantageous, the individual's pre-migration experience needs to be taken into account. Focusing on the individual's outcomes both prior to and after migration thus arguably represents a highly important but insufficiently studied dimension of the immigrant's labor market career.

Studies that have focused on the pre- to post-migration segment of the immigrant's labor market career are few. Existing studies nevertheless represent a number of different post-World War two contexts, such as Sweden, Australia, Germany, the USA and Israel, and they generally confirm the *Immigrant Assimilation Hypothesis* (e.g., Bauer & Zimmermann: 1999; Chiswick, Lee & Miller: 2002; Cohen & Eckstein: 2002; Rooth & Ekberg: 2006; Akresh: 2008). The hypothesis postulates that immigrants experience a decrease in occupational status or earnings initially after migration, followed by a catch-up period until

they – ideally - enjoy an occupational status more or less similar to that experienced prior to migration.

Rooth and Ekberg (2006) examine a sample of refugees from Somalia, Iran and Iraq arriving in Sweden during the late 1980s. In the sample, almost 40 percent of the sample enjoyed a home country occupation requiring higher education. The findings confirm the expected downward status adjustment experienced following migration, as a mere 24 percent of those having a high-status occupation in the home country managed to avoid downward mobility after migration to Sweden. Although a pre- to post-migration *improvement* in status is not entirely uncommon, in particular among individuals with low-status occupations in their country of origin, downward transitions are clearly dominating. While only four percent of the sample was in occupations with the lowest status before migration, the corresponding figure directly after migration was 26 percent. Over time, an improvement of occupational status occurred, as the share of refugees enjoying high-status occupations in the country of origin as well as in Sweden about 15 years after migration amounted to 50 percent. This study hence clearly supports the U-shaped occupational mobility pattern: after an initial post-migration decline in status, immigrants subsequently experience a process of catch-up.

Sweden and the United States represent two widely differing contexts in terms of both rewards from work and incentives to work. This potentially implies the existence of different selection mechanisms regarding who chooses to migrate to one country of destination or another. The U.S. is characterized by a wider wage distribution (Blau & Kahn: 1995) - implying higher rewards for the most skilled – as well as a less generous social insurance system (Isac: 2006). This could result in positive selection of immigrants moving to America and for fewer skilled, career-oriented and work-motivated immigrants migrating to Sweden, following the arguments of Borjas (1987).

Empirical results however show considerable similarity in terms of the pre- to post-migration labor market transition of immigrants across countries of destination. Using the 2003 New Immigrant Survey, Akresh (2008) shows that over 50 percent of a sample of immigrants in the United States experience a downward transition subsequent to migration. Using an occupational classification based on educational requirements, the results suggest that the average immigrant experiences a status deterioration of 25 percent when comparing the status of the last job prior to migration to the first job after. Chiswick, Lee and Miller (2002) show a similar pattern when examining a sample of immigrants to Australia. While about 55 percent of the immigrants had pre-migration occupations belonging to the most elevated Professional/Managers/Administrators category, this decreased by almost 35 percent when compared with the first job post-migration. The similarity across

contexts regarding immigrants' pre- to post-migration labor market outcomes suggests that the mechanisms are largely consistent. Therefore, empirical results from Sweden should be applicable to the experiences of immigrants in other countries of destination as well.

Among immigrants who commenced their labor market career prior to migration, the short-term transition to the destination country labor market can be particularly difficult, as explained and initially tested by Chiswick (1978, 1979). Since the individual's skills are not necessarily perfectly transferrable from the country of origin to the destination, the immigrant may experience a different labor market demand subsequent to migration. This may be linked to differences between the countries' educational systems, causing the prospective Swedish employer to not fully recognize the true productivity associated with an immigrant's human capital. As a result, the individual may be forced to accept employment in an occupation with less skill requirements than what was the case prior to migration, commonly translating to a downward adjustment in terms of occupational status.

An observation from previous empirical studies is that migrants who worked in high-status occupations prior to migration on average experience a relatively larger negative status transition compared to individuals with lower pre-migration occupational status (Rooth & Ekberg: 2006, Chiswick, Lee & Miller: 2003). This could be indicative of employers' greater reliance on formal credentials for employment in highly-skilled occupations. Due to the considerably higher complexity characterizing the typical tasks, the employer for highly-skilled occupations may increasingly rely on formal credentials as a means of gauging the potential employee's productivity. Compared with credentials obtained in Sweden, the average productivity associated with degrees obtained abroad can be expected to be comparatively low. As a result, highly-skilled immigrants could be disproportionately affected. Furthermore, occupations requiring advanced formal qualifications may demand investments into complementary forms of informal human capital.

A key characteristic used by individuals to signal their productivity to a prospective employer are skills obtained subsequent to their labor market entry. More specifically, labor market experience can increase the utility of a given set of formal skills by signaling to an employer their *actual* productivity (Mincer: 1962, Duncan & Hoffman: 1979, Brown: 1989). Empirical studies examining the impact of actual labor market experience obtained abroad on post-migration outcomes are rare. The typical approach is instead to approximate the amount of labor market experience that was obtained prior to migration, based on the individual's years of schooling and age at migration. Empirical findings generally suggest a rather weak effect of approximated labor market experience obtained prior to migration (Friedberg: 2000; Schaafsma & Sweetman: 2001).

This suggests that its utility in the destination country labor market potentially is limited, in particular compared to experience acquired in the country of destination. Potentially, this could be linked to the prospective Swedish employer's limited ability to contact an immigrant's previous employers and inquire about the potential new employee. Consequently, this could render such credentials of little worth. Furthermore, the utility of experience in a foreign labor market could be related to the extent to which the typical tasks of an occupation are similar across contexts.

A mechanism argued to influence the pace of assimilation to Swedish society is the linguistic distance between languages known to the immigrant and the language of the country of destination. Boyd (1985) shows that northern European and North American immigrants are more likely to adopt the Swedish language than immigrants from Finland, southern Europe, South America or Asia. The main explanations proposed for some groups' more rapid linguistic assimilation include possessing more favorable attitudes towards learning the host country language as well as closer contact with the majority population. However, this conclusion does not exclude an explanation pointing to the existence of an objective linguistic distance that influence the path of linguistic assimilation, as the English, German and Scandinavian languages all belong to the common Germanic language family. Other empirical research has supported the influence of acquiring the destination country language on various destination country labor market outcomes, sometimes linked to an objectively defined linguistic distance (Dustmann: 1994, Chiswick: 1991, Chiswick and Miller: 1995, 2001, 2005, 2006, Dustmann & Fabbri: 2000, Beenstock, Chiswick & Repetto: 2001).

2.3. Data

2.3.1. Sample

The data used in this chapter were selected from a subsample of the Swedish Longitudinal Immigrant database (SLI) that contains unique information on immigrants' pre- migration career. The data of particular interest to this study were gathered from the records of the Swedish immigration authority and were reported by the migrant while applying for various permits[11]. More specifically, the data provide information on pre-migration occupation and labor market experience, as well as information on formal education and language skills upon arrival in Sweden. The sample used in the chapter consists of immigrants from Turkey, Iran, Poland, Germany, the USA, Yugoslavia and Greece, and the pre-

[11] Including residence permit and work permit

migration information has been linked to longitudinal post-migration register data, thereby covering the transition from the pre- to post-migration labor market. The post-migration data were collected from a number of administrative records, including censuses and tax registers, thereby providing detailed individual-level information on a range of demographic, economic and labor market-related parameters.

Individuals reporting an occupation prior to migration and arriving in Sweden between the ages of 16 and 54 are included in the sample. The upper age restriction was chosen to exclude those likely to directly enter into retirement. The sample studied in the chapter consists of 2,724 individuals who were followed until obtaining their first post-migration occupation or until censoring[12]. Among the immigrants selected based on the aforementioned criteria, 1,777 successfully performed a pre- to post-migration labor market transition by obtaining a destination country occupation[13].

Since the information on the individual's pre- as well as post-migration occupation was self-reported, attention needs to be directed towards the obvious risk of individuals reporting a particular occupation while this in reality is not the case. The risk of a bias resulting from the provision of incorrect information can be assumed to be related to the individual's incentive to provide erroneous information, as well as the potential consequences of being caught doing so. In the case of information on post-migration occupation obtained from censuses, the individual's incentives to provide incorrect information should be regarded as very low. As the individuals provided the information at a time and place chosen at their own discretion and subsequently delivered it to the recipient, from 1975 and onwards by return mail[14], the procedure was characterized by a considerable degree of anonymity. The information of interest here must also be regarded as of a comparatively insensitive nature, further promoting the incentives to provide truthful information.

The pre-migration information was obtained from the records of the immigration authorities and was recorded during the application process for various visas and permits. The parameters of interest for this study were not factors that the immigration authority considered in the application process, therefore again implying that the incentive for the immigrant to provide untruthful information was negligible. It may however be argued that what

[12] Censoring occurs due to whichever comes first after emigration, age exceeding 60 or the year 1990.

[13] While a sample size of about 2,700 individuals may be considered small, it should be compared to similar studies; Chiswick, Lee and Miller (2002): n=1,678, Bauer and Zimmermann (1999): n=639, Rooth and Ekberg (2006): n=381, Akresh (2008): n=531.

[14] According to the original forms distributed to the Swedish population by Statistics Sweden in gathering information for the census.

primarily matters is whether the immigrant believed they could influence the application process by providing incorrect information. While it remains important to recognize this potential weakness, it remains an unavoidable characteristic of the pre-migration data.

2.3.2. Variable Design

Despite the lack of real incentives to provide incorrect post-migration occupational information, an individual may report working in a given occupation despite only doing so to a very limited extent during the census year. Even more so, the inquiry into the individual's post-migration occupation did not condition on the extent to which the individual actually had worked during the year in question. Therefore, individuals reporting very low incomes will be considered not to have performed the transition to employment, despite having reported an occupation. More specifically, the individual's disposable income is compared to thresholds that are estimated based on individuals in the censuses with positive incomes in all coded occupations according to the NYK78 classification (Statistics Sweden: 1989). A disposable income exceeding the 25th percentile for the occupation in question was chosen as a cutoff point, implying that an individual with an income below the relevant threshold is treated as unemployed despite having indicated working in a given occupation.

One of the main mechanisms expected to underlie a downward transition in occupational status is the intransferability of the immigrant's skills. The immigrant's inability to properly signal their capabilities may therefore manifest itself as a reduction of the typical skill level of the first occupation held after migration, compared to the last job prior. To appropriately capture this, the key dependent variable is derived from an occupational classification that explicitly takes the educational requirements of an occupation into account: the International Socio Economic Index (ISEI).

The ISEI is designed to gauge the educational requirements and earnings potential of an occupation and it is constructed from weighted sums of the education and earnings of each occupation's incumbents. The advantage of the ISEI in this context is that it was designed to provide a measure of occupational status that is comparable across countries. Thus, the index is intended to take between-country differences in the status of a given occupation into account. Information on the individual's post-migration occupation for this study was provided by the census, undertaken every five years between 1970 and 1990, from which it follows that occupational status observations were made at five-year intervals. The ISEI classification is a continuous measurement of occupational status that intuitively implies that occupations are arranged along a one-dimensional hierarchical scale, where a higher status score is synonymous

with a higher occupational status. The classification ranges from 16, representing for example restaurant cleaners, to a high score of 90 for judges (Ganzeboom, De Graaf & Treiman: 1992, Ganzeboom & Treiman: 1996, 2003). For this analysis, a continuous variable was created, calculated as the difference between the individual's pre- and post-migration ISEI score and ranging from +74 to – 74.

The theoretical section identified the linguistic distance experienced by an immigrant as a potentially influential factor in determining the post-migration labor market outcome. While an individual's inherent ability naturally influences an individual's capabilities to acquire a new language, two objectively determined dimensions related to the relative "proximity" of languages have here been identified. Using the available information on the individual's stated skills in up to four languages; the data allows the individual's linguistic distance to be distinguished according to two dimensions. First, in terms of the obstacles to learning the Swedish language, individuals unfamiliar with a language using the Latin alphabet, upon which Swedish writing is based, are believed to experience a disadvantage. In the sample here examined, this disadvantage is predominantly found among immigrants originating from the Middle East and Greece.

The other distinction is made according to how a language's origin relates to the Swedish language, belonging to the Germanic language family. While languages using a writing system other than Latin consistently belong to a different language family from Swedish, as regards languages based on the Latin alphabet this is not the case. Individuals commanding a language belonging to the Germanic language family are on average believed to experience a more rapid process of linguistic assimilation, due to the languages sharing a common language tree and concomitant similarities in terms of vocabulary and grammar (See Chiswick & Miller (2004) for a discussion on measuring linguistic distance). All languages recorded in the sample are displayed in Table 2.1, as well as whether they belong to the Germanic language family and whether they use the Latin writing system.

Table 2.1: Languages in SLI subsample, by writing system and belonging to Germanic language family

Language	Latin alphabet	Non-Latin alphabet	Language	Latin alphabet	Non-Latin alphabet
Albanian	X		**Jiddish**		X
Amharic		X	Kurdish (Iran & Iraq)		X
Arabic		X	Kurdish (Turkey)	X	
Armenian		X	Latin	X	
Azari		X	Macedonian		X
Azerbaijani (Iran)		X*	**Norwegian**	X	
Bosnian	X		Persian		X
Bulgarian		X	Polish	X	
Croatian	X		Portuguese	X	
Czech	X		Rumanian	X	
Danish**	X		Russian		X
Dutch	X		Serbian		X
English	X		Slovenian	X	
Farsi		X	Somali	X	
Finnish	X		Spanish	X	
French	X		**Swedish**	X	
German	X		Syriac		X
Greek		X	Tibetan		X
Hebrew		X	Tigrigna		X
Hungarian	X		Turkish	X	
Italian	X		Urdu		X
Japanese		X	Vietnamese	X	

Notes: *Azerbaijani speakers in Iran uses the Perso-Arabic script
** Germanic languages in bold

Source: Lewis (2009)

Home country labor market experience is self-reported information and is to be interpreted as *relevant labor market experience*, specifically related to what was indicated as the individual's home country occupation. While in some cases the *total labor market experience* of an individual is surely underestimated, it is here argued that the experience recorded should prove to be the most valuable in the destination country. Furthermore, this would emerge as particularly so when applying for employment in an occupation similar to that enjoyed in the country of origin. This being the case since the experience indicated was obtained when performing the relevant tasks and duties for that occupation.

Aiming to examine whether the transferability of migrated skills appears to differ according to the skill level of the occupation in which they were obtained, labor market experience is interacted with categories of pre-migration occupational status[15]. While the occupational categorization is somewhat crude, it should nevertheless be useful in determining whether experience obtained in high-, medium- or low-skill occupations provides the most favorable payoff in

[15] Low status is represented by the ISEI interval 16-40, medium status by 41-65, high status by 66-90.

the Swedish labor market. A similar representation of the effect of linguistic distance will investigate whether the assumed effort to linguistically assimilate affects the individual's outcome depending on the status of the occupation (Berman, Lang & Siniver: 2003), where highly skilled occupations typically are characterized by a greater focus on communicative skills as well as by a flatter organizational structure.

Due to an insufficient number of individuals belonging to each of the seven countries of origin included the study, three region-of-origin groups were created for use in the analysis. Immigrants from Germany and the United States constitute one group, based on the arguably rather close cultural and social ties of these countries to Sweden (Scott: 1999). The remaining nationalities are divided into two groups, designated European and Non-European, the latter including Iran and Turkey. Lastly, besides standard control variables, the models include variables representing the individual's motivations for migration. These are captured by categorical variables distinguishing between refugees, family reunification, and labor migrants.

2.4. Methods

2.4.1. The estimator

Not every individual in the sample was adjudged to have found gainful employment during the observation period. This makes the risk of obtaining biased estimates when restricting the analysis to those succeeding in doing so considerable. This bias could result from selection into employment being a non-random process, with more successful immigrants potentially possessing a set of unobserved and shared characteristics that – if observed – would explain their greater success. This problem has mostly been discussed in a cross-sectional setting by applying various estimators to different research problems (e.g., Heckman: 1979; Dubin & Rivers: 1989; Kang Fu, Winship & Mare: 2004; Nicoletti: 2008). Also, when attempting to control for sample selection bias when using panel data, the procedure has frequently been to transform the data with repeated observations on a particular unit of observation into a cross-section and to apply a cross-sectional estimator to control for sample selection. However, the implicit assumption that is made when choosing this approach is that the sample selection process is time-invariant, which does not appear to be a reasonable assumption.

A fair number of estimators for sample selection problems in a panel data setting have been proposed (e.g. Verbeek & Nijman: 1992; Kyriazidou: 1997; Vella & Verbeek: 1999; D'Addio, De Greef & Rosholm: 2002; Francesconi &

Nicoletti: 2004). The existing procedures all share the common feature that two separate estimations are performed, either simultaneously or separately. The first *selection equation* (1) provides the underlying individual specific probability of being included in the second *outcome equation* (2). The latter being the equation of main interest, as it performs the regression on the key outcome variable. In this chapter, the procedure applied is a two-step estimator, meaning that the two estimations are performed separately, explicitly following the method outlined in Jensen, Rosholm and Verner (2002) as the Wooldridge estimator[16]:

(1) $$d_{it}^{*} = \omega_{it}^{'}\gamma + \eta_i + u_{it}$$

$$where\ d_{it} = 1 \text{ if } d_{it}^{*} > 0, 0 \text{ otherwise}$$

2) $$y_{it}^{*} = \chi_{it}^{'}\beta + \hat{e}_{it}\theta + \bar{\hat{e}}_{i.}\mu + \varepsilon_{it}$$

The first (selection) equation uses all observations up to and including the time of first employment to estimate the probability of being employed for every individual *i* at each point in time, *t*. This means that the probability of having obtained a job in Sweden (d_{it} =1) is estimated given a vector ω of independent variables assumed to influence the likelihood of being employed. The estimation is performed using a probit regression with random effects, where γ is an unknown parameter vector to be estimated and η_i is an unobservable and time-invariant individual specific component. The outcome variable in the selection equation is dichotomous and assumes the value one when an individual indicates having an occupation combined with enjoying an income exceeding the income threshold for the occupation in question. From the results of the outcome equation, estimated by probit regression, the $\bar{\hat{e}}_{i..}$ and $\hat{e}_{it}$ vectors are predicted, where the latter term represents the residual at the time the individual is observed as employed. $\bar{\hat{e}}_{i.}$ represents the individual-specific average across all observations included in the selection equation, and both vectors are subsequently included in the outcome equation.

In the outcome equation, only observations where individuals are observed as being employed are used. This implies that the second estimation is performed on a considerably smaller sample, since all observations where d_{it} = 0 are excluded. The equation explicitly applies linear regression to estimate the determinants of the pre- to post-migration occupational status adjustment in

[16] In the chapter, the estimator is referred to as ”TSE1: Two-step estimator based on Wooldridge (1995) and Vella and Verbeek (1999)” Jensen, Rosholm and Verner (2002: 8), but here labeled the Wooldridge estimator.

terms of the change in the ISEI-score. The problem of selection is controlled for by taking into account the individual's specific likelihood of being employed obtained from the previously estimated selection equation. The estimation is performed using OLS, where β, θ and μ are parameters to be estimated. β is obtained using the vector of independent variables χ, whereas θ and μ are obtained by including the predicted $\bar{\hat{e}}_{i.}$ and $\hat{e}_{it}$ from the selection equation as regressors.

2.4.2. The exclusion restriction

The χ and ω vectors could be expected to be essentially the same from a theoretical point of view. This results from it being difficult to identify parameter(s) that only affect selection into employment and not the outcome. The influence of a covariate does not necessarily, however, operate in the same direction on the likelihood of becoming employed as it does on the change in occupational status given employment. For example, an advanced educational degree may negatively influence the likelihood of employment due to an expected higher "reservation occupational status" on the part of the job seeker. Its effect - given employment – should, however, be positive while holding pre-migration occupational status constant. To efficiently estimate the selection and subsequent outcome equations, one or more variables affecting only the selection outcome, however, need to be identified.

The data allow for the identification of childbirth, which should exercise a considerable influence on the individual's labor supply, especially during the first years of the child's life. Apart from being eligible for various transfers based on unemployment or need, in Sweden, parents of children under the age of 16 are awarded an allowance depending on the number of children (Ferrarini: 2009).

As a result of the design of this study, individuals were unemployed when at risk of having a child. To the extent that having a child affects the time spent not working, this is synonymous with time spent not utilizing a given set of skills in the labor market. From the employer's viewpoint, the indirect impact of having a child, potentially extending the time out of employment, could have a negative effect on the utility of a given set of skills. This would therefore not only affect the probability of employment but also on the occupational status of the first obtained job, suggesting that the exclusion restriction is inappropriate.

Because all individuals at risk of having a child were unemployed, the indirect effect of having a child, represented by its perceived influence on the perceived value of the individual's set of skills, is here however argued to be gauged by the number of years since migration – essentially capturing the amount of time during which the individual's skills have not been put to use.

Thus, due to time since migration essentially is measuring the individual's time spent unemployed, and thereby arguably also its effect on the value of the individual's skills, the effect of having a young child (age<=2) is argued to only affect the probability of being employed at a given point in time. The use of a similar exclusion restriction in related research has been discussed previously in articles by Jones and Peck (1989) and Puhani (1989).

2.5. Descriptive statistics

After making necessary adjustments to the data, 2,724 unique individuals from seven different countries of origin remain, of whom roughly 1,800 successfully performed the transition to employment during the period of observation. Consistent with Swedish immigration history, the bulk of the labor migrants in the sample originated from European countries and the United States, as displayed in Table 2.2. As expected, the Non-European group, consisting of immigrants from Turkey and Iran, is strongly associated with refugee migration.

Whereas the German and U.S. immigrants possess advanced formal education to a greater extent, also reflected in their more elevated pre-migration occupational status, the European immigrant group is more prevalent in occupations associated with less formal qualifications. Combined with its large share of labor migrants with strong ties to the destination country labor market upon arrival, the European immigrant group can be observed to enjoy a noteworthy advantage in terms of the transition to employment. Compared to the other groups, the share obtaining employment in the European group, 74 percent, isno less than 17 percentage points higher than for either the US/German or the Non-European immigrant group.

Table 2.2: Variable means

	US/Germany	Europe*	Non-Europe**	Total
Demographics and household structure				
Female (%)	43.25	45.94	24.80	41.26
Age	39.30	39.30	37.98	39.04
Unmarried, without child under age 2 (%)	35.44	22.28	24.65	26.90
Unmarried, with child under age 2 (%)	1.28	1.09	1.19	1.17
Married, without child under age 2 (%)	53.89	63.83	55.27	59.02
Married, with child under age 2 (%)	9.40	12.81	18.89	12.92
Residential information				
Municipal share of high skill workers (%)***	30.44	29.95	34.47	30.99
Regional unemployment level (%)	1.56	1.48	1.48	1.51
Immigration information				
Refugee migrant (%)	1.91	10.06	42.14	13.40
Labor migrant (%)	37.63	31.63	17.74	30.95
Family reunification migrant (%)	60.45	58.30	40.12	55.65
Years since migration	5.12	4.47	5.03	4.78
Immigration year	1977.40	1976.38	1978.40	1977.07
Language skills				
Germanic (%)	100.00	33.79	43.75	55.95
Latin alphabet (%)	0.00	30.55	43.55	23.53
Non-Latin alphabet (%)	0.00	35.66	12.70	20.52
Education				
Primary education (%)	26.91	46.16	44.19	39.69
Secondary education (%)	32.15	35.21	30.62	33.35
University education (%)	40.94	18.63	25.19	26.96
Employment and occupation				
Pre-migration occupational status	48.90	41.24	44.23	44.14
Pre-to-post migration status change****	-3.63	-8.01	-6.83	-6.65
Home country labor market experience	8.03	9.11	7.92	8.56
Ever employed (%)	56.87	73.54	56.05	65.23
N (selection equation)	1490	2303	921	4714
N (outcome equation)	476	1023	278	1777
Individuals	837	1391	496	2724

Notes: * Europe country group includes immigrants from Greece, Poland and Former Yugoslavia.
** Non-Europe country group includes immigrants from Turkey and Iran.
*** Share of workers in occupations belonging to ISCO skill category 4 in a given municipality
**** The figure is only calculated for individuals with a post-migration occupation

In a manner less associated with pre-migration occupational status than with educational level, the share obtaining employment consistently decreases the more advanced the individual's formal competence. In the Non-European immigrant group, the primary educated enjoys a 71 percent unadjusted likelihood of employment compared with 37 percent for those with a university degree. Thus, while not taking into account the obtained post-migration

occupational status, unadjusted probabilities of employment undoubtedly suggest a lower transferability associated with advanced formal degrees.

Linked to the nature of their respective mother tongues, all individuals originating from Germany and the U.S. are familiar with a language belonging to the Germanic language family. The other region-of-origin groups are considerably more heterogeneous linguistically, yet not containing any nationality characterized by an official language belonging to the Germanic language family. Despite this, non-negligible shares in both groups have indicated familiarity with a Germanic language, most commonly English or German.

Language skills are strongly correlated with attained education and, correspondingly, pre-migration occupational status. Among immigrants belonging to the European and Non-European country groups and possessing a university degree, roughly 70 percent have stated familiarity with a Germanic language, compared to only 20 percent among the primary educated. These figures suggest a considerably greater exposure to what first and foremost is the English language among highly educated individuals in occupations belonging to the upper end of the status distribution.

The closer linguistic distance typically characterizing immigrants with more advanced formal degrees does not appear to be sufficient to overcome the larger problems of attaining employment assumed to characterize immigrants aiming for employment in high status occupations. Whereas the unadjusted probability of obtaining employment for immigrants with only primary schooling amounts to almost 80 percent, the corresponding figure for university educated individuals does not exceed 50 percent.

Focusing on immigrants who become employed, but instead looking at the size of the occupational status transition, Table 2.3 shows the size of the typical transition for all linguistic categories and by educational level. Tentatively suggested by the table are the lesser demands on language proficiency in occupations typically employing individuals with the least formal skills. More specifically, this is illustrated by the lack of an apparent advantage in the occupational status transition among primary educated immigrants familiar with a language belonging to the Germanic language family.

Table 2.3.: Mean pre-to-post migration ISEI transition, by educational level and language group.

	Primary	Secondary	University
Germanic	-12.6%	-17.8%	-11.3%
	(37.09)	(43.52)	(61.56)
Latin	-19.0%	-19.9%	-24.2%
	(35.08)	(41.35)	(59.98)
Non-Latin	-12.8%	-24.8%	-30.4%
	(31.78)	(37.28)	(57.92)

Note: Mean pre-migration ISEI in parenthesis

Instead, the expectation that a shorter linguistic distance is associated with more favorable labor market outcomes appears to emerge among immigrants with secondary and, especially, university education. For these categories, Table 2.3 consistently suggests an increasing disadvantage with linguistic distance. More specifically, the difference in the average pre- to post-migration status change between an immigrant familiar with a Germanic language and someone unfamiliar with the Latin alphabet amounts to 7 and 19 percentage points for the secondary and university educated, respectively.

As might be expected, an individual's labor market experience obtained prior to migration strongly correlates with their age at migration, with an average work experience of 16 years among immigrants arriving in Sweden between the ages of 46 and 55. The typical amount of pre-migration labor market experience expectedly increases all but linearly with the individual's age at migration, and the figure among immigrants migrating before the age of 26 is a mere 2.7 years. Naturally, given the individual's age at migration, someone with more formal education have less experience as a result of the later age of labor market entry. Holding both age at migration as well as formal education constant, no evidence of a positive association between labor market experience and the likelihood of employment or the size of the pre- to post-migration occupational status change can be observed.

2.6. Results

The failure of certain individuals in the sample to become employed after arrival in Sweden indicates that the empirical strategy of the chapter is appropriate. More specifically, by modeling the transition from origin-country to destination-country labor market as a two-step procedure, the intention is to take the process of non-random selection into employment into account.

Table 2.4: Main estimates[17]

	Model 1			Model 2			Model 3		
VARIABLES	selection β	mfx (dx/dy)	outcome β	selection β	mfx (dx/dy)	outcome β	selection β	mfx (dx/dy)	outcome β
Region of origin:									
US/Germany	ref	ref	ref	ref	ref	ref	ref	ref	ref
Europe	0.433***	0.168	-7.434***	0.348***	0.135	-6.299***	0.328***	0.128	-6.603***
Non-Europe	-0.320***	-0.121	-3.810***	-0.300**	-0.114	-2.981***	-0.284**	-0.108	-2.404**
Language group:									
Germanic				ref	ref	ref			
Latin				0.239**	0.094	-1.504*			
Non-Latin				0.243**	0.096	-2.537***			
Language group * Country of origin occupational status:									
Germanic, ISEI 16-40							ref	ref	ref
Germanic, ISEI 41-65							0.116	0.045	-14.773***
Germanic, ISEI 66-90							-0.396	-0.148	-23.786***
Latin, ISEI 16-40							0.225*	0.089	0.278
Latin, ISEI 41-65							0.492**	0.194	-17.286***
Latin, ISEI 66-90							-0.329	-0.122	-31.051***
Non-Latin, ISEI 16-40							0.280**	0.111	0.059
Non-Latin, ISEI 41-65							0.486*	0.192	-20.521***
Non-Latin, ISEI 66-90							-0.722	-0.243	-36.269***
Labor market experience				-0.006	-0.002	0.113			
Labor market experience, squared				0.001	0.000	-0.004			
Labor market experience * Country of origin occupational status:									
Labor market experience. ISEI 16-40							0.004	0.001	-0.252
Labor market experience, squared. ISEI 16-40							0.000	0.000	0.008
Labor market experience. ISEI 41-65							-0.062	-0.024	0.244
Labor market experience, squared. ISEI 41-65							0.003*	0.001	0.000
Labor market experience. ISEI 66-90							0.051	0.020	1.106***
Labor market experience, squared. ISEI 66-90							-0.001	0.000	-0.055***
Formal education:									
Primary education	ref	ref	ref	ref	ref	ref	ref	ref	ref
Secondary education	-0.334***	-0.128	1.993**	-0.282***	-0.109	1.847**	-0.263***	-0.102	1.622**
University education	-0.484***	-0.182	12.520***	-0.405***	-0.153	12.217***	-0.372***	-0.142	9.724***
Visa status:									
Labor migrant				ref	ref	ref	ref	ref	ref
Refugee migrant				-0.514***	-0.188	-0.607	-0.506***	-0.185	-0.242
Family reunification migrant				-0.201**	-0.078	-1.994***	-0.181*	-0.071	-1.710**
Pre-migration occupational status, ISEI	-0.003	-0.001	-0.573***	-0.002	0.001	-0.581***			
Observations	4714		1777	4714		1777	4714		1777
R-squared			0.347			0.354			0.359
Probability at mean		0.418			0.418			0.419	
Number of indiv	2724		1777	2724		1777	2724		1777

Notes: Selection equations control for Age, Years Since Migration, Sex, Civil status, Child under the age of two, Municipal unemployment rate, Municipal share of working population in high skill occupations (ISCO=4), Time period. Outcome equations include eit and ei parameters, obtained from the predicted residuals from the selection equation. Outcome equations furthermore exclude the Child under the age of two parameter.

Marginal effects estimated as the percentage point change in the probability of a positive outcome (employment) resulting from a one unit change in X, with remaining X variables at their respective means.

*** p<0.01, ** p<0.05, * p<0.1

[17] All parameter estimates for Models 1-3 are in Table A2, Appendix A. Comparison models, run as OLS without the sample selection adjustment are in Table A1, Appendix A.

2.6.1. The basic model

Model 1, displayed in Table 2.4 is a very basic specification that allows for the estimation of baseline region-of-origin effects. These effects are expected to diminish in importance as the individual-level characteristics that are of particular interest to this chapter are included in extended models. The estimates from Model 1 therefore exclude the individual's motivations for migration, as well covariates gauging the individual's linguistic distance and pre-migration labor market experience.

Interpreting the estimates of the selection equation is performed using marginal effects, representing a parameter's influence on the probability of experiencing employment. The marginal effects are estimated at the sample mean and suggest a 17 percentage point higher probability of employment for European immigrants compared to the reference category, represented by individuals born in either the U.S. or Germany. Also consistent with the indications provided by the descriptive results, the parameter estimate for Non-European immigrants suggests a 12 percentage point lower probability for employment compared to American or German immigrants. Consistent with the expected greater problems in transitioning to employment in an appropriate job among formally trained highly-skilled workers, immigrants with a university degree are associated with an 18 percentage point lower probability of employment compared to individuals with no more than primary education, as predicted at variable means.

Turning to the outcome equation of Model 1, the baseline coefficient for the Non-European immigrant group remains negative, suggesting a significantly larger negative occupational status transition for immigrants from Iran compared to those born in Germany. While this disadvantage emerges as highly expected yet only amounting to a 3.8 status point greater negative transition, the predicted occupational status transition of -7.4 ISEI points observed for the European immigrant group suggests that this group is advantaged only in the process towards becoming employed, possibly indicative of a lower reservation occupational status. While estimated differences in the predicted pre- to post-migration transition in terms of occupational status are significant, they do not translate into any dramatic differences in terms of the occupation obtained subsequent to migration. For an immigrant nurse, the downward transition predicted for European immigrants (-7.4 status points) roughly translates into initially obtaining employment as a nurse's assistant as the first job after migration (Ganzeboom & Treiman: 1996). Subsequently, the downward transition predicted for the other region of origin groups emerges as negligible in real terms.

As expected, the outcome equation points to a reverse influence of formal education on the pre- to post-migration status change. This suggests that an advanced formal degree is associated with greater difficulties in obtaining employment, but also, having surpassed this obstacle, that it is linked to a more favorable transition in terms of occupational status. However, this effect needs to be interpreted while taking the influence of pre-migration occupational status into account, as its significant and negative coefficient suggests that the predicted status transition becomes increasingly negative the higher the individual's pre-migration occupational status. Predicted at the average pre-migration occupational status for the different educational levels and holding everything else constant, the typical pre- to post-migration status transition appears to favor the less formally skilled. All else being equal, the 8 and 26 point higher mean pre-migration occupational status for the secondary- and university educated translates to a 2.8 and 2.3 status points greater negative transition in absolute terms compared to that predicted for the primary educated, respectively.

2.6.2. The extended models

Model two is extended to account for the influence of the individual characteristics of particular interest to this study. Apart from the influence of linguistic distance as well as labor market experience prior to migration, the model also includes information on the immigrants' visa status. Looking at the results from the selection equation, all added parameters apart from labor market experience are consistently statistically significant. Holding all else constant, they suggest diminished baseline differences between individuals from different regions of origin.

The European immigrant group is still associated with a noteworthy advantage in terms of obtaining employment relative to the other country of origin groups. The marginal effect estimated at the mean suggests a higher probability of employment compared to the US/German immigrant group amounting to 13.5 percentage points. Resulting from including mentioned pre-migration characteristics, the region-of-origin effect can, however, be observed to be roughly three percentage points less. Consistent with the selection equation of Model 1, all region-of-origin effects are furthermore significantly different from each other. Therefore, the Non-European immigrant's probability of transition to employment is again estimated as significantly lower than that of the US/German immigrant, amounting to 11.4 percentage points lower at the mean, according to Model 2.

Surprisingly, given a common region of origin, the selection equation does not indicate that familiarity with a Germanic language is associated with an

advantage in becoming employed. Since the dependent variable does not distinguish between the occupational status of the job attained, this could however be indicative of immigrants belonging to the Non-Latin or Latin language group as to a greater extent settling for occupations associated with less obstacles for entry. Since all immigrants belonging to the US/German group possess knowledge of a Germanic language, the effects of the Latin and non-Latin language groups are estimated as a joint effect for European and Non-European immigrants only. Thus, a Greek immigrant belonging to either of these linguistic groups is predicted to enjoy an advantage in becoming employed amounting to about 10 percentage points compared to an otherwise similar individual familiar with a Germanic language, according to the marginal effects.

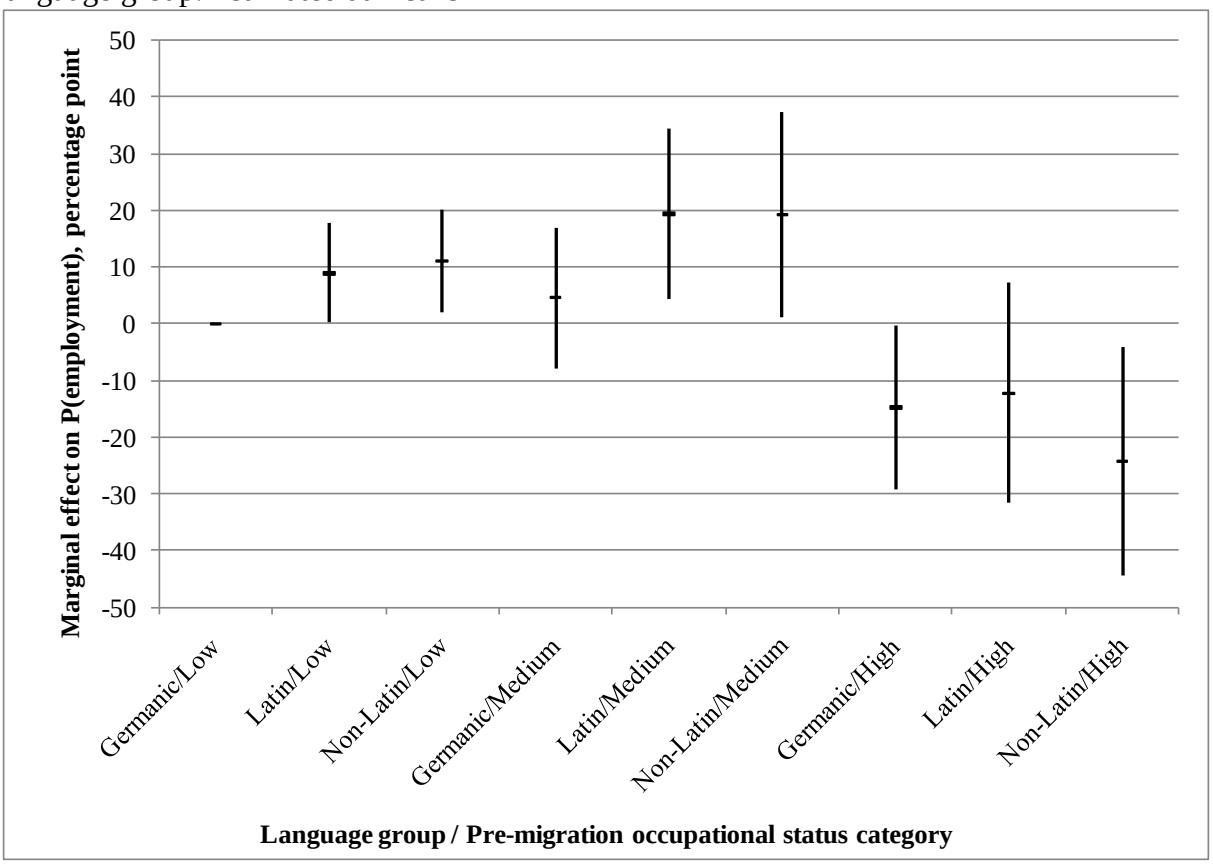
The outcome equation of model two presents parameter estimates that suggest even less a baseline difference between individuals' outcomes depending on their region-of-origin than in the specification of Model 1. Admittedly only marginally changed as a result of the model extension, the negative occupational status change predicted for the European immigrant group is again observed as being greater than for the other groups, all else being equal. Whereas the difference between the effects estimated for the European and Non-European immigrants is not significant, both groups are observed to be disadvantaged relative to US/German immigrants.

The descriptive section suggested the influence of the individual's linguistic distance to be associated with the individual's occupational status optained subsequent to migration. More specifically, a shorter linguistic distance appeared to be particularly beneficial for the pre- to post-migration transition among individuals in high-skilled jobs prior to migration. This is intuitively appealing, as language skills have been suggested to be more important in highly-skilled jobs that are commonly found in a flatter organizational structure. Furthermore, the influence of home country labor market experience may differ in a similar fashion, why model three is extended to more properly investigate those mechanisms. The effects of home country labor market experience and linguistic distance are therefore interacted with a categorized variable representing three different levels of pre-migration occupational status. Thereby, the influence of Germanic language skills (for example) is allowed to vary depending on the individual being in a low/medium/high status pre-migration occupation[18]. Since the model as a result of these parameters controls for the individual's pre-migration occupational status, the linear effect of origin occupational status included in previous model specifications is excluded.

[18] Low status is represented by the ISEI interval 16-40, medium status by 41-65, high status by 66-90.

Comparing the effects within a given pre-migration occupational status level appears to be the most relevant strategy, as shown in Figure 2.1, illustrating each parameter's marginal effect and 90 percent confidence limits estimated at the mean. The higher probability of employment among immigrants unfamiliar with a Germanic language is again confirmed in low- and medium-status pre-migration occupations. Whereas the between-group differences are statistically insignificant among individuals in medium-status occupations, immigrants in low-status occupations and belonging to either the Latin or Non-Latin language group are observed to enjoy a statistically significant advantage, amounting respectively to 9 or 11 percentage points at the mean. This could be indicative of the lesser demands on language skills within low-status occupations in particular. The pattern suggested among immigrants in high-status occupations prior to migration instead points to those unfamiliar with the Latin alphabet as disadvantaged, amounting to a 9 percentage point – albeit insignificant – lower employment probability compared to immigrants familiar with a Germanic language at the mean. When interpreting the effects, it remains important to remember that the differences are predicted for individuals sharing a common region-of-origin.

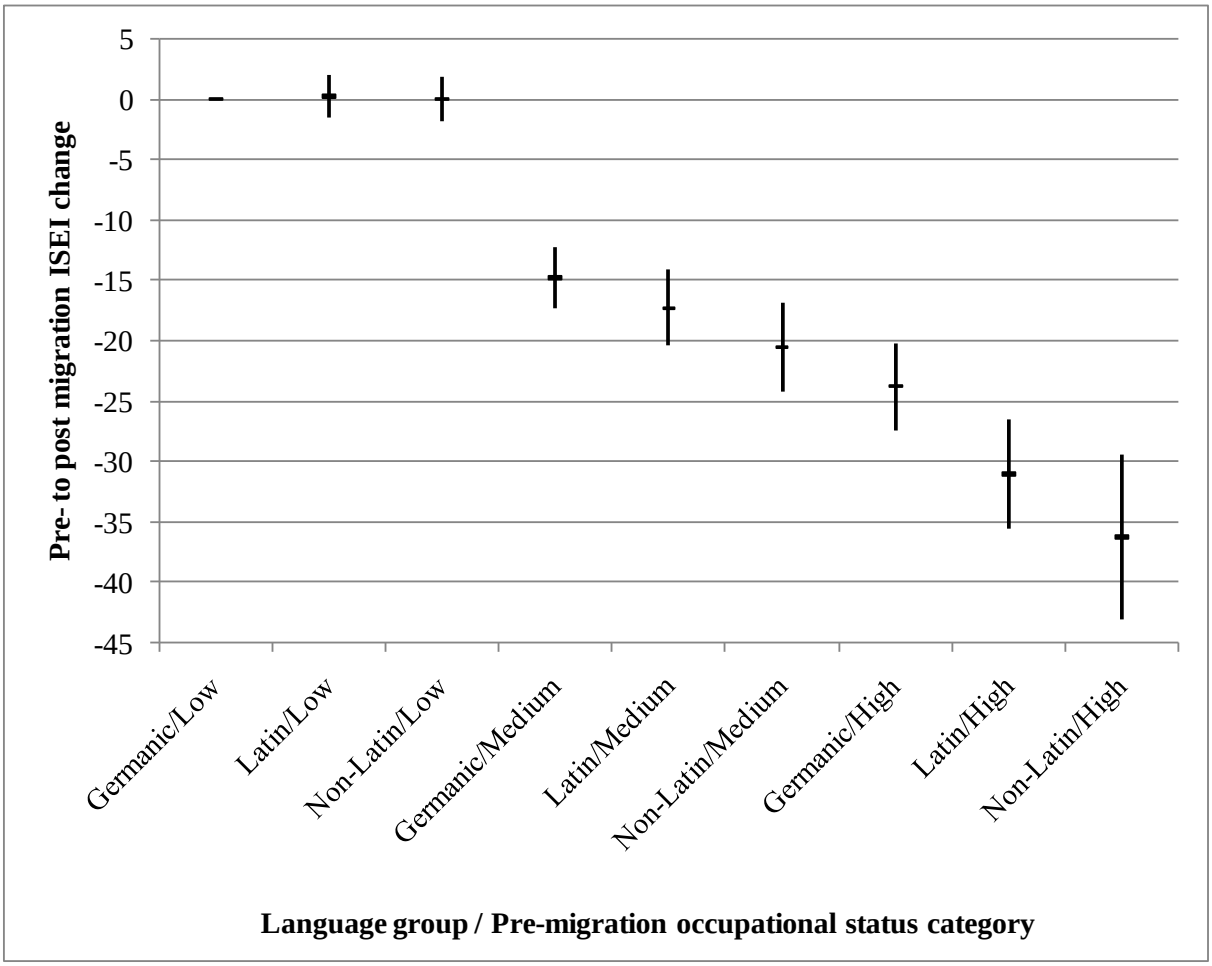
Figure 2.1.: Marginal effect on probability of employment, by origin occupational status and language group. Estimated at means



Estimates of the Model 3 selection equation largely confirm baseline region of origin effects as well as the influences of visa status and formal education. Furthermore, the influence of labor market experience is still observed to exercise virtually no effect. Turning to the outcome equation, this, however, ceases to be true for immigrants in high-status occupations prior to migration, with parameter estimates for low- and medium-occupational status immigrants remaining insignificant. According to the results, the average immigrant in a high-status pre-migration occupation experiences a predicted downward status transition amounting to 19.7 ISEI units if arriving in Sweden with less than one year of labor market experience. Within this group, the statistically significant beneficial effect from labor market experience peaks at 10 years, resulting in a 5.6 unit (or 28 percent) less severe downward status transition than an otherwise identical individual.

Among immigrants in medium- and high-status occupations prior to migration, the results strongly suggest an increasingly negative effect on the individual's post-migration occupational status with a greater linguistic distance. As shown in Figure 2.2, the effect of familiarity with a Germanic language is associated with a predicted post-migration occupation 12.5 ISEI units higher than the effect for an immigrant belonging to the Non-Latin language group. The increasing disadvantage according to linguistic distance is less accentuated among immigrants in medium-status pre-migration occupations. Despite this, unlike the situation for immigrants in low-status pre-migration occupations, the estimates suggest a favorable outcome among individuals enjoying a smoother process of linguistic assimilation.

Figure 2.2.: Parameter estimate of the effect of linguistic distance, by origin occupational status.



As illustrated in Figure 2.2, at a given pre-migration occupational status level, predicted differences across individuals according to linguistic distance are only significantly different from each other among the university educated. Table 2.5 takes respective occupational status category's mean characteristics into account, in order to predict their typical pre- to post-migration occupational status transition. Predicted at the high-status variable means, immigrants belonging to the Non-Latin language group experience a predicted pre- to post-migration status transition of -27.6 ISEI status points, compared to -15 for immigrants belonging to the Germanic language group. Solely resulting from a varying linguistic distance, the predicted status transitions for the Germanic and Latin language groups compared to the Non-Latin category are predicted to be 45 percent and 19 percent less negative. While the predicted negative transitions are of less magnitude among immigrants in medium-status occupations prior to migration, they are by no means negligible. Considering a typical pre-migration occupational status among individuals in this group amounting to the low 60s, corresponding to a business associate professional, the first occupation

subsequent to migration for an immigrant belonging to the Non-Latin language group is associated with a status that is 18 points lower. Implying a downward status transition 32 percent percent greater than that of Germanic immigrants, the negative status transition of Non-Latin immigrants translates to obtaining employment as a filing clerk.

Table 2.5.: Predicted occupational status change, by pre-migration occupational status and language group.

	Pre-migration occupational status		
	High	Med	Low
Germanic	-15.07	-12.14	-1.53
Latin	-22.34	-14.65	-1.25
Non-Latin	-27.56	-17.88	-1.47

Note: Predicted pre-to-post migration status change, estimated at means for each pre-migration occupational status category

Among individuals in low-status occupations prior to migration, the difference in the predicted outcome in absolute as well as relative terms resulting from different language skills emerges as negligible. As suggested by the predictions, an immigrant familiar with a Germanic language experiences a downward status transition amounting to -1.53 ISEI units, compared with -1.25 for the Latin language group.

2.7. Sensitivity analyses

In order to be able to gauge an individual's pre- to post-migration labor market transition, relevant observations on the outcome variable chosen need to exist prior to as well as subsequent to migration. In this chapter, an individual's labor market outcome is measured in terms of occupational status, and an attained occupation therefore becomes the minimum requirement for inclusion in the sample. Without applying the aforementioned 25^{th} percentile income threshold within each occupation, all individuals with a record of occupation both before and after migration would therefore be treated as completing their transition to the destination country labor market by obtaining employment. The income threshold was therefore chosen to exclude individuals stating a particular occupation but who actually contributed with what here was deemed an insufficient supply of worked hours or weeks and who therefore should not be considered as having completed the transition to the destination country labor market.

Table 2.6: Sensitivity analyses, estimates

	Model 4			Model 5			Model 6		
	selection	mfx	outcome	selection	mfx	outcome	selection	mfx	outcome
VARIABLES	β	(dx/dy)	β	β	(dx/dy)	β	β	(dx/dy)	β
Region of origin:									
US/Germany	ref	ref	ref	ref	ref	ref			
Europe	0.076	0.022	-6.010***	0.300**	0.076	-4.905***	0.658***	0.253	-5.194***
Non-Europe	-0.461***	-0.160	-2.124**	-0.484***	-0.105	-5.568***	ref	ref	ref
Language group:									
Germanic									
Latin									
Non-Latin									
Language group * Country of origin occupational status:									
Germanic, ISEI 16-40	ref	ref	ref	ref	ref	ref	ref	ref	ref
Germanic, ISEI 41-65	-0.017	-0.005	-12.515***	-0.120	-0.029	-15.070***	0.250	0.100	-16.240***
Germanic, ISEI 66-90	0.238	0.065	-26.044***	-0.676**	-0.132	-29.077***	-0.496	-0.190	-22.018***
Latin, ISEI 16-40	-0.074	-0.023	1.177	0.309*	0.086	2.295*	0.221	0.088	-1.085
Latin, ISEI 41-65	0.091	0.027	-15.879***	0.108	0.028	-15.769***	0.672**	0.257	-18.929***
Latin, ISEI 66-90	-0.128	-0.040	-32.288***	-0.615	-0.113	-34.802***	-0.405	-0.156	-29.463***
Non-Latin, ISEI 16-40	0.291**	0.078	1.917**	0.323**	0.090	1.989	0.320*	0.127	-1.772
Non-Latin, ISEI 41-65	-0.270	-0.089	-17.243***	0.597*	0.188	-15.788***	0.676*	0.257	-22.352***
Non-Latin, ISEI 66-90	0.345	0.090	-31.637***	-0.944	-0.142	-45.318***	-0.815	-0.287	-34.236***
Labor market experience									
Labor market experience, squared									
Labor market experience * Country of origin occupational status:									
Labor market experience. ISEI 16-40	0.055**	0.016	-0.217	-0.011	-0.003	-0.019	0.012	0.005	-0.076
Labor market experience, squared. ISEI 16-40	-0.002***	-0.001	0.006	0.001	0.000	0.001	-0.000	0.000	0.004
Labor market experience. ISEI 41-65	0.048*	0.014	0.145	-0.015	-0.004	0.222	-0.118	-0.047	0.643*
Labor market experience, squared. ISEI 41-65	-0.001	0.000	-0.003	0.001	0.000	0.008	0.005*	0.002	-0.014
Labor market experience. ISEI 66-90	0.022	0.007	1.233***	0.099*	0.025	2.214***	0.074	0.029	1.182***
Labor market experience, squared. ISEI 66-90	-0.001	0.000	-0.048***	-0.002	0.000	-0.084***	-0.002	-0.001	-0.067***
Formal education:									
Primary education	ref	ref	ref	ref	ref	ref	ref	ref	ref
Secondary education	-0.176**	-0.057	1.846***	-0.186*	-0.046	-0.004	-0.407***	-0.160	2.416**
University education	-0.062	-0.019	8.132***	-0.516***	-0.115	6.268***	-0.512***	-0.198	10.308***
Visa status:									
Labor migrant	ref	ref	ref	ref	ref	ref	ref	ref	ref
Refugee migrant	-0.681***	-0.246	-1.864*	-0.896***	-0.159	-6.341***	-0.588***	-0.225	2.333
Family reunification migrant	-0.277***	-0.075	-3.008***	-0.301**	-0.077	-4.139***	-0.157	-0.062	-1.323
Pre-migration occupational status, ISEI									
Observations	3635		2724	5571		1321	3224		1301
R-squared			0.298			0.380			0.406
Probability at mean/median		0.773			0.169			0.477	
Number of indiv	2724		2724	2724		1321	1887		1301

Notes: Selection equations control for Age, Years Since Migration, Sex, Civil status, Child under the age of two, Municipal unemployment rate, Municipal share of working population in high skill occupations (ISCO=4), Time period. Outcome equations include eit and ei parameters, obtained from the predicted residuals from the selection equation. Outcome equations furthermore exclude the Child under the age of two parameter.

Marginal effects estimated as the percentage point change in the probability of a positive outcome (employment) resulting from a one unit change in X, with remaining X variables at their respective means. Marginal effects of Model 4 estimated at median.

Model 4 imposes no income threshold on the dependent variable(s). Model 5 imposes a 50th percentile income threshold on the dependent variable(s). Model 6 is estimated excluding the immigrants belonging to the US/Germany group.

*** p<0.01, ** p<0.05, * p<0.1

To investigate to what extent the chosen threshold influences the results, Model 4, displayed in Table 2.6 is estimated without applying such a restriction, whereas Model 5 instead applies an even more stringent threshold, represented by the 50th income percentile within the individual's occupation.As a result of the employment obstacle being removed in Model 4, all individuals eventually become recorded as employed, essentially making the interpretation of the parameters of the selection equation irrelevant. The elevated probability of employment predicted at the mean (>90 percent) furthermore strongly influences the estimation of marginal effects at the mean, which is why marginal effects for Model 4 are estimated at the median. The outcome equation presents parameter estimates very much in accordance with those previously presented, again supporting the prominent impacts of labor market experience and linguistic distance among immigrants in high-status occupations prior to migration.

Raising the income requirement for being recorded as employed as in Model 5 results in the average individual contributing a greater amount of observations when unemployed This is illustrated by the same number of individuals being included in the selection equations of Models 3 and 5 but contributing with a greater number of observations of unemployment in Model 5. Applying this income threshold to the selection equation translates to a lower average probability of employment – 16.9 percentage points – but with parameter estimates that otherwise confirm the previous findings. The outcome equation suggests even greater differences between an individual's predicted post-migration occupational status resulting from linguistic distance, strongly supporting individuals with Germanic language skills and in high-status pre-migration occupations. The predicted and statistically significant effect of pre-migration labor market experience among immigrants belonging to the same high-status category is almost three times as large as the effect predicted from Model 3 at its peak, again supporting the findings from the main analysis. Choosing a different income threshold to determine when an individual is regarded as employed therefore appears to affect only the size of the coefficients, and not their sign or – in most cases – their statistical significance.

Historical facts regarding the comparatively favorable labor market integration of post-World War US/German immigrants, combined with the linguistic homogeneity in the sample, may result in some bias in the average effects. A final model is therefore run only on the European and Non-European country groups to determine whether the parameter estimates of the effects of particular interest for this chapter remain robust when excluding US/German immigrants. Model 6 presents results highly similar to the previous specifications in terms of both the direction and the significance of the effects of linguistic distance and labor market experience. It therefore appears safe to

conclude that the particularities of the effects of actual labor market experience and language skills that vary according to the immigrant's occupational status are not driven by the inclusion of German and American immigrants in the sample.

2.8. Conclusions

This chapter has aimed to provide further precision into the determinants of the initial labor market experience of immigrants to Sweden. The contributions pertain to extending the study of a highly interesting segment of the immigrant's labor market career to a previously unstudied time period. Furthermore, the sample emerges as comparatively heterogeneous in terms of representing a large number of countries of origin. Most importantly, however, what constitutes the region of origin effect has been estimated with better precision due to the ability to control for frequently unobserved but highly relevant individual characteristics in determining labor market outcomes. Thereby, a non-negligible part of an immigrant's labor market initial outcome can empirically be attributed to characteristics such as language skills and labor market experience. This naturally also introduces heterogeneities between the outcomes of individuals from a given country of origin.

Identified in the chapter was also the need to take into account the fact that selection into employment may be driven by unobserved characteristics. While the direction of the estimated effects when running models not taking selection into account remain consistent with the sample selection models, the size naturally varies somewhat. This being said, the conclusions regarding the economic effects of pre-migration language skills and labor market experience appears to vary only to a negligible extent. Therefore, in explaining the pre- to post-migration occupational status transition in the sample here examined, adjusting for the influence of selection into employment does not appear to be of a paramount importance.

Previous research has typically estimated the influence of roughly approximated pre-migration labor market experience. Whereas the approximation may be close to accurate for male labor migrants, having migrated voluntarily and likely to have enjoyed an uninterrupted pre-migration career, this is not likely to be the case for refugees. This chapter has used the immigrant's actual labor market experience, estimating its influence on the process determining employment as well as the post-migration occupational status obtained. The results consistently suggest such characteristics as irrelevant in determining employment, regardless of how its influence is modeled. While controlling for selection into employment, only highly-skilled

immigrants are observed to enjoy a more beneficial transition in terms of occupational status from country of origin labor market experience. This effect remains robust across a range of model specifications, indicating high-skill immigrants as comparatively more able at signaling such skills, thereby complementing their formal human capital.

High–skill occupations are typically associated with the performance of tasks characterized by a considerable extent of theoretical skills as well a horizontal organization of labor. As a result, such occupations are considered to rely more extensively on destination country specific informal skills, such as language. The results, strongly suggesting differences in terms of the post-migration occupation obtained between immigrants depending on their linguistic distance and increasing with their pre-migration occupation's skill level should therefore not emerge as surprising. Among immigrants in low-skill occupations prior to migration, no advantage in the transition to the Swedish labor market can be observed for individuals with a closer linguistic distance to Sweden. Hence, the results suggest low-skill employers as indeed placing a very small focus on linguistic skills in becoming eligible for employment. Among immigrants in high-skill occupations prior to migration, the influence of language skills is however substantial. Particularly regarding the transition to a post-migration occupation, predicted outcomes suggests a substantial disadvantage that is the most accentuated among immigrants without familiarity with neither a language belonging to the same language family as the Swedish nor the Latin writing system. While a theoretically highly expected result, the lack of empirical results estimating its actual effect makes the finding highly interesting.

This chapter underlines the composition of the investigated personal characteristics as of great interest, in particular when explaining the outcomes of highly-skilled immigrants. Especially, the empirically confirmed importance of language skills among highly-skilled immigrants entails strong policy implications. This is linked to the fact that the general society arguably could benefit considerably from being more successful in integrating highly-skilled immigrants on the labor market. The results therefore suggest that considerable gains would be associated with rapidly providing immigrants with a range of destination country specific informal skills, where the Swedish language arguably represents the most easily implementable policy.

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Statistical Sources

Swedish Longitudinal Immigrant Database, Centre for Economic Demography , Lund University

Appendix A

Table A1: Comparison models, without two step sample selection. To be compared with outcome equation of models 1, 2 & 3 in Table 2.3.

VARIABLES	Comp 1 OLS β	Comp 2 OLS β	Comp 3 OLS β
Region of origin:			
US/Germany	ref	ref	
Europe	-6.052***	-5.083***	-5.475***
Non-Europe	-4.694***	-3.855***	-3.272***
Language group:			
Germanic		ref	
Latin		-0.724	
Non-Latin		-1.730*	
Language group * Country of origin occupational status:			
Germanic, ISEI 16-40			ref
Germanic, ISEI 41-65			-14.402***
Germanic, ISEI 66-90			-25.019***
Latin, ISEI 16-40			1.048
Latin, ISEI 41-65			-15.753***
Latin, ISEI 66-90			-32.017***
Non-Latin, ISEI 16-40			0.992
Non-Latin, ISEI 41-65			-18.926***
Non-Latin, ISEI 66-90			-38.470***
Labor market experience		0.096	
Labor market experience, squared		-0.002	
Labor market experience * Country of origin occupational status:			
Labor market experience. ISEI 16-40			-0.239
Labor market experience, squared. ISEI 16-40			0.008
Labor market experience. ISEI 41-65			0.039
Labor market experience, squared. ISEI 41-65			0.009
Labor market experience. ISEI 66-90			1.235***
Labor market experience, squared. ISEI 66-90			-0.056***
Formal education:			
Primary education	ref	ref	ref
Secondary education	0.989	0.900	0.714
University education	11.040***	10.881***	8.496***
Visa status:			
Labor migrant		ref	ref
Refugee migrant		-2.253*	-1.860
Family reunification migrant		-2.613***	-2.265***
Pre-migration occupational status, ISEI	-0.581***	-0.587***	
Observations	1777	1777	1777
R-squared	0.345	0.351	0.357
Probability at mean			
Number of indiv	1777	1777	1777

Notes: Models additionally control for Age, Years Since Migration, Sex, Civil status, Child under the age of two, Municipal unemployment rate, Municipal share of working population in high skill occupations (ISCO=4), Time period and Child under the age of two.

*** p<0.01, ** p<0.05, * p<0.1

Table A2: Full estimates, Models 1-3.

	Model 1		Model 2		Model 3	
	selection	outcome	selection	outcome	selection	outcome
VARIABLES	β	β	β	β	β	β
iseihome	-0.003	-0.573***	-0.002	-0.581***		
age	0.005	0.585**	0.008	0.444*	0.012	0.429*
age2	-0.000	-0.007***	-0.000	-0.006*	-0.000	-0.006*
manmarchild	0.071		0.088		0.087	
wommarchild	-0.926***		-0.908***		-0.928***	
mannonmarchild	1.047***		1.115***		1.108***	
womnonmarchild	-0.448		-0.436		-0.423	
wommarnochild	-0.476***		-0.437***		-0.439***	
mannonmarnochild	-0.167*		-0.144		-0.134	
womnonmarnochild	-0.435***		-0.387***		-0.386***	
unem	-0.072	0.635	-0.058	0.530	-0.059	0.198
hi_share	0.007	-0.116***	0.008*	-0.120***	0.008*	-0.114***
p75	0.001	0.076	0.081	0.536	0.078	-0.070
p80	0.028	-0.567	0.163	0.237	0.158	-0.236
p85	-0.866***	-1.529	-0.715***	-0.155	-0.737***	-0.731
p90	-0.940***	-0.570	-0.764***	0.699	-0.798***	-0.125
labor			0.000	0.000	0.000	0.000
refugee			-0.514***	-0.607	-0.506***	-0.242
tied			-0.201**	-1.994***	-0.181*	-1.710**
Germanic			0.000	0.000		
Latin			0.239**	-1.504*		
Non-Latin			0.243**	-2.537***		
Primary	0.000	0.000	0.000	0.000		0.000
Secondary	-0.334***	1.993**	-0.282***	1.847**	-0.263***	1.622**
University	-0.484***	12.520***	-0.405***	12.217***	-0.372***	9.724***
US/Germany	0.000	0.000	0.000	0.000		0.000
Europe	0.433***	-7.434***	0.348***	-6.299***	0.328***	-6.603***
Non-Europe	-0.320***	-3.810***	-0.300**	-2.981***	-0.284**	-2.404**
ysm	0.312***	-0.449	0.315***	-0.586	0.323***	-0.420
ysm2	-0.014***	0.019	-0.014***	0.025	-0.014***	0.026
lme_home			-0.006	0.113		
lme_home2			0.001	-0.004		
manmar		1.072		1.152		1.065
wommar		-1.224		-0.348		-0.667
womnonmar		-1.089		-0.496		-0.459
germ_isei41-65					0.116	-14.773***
germ_isei66-90					-0.396	-23.786***
lat_isei16-40					0.225*	0.278
lat_isei41-65					0.492**	-17.286***
lat_isei66-90					-0.329	-31.051***
nonlat_isei16-40					0.280**	0.059
nonlat_isei41-65					0.486*	-20.521***
nonlat_isei66-60					-0.722	-36.269***
isei16-40_lme					0.004	-0.252
isei16-40_lme2					0.000	0.008
isei41-65_lme					-0.062	0.244
isei41-65_lme2					0.003*	0.000
isei66-90_lme					0.051	1.106***
isei66-90_lme2					-0.001	-0.055***
eit		-2.739		-3.988		-6.481
ei		-6.867**		-6.608**		-4.266
Constant	-0.545	16.268***	-0.688	20.663***	-0.864	3.906
Observations	4714	1777	4714	1777	4714	1777
R-squared		0.347		0.354		0.359
Number of indiv	2724		2724		2724	

*** p<0.01, ** p<0.05, * p<0.1

Chapter 3.

Thou Shalt Not Pass? Examining the Existence of an Immigrant Glass Ceiling in Sweden, 1970-1990

Forthcoming in Demographic Research

3.1. Introduction and background

This chapter addresses the existence of a labor market glass ceiling in a population of natives and first generation immigrants in late 20th century Sweden. The term "glass ceiling" refers to a phenomenon where peripheral groups in the labor market experience disadvantages in their likelihood of attaining further upward mobility. This is a disadvantage that furthermore increases the more socio-economically advanced the position of origin. The concept is most frequently used in sociological research on gender-related differences. The glass ceiling hypothesis is however theoretically equally relevant in describing mechanisms in the labor market that may cause individuals, based on factors related to their country of origin, to face obstacles in progressing past a certain hierarchical level. In this chapter, the focus will be on examining to what extent the presence of a glass ceiling can be attributed to characteristics related to gender and country of origin. This study will furthermore examine whether these mechanisms operate differently in various sectors of the Swedish labor market, which could entail certain particularities in terms of career opportunities. In the chapter, the labor market outcomes in terms of upward occupational status transitions will be studied among a longitudinal sample of around 70,000 natives and first generation immigrants from 1970 until 1990.

In the United States, the hypothesized existence of a glass-ceiling for immigrants and women led to the appointment of a federal body, "The Glass

Ceiling Commission", whose work resulted in a number of research papers regarding the issue in the mid 1990s. Generally, most studies with this hypothesis consider a post-1990 context and conclude by confirming the presence of disadvantaged groups. Regardless of whether the study focuses on the entire labor market or a smaller segment of it, this is sometimes taken to indicate the existence of a glass ceiling[19]. Confirmation of the hypothesis, implying disproportionate difficulty in attaining further upward mobility for peripheral groups also appears robust despite differences in definitions of the dependent variables, which range from income to occupational status.

The end of the Second World War marked the beginning of Sweden's role as a country of immigration, something that has dramatically altered the demographic composition of the population. From the 1950s and until the end of the 1980s, the share of the Swedish population consisting of foreign born individuals increased from about two to almost ten percent[20]. The first phase of this demographic metamorphosis was characterized by the immigration of predominantly European refugees from countries more severely affected by the war. Due to a shortage of labor until the late 1960s, a period of labor immigration resulted in a substantial inflow of mainly unskilled immigrants from the neighboring Nordic countries and from other European countries. After this period and until the present day, the body of non-Nordic immigrants to Sweden has consisted mainly of refugees, to a large extent of non-European origin[21]

Until the beginning of the 1970s and essentially coinciding with the shift in the immigrant inflow from labor to refugee migration, labor market outcomes for immigrants were very favorable. Calculations by Ekberg (1990) show an even higher labor market participation rate for immigrants than for natives until the beginning of the 1970s. Thereafter, this rate decreased considerably and averaged 17 percent below that of the native population at the end of the 1980s. Therefore, the period examined in this chapter can be regarded as characterized by a continuously deteriorating situation for immigrants in the Swedish labor market. This result cannot be understood without taking into account several important heterogeneities between immigrant cohorts. Those migrating before 1970 – predominantly European labor migrants – consistently show labor market attachment similar to that of the native population. Also, the earlier immigrant population shows a distribution across occupational categories that are much more similar to that of natives, where the divergence from the pattern

[19] See for example Fernandez (1998) , Tang (1993, 1997), Woo (1994)

[20] Gustafsson & Zheng (2006)

[21] See Bengtsson *et al* (2005), Bevelander (2001) , Ekberg & Gustafsson (1995), Lundh (2005), Scott (1999), Rooth (1999) for a more comprehensive overview of Sweden's post war immigration history.

to a large extent seems to be linked to country of origin. Not surprisingly, an increasing distributional discrepancy between the native and the immigrant population consistently implies that immigrants are occupying a growing share of the unskilled - low status - occupations.

Wadensjö (1976) shows that immigrants' distribution across occupational categories in Sweden in 1970 was much more similar to that of natives among those arriving between 1941-1945 than among immigrants arriving in 1970. Virtually the same pattern emerges in Ekberg (1990), suggesting that immigrants' distribution across occupations becomes more similar to that of the native population as time spent in the country of destination increases. Using cross-sectional data from 1987, he reports that the occupational distribution pattern among immigrants arriving in Sweden before 1970 is much more similar to that of the total population than those immigrants that arrived in the 1980s. Overall, however, foreign citizens were clearly over-represented in manual occupations, and there is reason to believe that this share has become larger for more recently arriving immigrants. Whereas both studies show a certain degree of occupational mobility among immigrants, neither study addresses to what extent this process, which seems to represent a pattern of occupational assimilation, is increasingly or decreasingly restricted for higher occupational status categories. Ekberg (ibid) concludes by describing the period beginning in the middle of the 1970s as characterized by a gradually worsening situation for immigrants in the Swedish labor market.

The gender dimension of the glass ceiling issue has previously been examined in empirical labor market research in a Swedish context where the tendency is to attribute the smaller share of women in advanced positions as confirmation of the glass ceiling's existence. Stanfors (2007) reports distinct differences between labor market sectors, where only 30 percent of the management positions in the public sector were occupied by women in 1990, despite this sector considered to be relatively favorable for women. However, this figure is considerably higher than that for the private sector, where it has been reported that only one out of ten management positions is held by a woman. Another study that exclusively examines the Swedish private sector suggests that the situation has improved over time, with women's share in management positions increasing considerably from 1970 until 1990. Despite this, the share is still substantially lower than the corresponding figure for males[22]. Interestingly, the authors of this study to a lesser degree attribute the distinction to outright discrimination. Instead they claim that it depends more on gender differences in educational attainment and labor market participation. Another potential explanation for patterns of labor market outcomes may be

[22] Meyerson & Petersen (1997)

related to horizontal segregation. Knocke (2001) reports a rather consistent pattern as regards the ten most common occupations of foreign and Swedish born women in 1985. More specifically, eight of the most common occupations were the same for both groups. The result does not however indicate what percentage of each group is employed in hierarchically elevated positions within a particular occupation.

Contrary to what is often seen in the literature, merely showing how peripheral groups are disadvantaged in the labor market is not synonymous with confirming the existence of a glass ceiling. Studies that are arguably more correct in their orientation explore the possible existence of a gender-specific glass ceiling by examining gender-based *differences in the likelihood of experiencing upward mobility*. Typically, an overall female penalty in the labor market is observed, combined with the conclusion that the story is considerably more complex than simply confirming this as evidence of a glass ceiling. For example, some results suggest that women seem to be penalized more in terms of their likelihood of experiencing upward mobility in female dominated occupations, whereas their career opportunities are on par with those of men in male dominated occupations[23]. This idea is supported by findings presented by Bihagen and Ohls (2006), who fail to find a greater gender penalty in the private sector as compared to the public sector. Also, indications that the disadvantage women experience in terms of further upward mobility is more severe when they are employed in lower- rather than higher-status positions would seem to disprove the glass ceiling hypothesis for Sweden[24]. A study on the existence of a glass ceiling for immigrants in Sweden has never been conducted for the period to which this chapter refers, making it an exploration of unchartered territory. The only study explicitly addressing the issue of such immigrant-native differences was conducted during a later time period and suggests that immigrants are at a disadvantage in terms of income attainment. Immigrant status is however observed to be a disadvantage that is constant across income percentiles, rather than accentuating at higher income levels, therefore inconsistent with the glass ceiling hypothesis[25].

3.2. Theoretical framework

The term “glass ceiling” refers to a labor market phenomenon in which women and minorities experience fewer opportunities for career progress, with an increasing disadvantage emerging as the individual moves up the status

[23] Hultin (2003)
[24] Bihagen & Ohls (2006)
[25] Albrecht *et al* (2003)

hierarchy. More specifically, a glass ceiling manifests itself in the form of increasing difficulty in achieving further career advancement, such as a promotion or a raise, when the individual rises higher in the hierarchy[26]. Whereas this phenomenon is universally expected, as opportunities for further advancement are negatively correlated with the level of the position of origin, the glass ceiling hypothesis also postulates that these problems accentuate disproportionally for women and minorities. Furthermore, the disadvantage experienced by the peripheral groups is not determined by different endowments of labor market relevant characteristics. Explanations for the existence of a glass ceiling are typically dominated by demand side mechanisms. However, as will be argued here, it is also essential to consider supply side factors such as the varying returns to human capital, in particular when focusing on differences between natives and immigrants.

One of the most common explanations for the existence of a glass ceiling, as proposed in the literature that focuses on demand-side mechanisms, pertains to the top sphere of the occupational hierarchy as being "homo-social"[27]. This implies that the top segment of the occupational hierarchy is being dominated by native men who maintain its homogeneity by mainly recruiting individuals who resemble them. As a result, this effectively leads to a demand-side driven exclusion of women and minorities. Correspondingly, immigrant women could be expected to face a "double-penalty", because they diverge from the "elitist" stereotype – typically represented by the native men - in two respects[28].

A persisting over representation of individuals with similar characteristics in some socio-economically unfavorable occupational categories may also be a symptom of mechanisms that direct certain individuals into peripheral jobs or labor market sectors with relatively few opportunities for mobility into the uppermost occupational status categories[29]. This means that mechanisms in the labor market promoting horizontal occupational segregation on the basis of certain individual characteristics may also put some individuals on the fast track to a highly successful career. The other side of that coin represents individuals experiencing few opportunities for any advancement at all. Traditionally, this segregation is viewed along gender-lines, which is explained by differences in supply side factors, apart from aforementioned demand side factors. The former include endowments, qualifications, preferences, and self-selection into certain occupational tracks[30]. Empirical research on Sweden indicated that horizontal occupational segregation for immigrants exists, making the same arguments

[26] Woo (1994)
[27] Bihagen & Ohls (2006)
[28] Tang (1997)
[29] Ibid, Rosenfeld (1992)
[30] Blau & Ferber (1992)

potentially relevant in this context as well. Regardless of what is the key mechanism for creating labor market segregation based on gender and origin, according to the theory, occupations in which females and certain immigrant groups are relatively dominant may potentially offer limited opportunities for upward mobility.

Despite the likelihood of a relative shortage of advanced positions in the female- or immigrant dominated occupations, being a male in such an occupation or sector is not necessarily believed to create the same limitations as the peripheral group's experience. Overall, men are considered to possess a "social vicinity" to the most influential actors regardless of their sector. This could lead to what has been argued to be a universal advantage in the promotion process that at least partly could compensate for the inherently poorer opportunities associated with a certain position[31]. Also, according to Williams (1989), women in female dominated occupations tend to welcome men as potential "prestige-and-pay-raisers" and view them as better-suited representatives in negotiations. Theoretically, the same does not apply to women in the male-dominated sector because the presence of individuals with minority status in that context cannot be expected to provide any additional prestige. Instead, potential resistance from coworkers and managers based on the inappropriateness of a woman's carrying out a "man's job" could lead to the exclusion from valuable social networks and instead diminish opportunities for further professional advancement[32].

Employers have been empirically shown to typically rely on various methods of recruitment, a pattern that is linked to their labor market sector. The literature has indicated two types of recruitment channels, labeled formal or informal (SOU: 2005). The main difference between the methods as regards this chapter pertains to how segments of the population are likely to be differently exposed to the recruitment methods of employers depending on their sector. At the time of interest for this study, the main formal channel in the labor market was represented by posting a job vacancy through the National Labor-Market Board. This channel arguably represents the most generally accessible source in becoming informed regarding an available position in the labor market. While Swedish employers by law are required to inform the National Labor-Market Board regarding their vacant positions, few indications would however suggest this as actually being the case (Korpi: 2001). Other formal channels of recruitment include the company posting the vacancy in various media, also a comparatively accessible form of information (Klingvall: 1998).

[31] Ibid

[32] See Hultin (2003),

Indicated as of increasing importance over time, obtaining a job has become strongly linked to having access to informal channels. More specifically, the informal channel implies recruitment of new staff without ever publically announcing the vacancy, but instead being more or less directly recruited by the employer. An individual may also be informed regarding a vacancy by friends or acquaintances, in many cases a preferred channel also for the employer as it is associated with considerably lower costs. Due to the immigrant's typically less extensive network in the labor market, they are believed to be less capable in utilizing informal job search channels. While informal channels today emerge as the dominant recruitment method, it was however only the third most popular method in 1989 (Harkman: 1990). Empirical research on Sweden for the time period before 1990 are scarce, studies on the subsequent period however suggest noteworthy differences between the typical recruitment methods used by the labor market sectors.

Employers in the public sector appear over-represented in the use of formal channels such as the National Labor-Market Board or advertisements in the media (Ekström: 2001). The employment procedure in the public sector can also be characterized by considerably more formalized recruitment procedures, potentially translating to a more transparent process (SOU: 2005). Correspondingly, actors in the private sector emerge as more likely to use informal recruitment channels (Ekström: 2001). Empirical research has also shown informal methods as increasingly being used in the recruitment of personnel for positions requiring more advanced formal competence, frequently also associated with informal country specific skills (SOU: 2005, Ekström: 2001). The lack of empirical evidence regarding the recruitment methods used during the time period examined in this chapter unfortunately cannot guide as to what extent such differences in the use of recruitment channels existed prior to 1989. It would however appear to be reasonable to assume such differences as having emerged over an extended period of time and therefore potentially representing an explanation to why immigrants could be expected to be increasingly penalized in the private sector.

Human capital theory remains the most commonly utilized theory in explaining individual labor market outcomes[33] in which the explanation for the suboptimal labor market outcomes frequently observed among immigrants is their inability to fully transfer a foreign obtained education and labor market experience to the new context[34]. The problem has been identified to be related to both the difficulty the potential Swedish employer has to gauge the productivity associated with a foreign-obtained formal degree, and to the immigrant' inability

[33] Becker (1975), Mincer (1974)
[34] Chiswick, Lee & Miller (2003)

to properly signal their capabilities. As a result, the immigrant may experience suboptimal labor market outcomes in terms of their returns to formal skills[35]. In the context examined here, the problems related to human capital intransferability may cause a foreign-educated attorney-at-law to accept employment in a lower status occupation, such as a janitor or bus driver, either for a period of time or permanently.

A key form of such investment is the process of acquiring the language of the destination country. This achievement is not only a prerequisite for many occupations requiring destination country specific informal skills, but also a necessity in that it allows an individual to interpret and respond to labor market demand. It would, however, appear that such ability to acquire a new language is being strongly dependent on the individual's prior language skills. This has been suggested by Chiswick and Miller (2005) and Beenstock, Chiswick and Repetto (2001) among others, suggesting the existence of an objectively defined linguistic distance. Although it is difficult to quantify such a distance, languages belonging to a common language family share a common historical origin and are more likely to have vocabularies and grammar that are similar than languages belonging to distant language families. This distinction may potentially have an effect on the process of linguistic assimilation. Moreover, individuals from countries whose official language not only belongs to a different language family but also use a writing system based on an alphabet other than the Latin may, apart from learning a new grammar and vocabulary, face yet another obstacle in adapting to the destination country.

In absolute terms, whereas an immigrant will often experience a lower payoff from formal skills than will an otherwise similar native, the general conclusion from empirical labor market research on immigrants is that the return increases with the individual's skill level[36]. However, one should also consider the payoff that the individual expected to enjoy in terms of occupational attainment at the time the human capital investment was made. Therefore, one may conceptualize the post-migration situation for immigrants with advanced formal degrees and from countries suffering from elevated transferability problems as relatively worse than that for individuals of the same origin but with less advanced formal human capital. The increased transferability problems associated with advanced formal skills are believed to be due to differences in the typical between high- and low status occupations. Occupations on the low-status end of the distribution involve the performance of manual labor to a greater extent, leaving the employer with a comparatively easier task in assessing the potential immigrant employee's productivity and putting a

[35] Bauer & Zimmermann (1999), Chiswick, Lee & Miller (2005), Chiswick & Miller (2008, 2009)

[36] See for example Dustmann (1993) , Friedberg (2000), Nordin (2007)

relatively minor focus on making such an assessment based on the individual's formal credentials. On this basis, immigrants with more basic formal skills are believed to be able to more quickly adapt to the destination country labor market because it is easier to match their formal skills with the skill requirements of the desired occupation.

In the same vein, the employer's greater uncertainty regarding the ability of a potential employee to perform tasks necessary for high skill occupations encourages the more extensive use of formal credentials as a signaling mechanism. As a result of the employer's greater reliance on the formal skills of the employee, combined with the former's potential inability to interpret formal credentials obtained abroad, immigrants with advanced formal degrees are increasingly disadvantaged and likely to find work only in occupations for which they are over-qualified[37]. Whereas formally low-skilled individuals on average experience a better initial post-migration matching between their occupation and their skill set, highly skilled immigrants may increasingly be forced to make extensive post-migration investments. Such investments would be directed towards adjusting their human capital to the new context so that they will be able to attain an occupation similar to the one held prior to migration. Until these adjustments take place, the employer's potential failure to recognize the true value of a foreign obtained degree may therefore lead to the upper end of the occupational status hierarchy being largely unavailable to affected individuals. Also, the pattern of an initial occupational status downgrading may deepen for individuals who speak languages that are the furthest from the destination country language. With lower proficiency in the language of the destination country and fewer informal skills, the individuals will experience another obstacle for mobility into highly skilled occupations, especially given the assumed higher demands for Sweden-specific skills.

3.3. Data and method

3.3.1 Sampling and data source

This chapter follows approximately 70,000 unique individuals of different origins throughout a portion of their career in Sweden between 1970 and 1990. The data used for the analysis come from the Swedish Longitudinal Immigrant database (SLI), which contains information from a number of administrative registers; for example, the tax register, into which data are recorded on a yearly basis and which provides information on income and various transfers. Another

[37] See for example Reitz (2003, 2005)

source is the censuses[38] that are undertaken every five years between 1970 and 1990, which contain essential information used to derive the individual's occupational status. Due to the time interval between the censuses, observations related to the individual's occupational status – which form the basis for the dependent variable - are recorded every five years. Furthermore, the database is equipped with information on various demographic events, internal migration and individual-level characteristics such as educational attainment. The database is essentially longitudinal, and individuals are followed from whichever date is latest: their birth, their arrival in Sweden or the year 1968.

The sample consists of natives and first-generation immigrants born in 18 different countries[39] who were followed for at least six consecutive years after their entry into the Swedish labor market - defined by their having an occupation - and for no longer than when they turned 60 years of age. The empirical strategy employed here consists of analyzing the determinants of upward transitions in terms of occupational status, meaning that every individual needs to report an occupation during at least at two consecutive censuses to be included in the sample. Thus, an individual reporting an occupation during every census in the period studied here (1970, 1975, 1980, 1985 and 1990) first becomes eligible for a transition in 1975. In this procedure, those individuals who remain under observation for five years or less or who fail to report an occupation during two separate censuses were excluded from the study. As is always the case for studies using self-reported information, this study may suffer from mis-reporting, which may affect its validity. To minimize any potential influence of such mis-reporting on the results, income thresholds for all coded occupations according to the NYK78 occupational classification (Statistics Sweden (1989)) were created based on the work incomes of the total Swedish working population. An individual working as a nurse is therefore only treated as having that occupational status if their disposable income is in the 25th percentile or higher for individuals with a similarly coded occupation[40]. Otherwise, they are treated as unemployed. An additional purpose for applying an income threshold below which individuals are excluded from the analysis is that this helps us to mainly include individuals who are fully participating in the labor market. The aim is to avoid biasing the results in the way that could otherwise result from the considerable upward mobility expected of individuals

[38] Swedish Census of the Population

[39] See Table B1, Appendix B for a list of countries of origin

[40] Own calculations based on the censuses (Swedish Census of the Population 1970/1975/1980/1985/1990))

working part-time in low-skill occupations while studying and subsequently advancing to an occupation matching their formal skills[41].

3.3.2. Variable design

The outcome variable is based on changes in the individual's occupational status and is coded according to the International Socio Economic Index (ISEI) classification of occupations[42]. The classification arranges occupations continuously along a one dimensional hierarchical scale on which a higher status score is synonymous with a higher occupational status. Due to the continuous nature of the ISEI classification, an increase of X status points can be interpreted as an equally large status improvement regardless of the status from which the transition occurs. The ISEI is designed to represent the educational requirements and earnings potential of an occupation and is constructed from weighted sums of the education and earnings of the individual's in each occupation[43]. The scores range from 16, the score for restaurant cleaners, to 90, the score for judges. The outcome variable in the study is categorical and upward occupational mobility is indicated when there is an increase in occupational status of five or more status points[44]. Due to the design of the dependent variable, observations for individuals with an origin status score exceeding 85 are excluded; these individuals are obviously unable to experience an upward transition past this threshold.

To estimate the effect of a given parameter on the probability of upward occupational mobility across various labor market sectors, multinomial logit models were estimated in which the outcome variable indicates whether an upward transition occurs into an occupation belonging to the public sector, the private service sector or the private manufacturing sector. These three categories of the labor market are intended to represent segments that potentially possess particular attributes and prerequisites for career progress.

The private manufacturing[45] sector can be expected to be male dominated and diminishing in terms of the share of the labor force employed over the time

[41] In order to effectively exclude individuals who could still be in school, Model 4 is restricted to individuals over the age of 30. See tables B2 and B3, Appendix B.

[42] The derivation of occupations into the ISEI classification from ISCO88 is made in accordance with the key provided by Ganzeboom & Treiman (1996). The conversion of occupational codes used in the Censuses into ISCO88 is made in accordance with the key provided by Erik Bihagen (http://www2.sofi.su.se/~ebi/), retrieved December 18, 2009.

[43] Ganzeboom, De Graaf & Treiman (1992), Ganzeboom & Treiman (1996, 2003)

[44] Sensitivity tests with different thresholds for transition (increase in ISEI of 10 or more status points) have been carried out, showing results not differing noteworthily. See Model 3 in Tables B2 and B3, Appendix B.

[45] Including occupations within metal ore mining, manufacturing industry, electricity, gas and heating services, construction, repair, other services.

period here examined, potentially affecting the available opportunities for career progress. The private manufacturing sector includes occupations like the manufacturing of fabricated metal products, machinery and equipment and building construction. Whereas the private manufacturing sector in itself is rather heterogeneous, it is also believed to fundamentally differ from the private service sector[46] in that the latter represents occupations that require a larger extent of informal- and language skills if one is to successfully perform typical tasks. Among others, occupations within different forms of retail trade, and jobs within real estate and engineering are allocated to the latter sector.

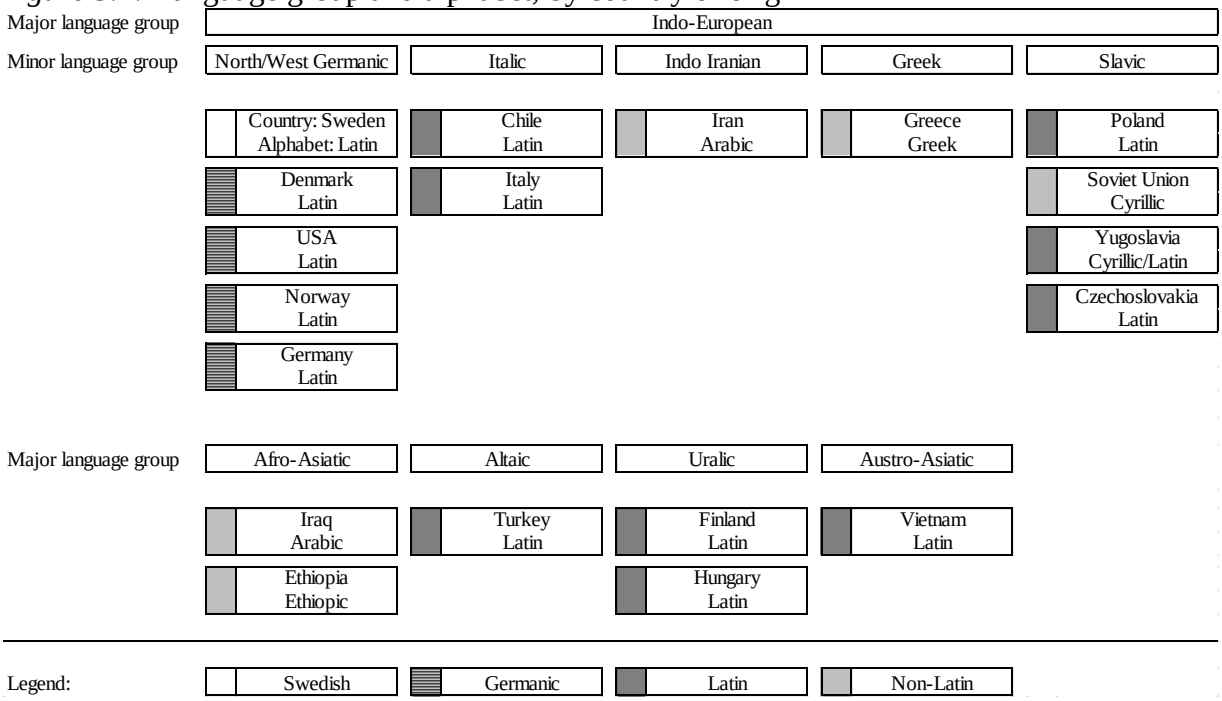
Finally, the public sector[47] contains both traditionally female-dominated occupations within education or health care, for example, and also occupations within defense and policing. The relatively greater share of presumed peripheral groups in higher positions in the public sector, which has been empirically confirmed in previous research, possibly reflects lower obstacles for career advancement that may be due to demand side factors such as the typical recruitment method used. The agricultural sector is excluded from the analysis because it is assumed to be largely different from the regular labor market, especially in terms of career dynamics and the mechanism linking formal qualifications to remuneration in terms of occupational status.

The utility of a particular formal education is expected to be related to the individual's expected difficulty adjusting to the destination country in terms of linguistic assimilation. To capture the influence of linguistic distance on the utility of a given degree, three discrete categories of educational attainment interact with categories representing characteristics of the official language of the individual's country of origin, illustrated in Figure 3.1.

[46] Including occupations within wholesale and retail trade, hotels and restaurants, transport, post and telecommunications, banks, insurance and property management, recreation and cultural services.

[47] Including occupations within public administration, defense, police, teaching, research and health care

Figure 3.1: Language group and alphabet, by country of origin



Source: Lewis (2009)

The reference category is represented by the native born, which is also the largest group, representing about 65 percent of the sample. The group assumed to experience the fewest problems in linguistically assimilating to Sweden is represented by individuals from countries such as Denmark and Germany and those whose official languages belong to the Germanic language tree along with the Swedish language. Immigrants from the remaining countries represented in the sample are separated into two groups. The first group, labeled Latin, includes countries of origin with an official language belonging to a different language family, such as the Italic or the Slavic family, but that is based on the Latin alphabet. Lastly, countries of origin with official languages that belong to different language families than the Swedish language and are based on alphabets other than the Latin one, such as the Cyrillic and the Arabic alphabets, fall under the Non-Latin group.

The demand side mechanisms that affect the chances of upward occupational mobility and are believed to be sector specific are modeled by controlling for the individual's origin occupational status. As suggested by the background and theoretical sections, these demand side factors potentially not only vary across labor market sectors, but also depend on factors linked to the individual's sex and/or country of origin. In order to model this properly, origin occupational status is interacted with sex and the four linguistic groups. The link

between an individual's occupational status and their likelihood for experiencing upward occupational mobility is, however, not likely to be linear. This motivates the inclusion of a second and third polynomial of the main origin occupational status effect. Also, the original design of the occupational status measurement – ranging from 16 through 90 – was altered for use in the econometric analysis in order for it to originate from zero. Hence the values 0/69 on the origin occupational status variable used in the econometric analysis represent a real origin status of 16/85. The estimated models, furthermore, control for a number of other individual and contextual variables, such as age, years since migration and regional unemployment.

3.3.3. Methodological discussion

Following the previous literature, two conditions need to be fulfilled in order to be able to confirm the existence of a glass ceiling[48]. 1) The likelihood of further upward mobility from a given position in the occupational hierarchy must be lower for the peripheral group, in this case immigrants and women. Furthermore, the lower likelihood cannot be explained by differences in the individual's job-relevant characteristics. 2) The relative difference in the likelihood of further upward mobility between the groups must increase when the position of origin in the occupational hierarchy is higher. To empirically test the glass ceiling hypothesis, econometric models on the probability of experiencing upward mobility into each of the three aforementioned sectors are jointly estimated by multinomial logistic regression analysis. In order to account for the panel data structure with repeated observations for a given individual, STATA's cluster command was used to obtain robust standard errors.

In the glass ceiling framework as outlined here, the obvious reference category is the native man who is assumed to enjoy a universal advantage in terms of experiencing upward mobility. To empirically test the relevance of the glass ceiling hypothesis, differences between groups in their *predicted probability* of experiencing upward mobility from a given origin status must be calculated, while canceling out the potentially confounding influence of the groups' different characteristics. Due to considerable differences in the size of the probability of a person's experiencing upward mobility at different levels of origin occupational status, using either the absolute or the relative differences in the predicted probabilities between different groups presents various problems. Illustrating between-group differences by using the absolute size of the probability difference means ignoring the fact that the magnitude of a two percent absolute difference in probability when the reference probability is 60 percent is highly different from when it is one percent. Therefore, it could be

[48] see Baxter & Olin Wright (2000), Cotter et at (2001)

argued that such a procedure becomes rather uninformative. However, to calculate a relative probability based on two groups' predicted probabilities then introduces another problem: the creation of an asymmetrical scale. In the situation in which the reference group's probability of attaining upward mobility is higher, the relative probability approaches an infinitely positive value. This is illustrated by a scenario in which the reference group enjoys a probability of 90 percent and the comparison group experiences a probability of 1 percent, resulting in a relative probability of 90 (90/1). The opposite situation results in a relative probability of 0.01 (1/90) in which the probability approaches but never descends below zero.

In order to ameliorate the problems associated with various methods of using predicted probabilities in illustrating the potential existence of a glass ceiling, probabilities are first transformed into their natural logarithm. From the transformed values, the comparison groups' situation *vis à vis* that of the native male reference group is obtained by calculating the difference between log probabilities. A value of zero is interpreted as indicating that the comparison group experiences a probability of upward mobility equal to that of a native man, whereas a *positive value indicates an advantage experienced by the native male*[49]. A pedagogically appealing feature of differences between the logarithmically transformed probabilities is that it yields a scale on which the native male's advantage theoretically ranges between plus and minus infinity. Also, the log probability advantage easily transforms into more straightforwardly interpretable figures via exponentiation. The exponent of a given log probability advantage indicates the size of the actual native man's probability of upward mobility in relation to that of the comparison group. A difference in the log probability of +1 yields an exponentiated figure of exp(1) = 2.7 that thus must be interpreted as indicating that the native man enjoys a likelihood of upward mobility 1.7 (2.7-1) times higher than the comparison group[50].

3.4. Results

3.4.1 Sample characteristics

The sample is comprised of 71,747 unique individuals, of whom 39,129 are men and 32,618 are women. The typical individual is observed at risk of experiencing a status transition 1.7 times, which means that these individuals'

[49] Log(Probability, native man) – log(Probability, other group)

[50] For comparison; a log probability difference of -0.6 transforms into exp(-0.6) = 0.94, meaning that the native man's probability is (0.94-1) = 6 percent lower than the comparison group's.

average time under observation amounts to about 12 years. As emerges from Table 3.1, which contains the variable means, a greater linguistic distance appear to be associated with lower post-migration occupational status, on average amounting to 10 status points lower than the corresponding figures for the native. While not an unexpected outcome, this could also be the result of the groups' differing distribution across educational levels; the Non-Latin group stands out as including a comparatively large share of individuals with only primary education. In fact, controlling for educational level, only rather small differences in the average occupational status between the groups can be observed, suggesting that average occupational status is strongly linked to these groups' average formal educational attainment.

Another finding that emerges from the variable means is that the highest shares of individuals becoming Swedish citizens can be found among the Latin and Non-Latin groups rather than the Germanic group. Comparing the mean time since migration and the time since receipt of Swedish citizenship, the data suggests the typical immigrant to have applied for citizenship relatively soon after having become eligible based on their time spent in Sweden, typically after seven years until 1976 and five years thereafter. For the purpose of this chapter, the key requirement for formal eligibility for all but the entire labor market was the possession of a work permit, which requires a lesser period of residence, but is not observed in the data. During the period in question, only immigrants from the Nordic countries were exempt from this requirement, and were thus at liberty to enter the Swedish labor market directly after migration (Lundh & Ohlsson (1999)).

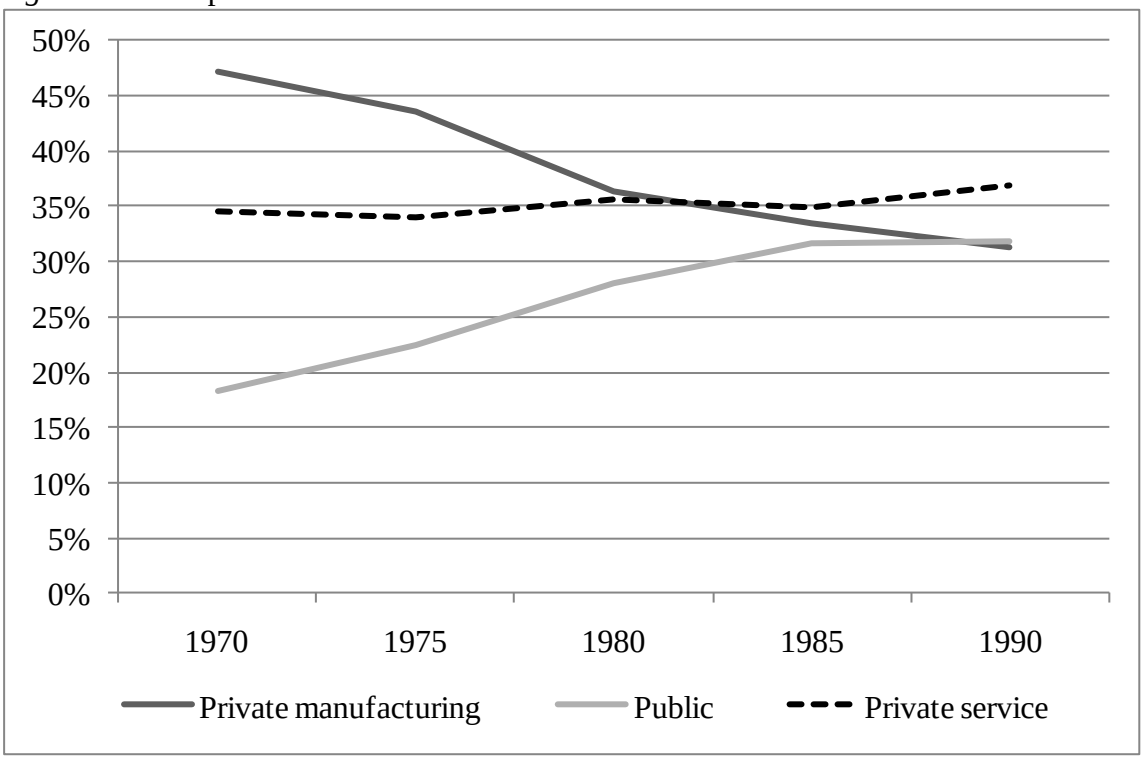
Table 3.1: Variable means

	Sweden	Germanic	Latin	Non-latin
Year	1983.6	1983.4	1984.4	1984.5
Age	37.5	43.9	40.5	40.6
Sex (% women)	43.1%	41.3%	47.0%	39.3%
Civil status (% married)	54.2%	65.8%	67.1%	77.5%
Child under the age of 2 (%)	1.9%	5.0%	5.8%	8.1%
Primary education (%)	36.0%	37.6%	51.1%	58.4%
Secondary education (%)	49.6%	48.2%	39.0%	30.9%
University education (%)	14.4%	14.2%	9.9%	10.8%
Municipal share in high skill occupations*	29.8%	29.7%	32.1%	35.2%
Regional unemployment rate (%)	1.8%	1.7%	1.7%	1.5%
Immigration year	-	1965.8	1970.8	1972.6
Years since migration	-	17.7	13.7	12.1
Swedish citizen (%)	-	29.5	39.4	49.4
Years since becoming Swedish citizen (if citizen)	-	8.58	7.07	5.71
Private manufacturing sector (%)	32.8	39.9	46.8	35.1
Private service sector (%)	29.2	24.2	22.5	23.4
Public sector (%)	38	35.9	30.7	41.5
ISEI occupational status	41.3	39.4	34.7	31.3
Country of origin (ISO 3166-1-alpha-2 code****)	SE	US, DE, DK, NO	CL, FI, IT, PL, CZ, TR, YU**, HU, VN	ET, GR, IR, IQ, RU***
N (observations)	138 423	13 774	42 202	7 769
n (individuals)	46 371	5 299	16 897	3 180

* Share of working individuals in high skill occupations within municipality (ISCO skill level 4)
** Former Yugoslavia
*** Refers to the Soviet Union
**** See Appendix B, Table B1

The structural transformation of the Swedish labor market that occurred during the period from 1970 to 1990 is clearly reflected in the data, wherein the share of individuals employed in occupations in the private manufacturing sector decreased considerably from 1970 (47 percent) to 1990 (31 percent). The public sector increased its share of the sample from 18 to 32 percent during the same period. Taking into account the expected dominance of comparatively unskilled jobs in the private manufacturing sector, its decline undoubtedly resulted in a decreasing proportion of low status occupations in the labor market as a whole. Furthermore, the growth of the public sector, believed to offer relatively favorable career prerequisites for more marginalized groups in the labor market, could entail gradual improvement to opportunities for upward mobility. As a result of the labor market changes, towards the end of the period studied here, the sample was distributed across the three sectors in shares that were about equally large, as seen in Figure 3.2.

Figure 3.2: Sample distribution across labor market sectors

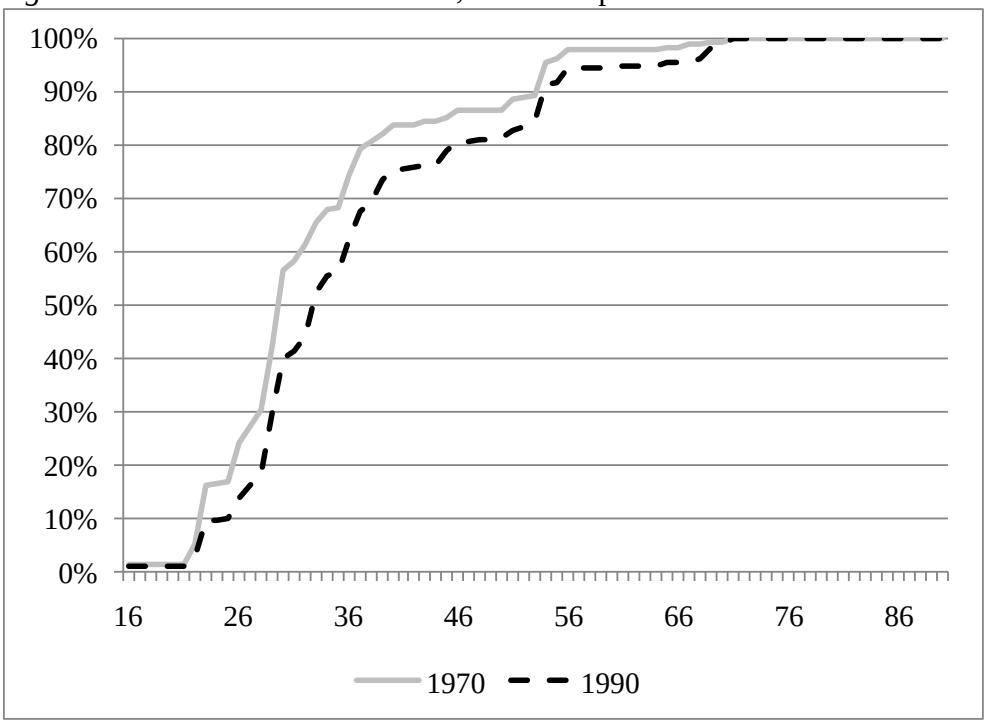


Source: Swedish Longitudinal Immigrant database, own calculations

Figures 3.3 through 3.5 below, representing the total working population in Sweden show the cumulative distribution of occupational status for individuals working in all three sectors. These figures indicate the share of occupations above and below a given occupational status. Looking at Figure 3.3, the cumulative distribution of occupations in the private manufacturing sector in 1970 can be observed: 70 percent are occupations with status scores below 35. The figures suggest that each labor market sector represents a characteristic occupational status distribution but that all increased their share of high status occupations over time. The dramatic change occurring in the public sector indeed appear most likely to have lead to changing opportunities for upward mobility, due to the considerable increase in the share of occupations with a status score exceeding 35. For example, in 1970, the distribution of occupations in the public sector closely resembled that of the private manufacturing sector. More specifically, both sectors were characterized by around 50 percent of individuals employed in occupations with status scores below 30 and only about 10 percent in occupations with occupational status scores above 50. Comparing the share of high status occupations with the corresponding figure for the private service sector at the time, which was about 30 percent, the private service sector is underlined as hosting the largest share of high status occupations in 1970.

While the distribution of private manufacturing and private service sector occupations in terms of occupational status maintains a rather constant pattern, the major changes over time instead occur in the public sector. Whereas the public sector still indicates a rather high share of low-status occupations in 1990, its share of occupations with a status score exceeding 50 increased to about as high as the private service sector. Over time, the public sector hence assumes a bimodal distribution, possessing not only a large share of low status occupations but also a considerable share of high status occupations[51] that has increased considerably over time and potentially offers expanded opportunities for upward mobility.

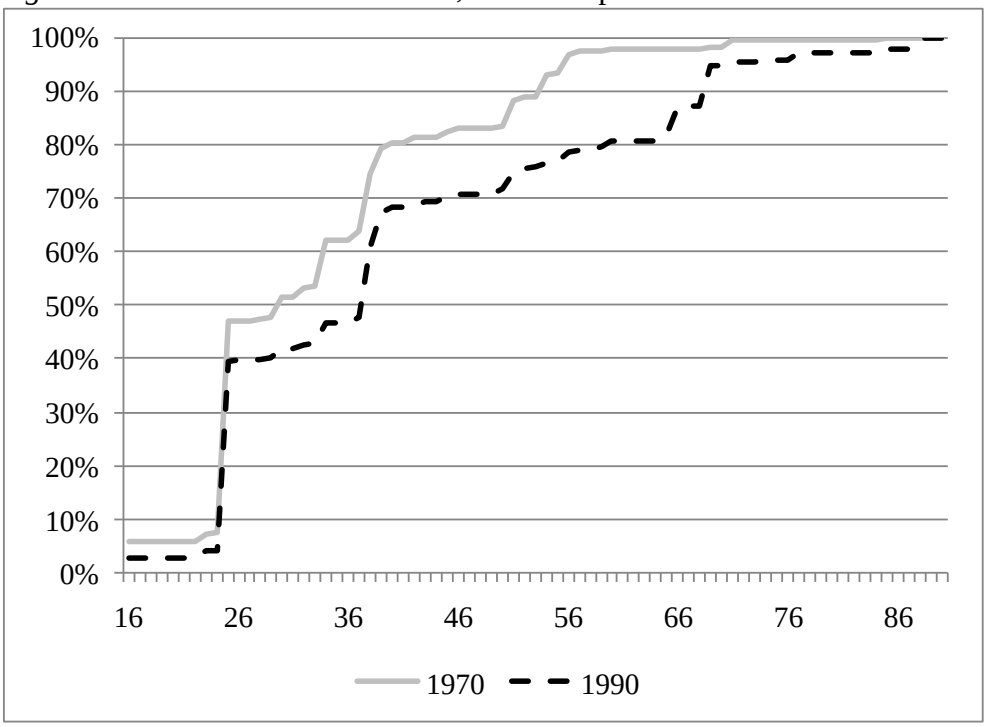
Figure 3.3: Cumulative distribution, ISEI occupational status. Private manufacturing sector.



Source: Swedish Census of the Population 1970/1990, own calculations.
Y-axis: Cumulative distribution (percent), X-axis: ISEI occupational status

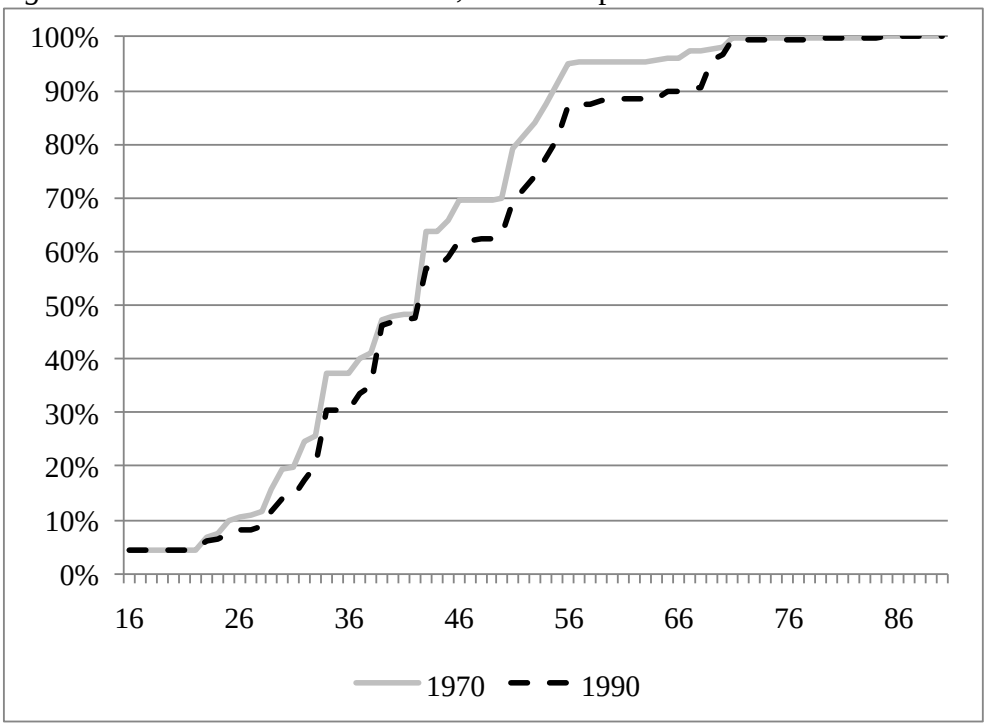
51 These figures were calculated for the total working population using the censuses.

Figure 3.4: Cumulative distribution, ISEI occupational status. Public sector.



Source: Swedish Census of the Population 1970/1990, own calculations.
Y-axis: Cumulative distribution (percent), X-axis: ISEI occupational status

Figure 3.5: Cumulative distribution, ISEI occupational status. Private service sector.

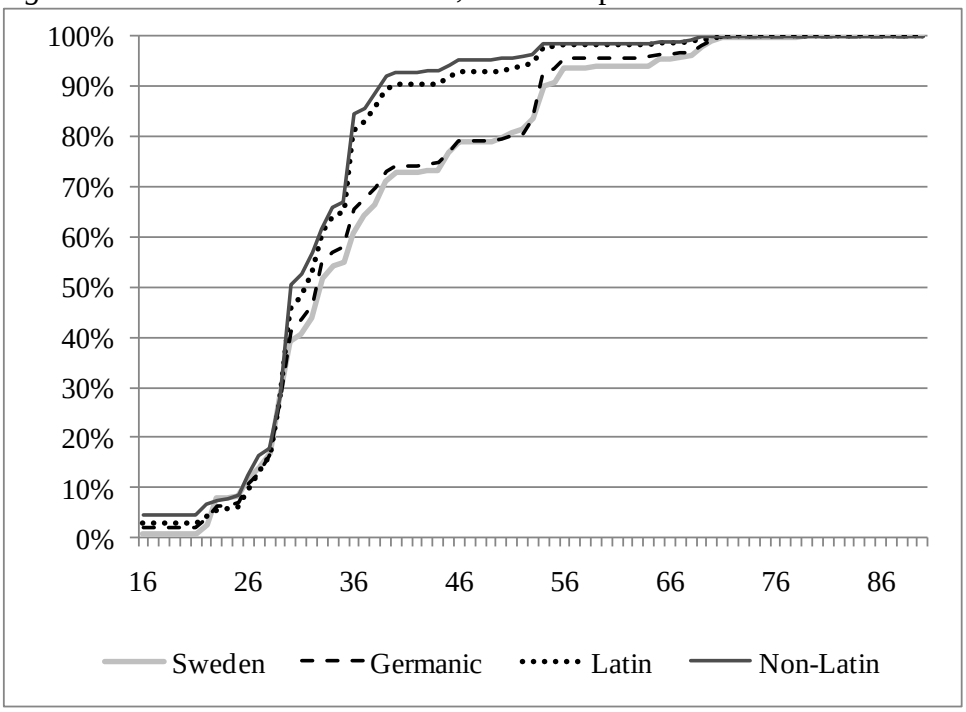


Source: Swedish Census of the Population 1970/1990, own calculations.
Y-axis: Cumulative distribution (percent), X-axis: ISEI occupational status

Based on the sample, and shown in Figures 3.6 through 3.8, within and between sectors, noteworthy distributional differences emerge that are linked to linguistic groups. Consistently, however, natives appear to be occupying the most favorable positions across all sectors. The comparatively high demands related to language and informal skills that are expected to exist in occupations in the private service sector may explain the accentuated distinctions between individuals speaking languages being increasingly different from Swedish. Whereas natives and immigrants with mother tongues that belong to the Germanic language family share virtually the same distribution across occupations in the private service sector, immigrants without prior knowledge of the Latin alphabet are particularly over-represented in low status occupations such as janitorial work and cleaning. A similar pattern based on linguistic distance is also visible in the public sector, with a disproportionally large share of individuals from the Non-Latin group in low status occupations. However, the linguistic groups' distributions converge at higher occupational status levels. As a result, the proportion of individuals in public sector occupations that have an occupational status at or above about 40, the score corresponding to work as a school teacher, does not greatly differ between the groups. This suggests a relative absence of obstacles to advancement into occupations at medium and high status levels in the public sector. Lastly, obstacles to mobility into the private manufacturing sector appear to be present for medium-level to high status occupations, again showing Latin- and Non-Latin immigrants as being worse off than Natives and Germanic immigrants. More specifically, the differing distributions suggest that Latin/Non-Latin immigrants are overrepresented in machine operation jobs, whereas natives and Germanic immigrants occupy a disproportionally large share of managerial positions with status scores around 55[52].

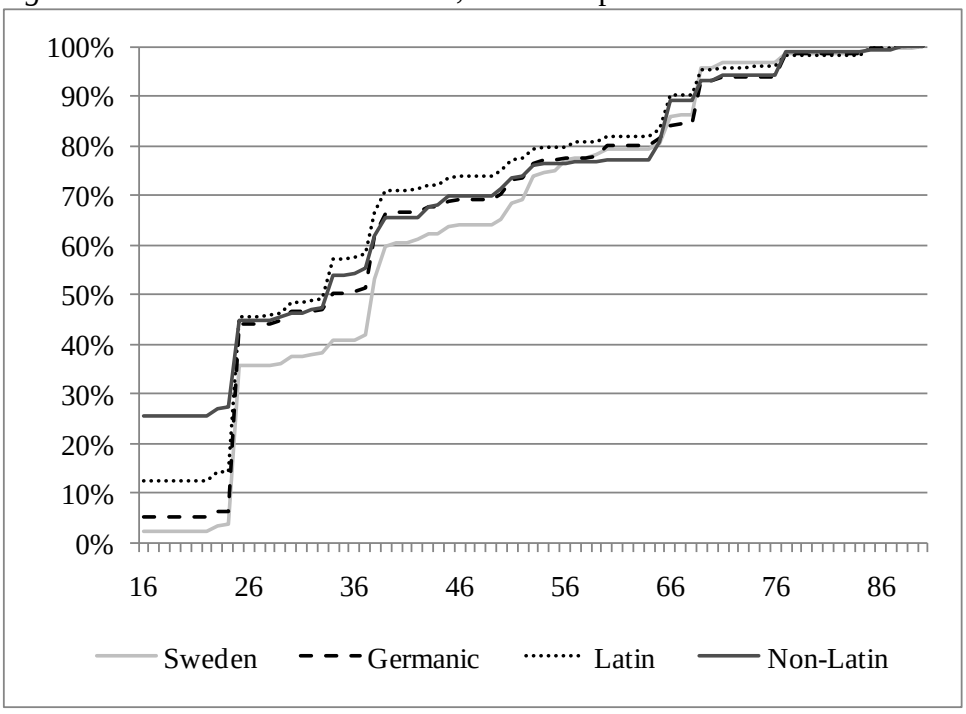
[52] While the situation presented in figures 3.6-3.8 are based on the sample examined in the chapter, the pattern represented by the total working population, calculated using the censuses of 1970 and 1990 (Folk och bostadsräkningen) is almost identical.

Figure 3.6: Cumulative distribution, ISEI occupational status. Private manufacturing sector.



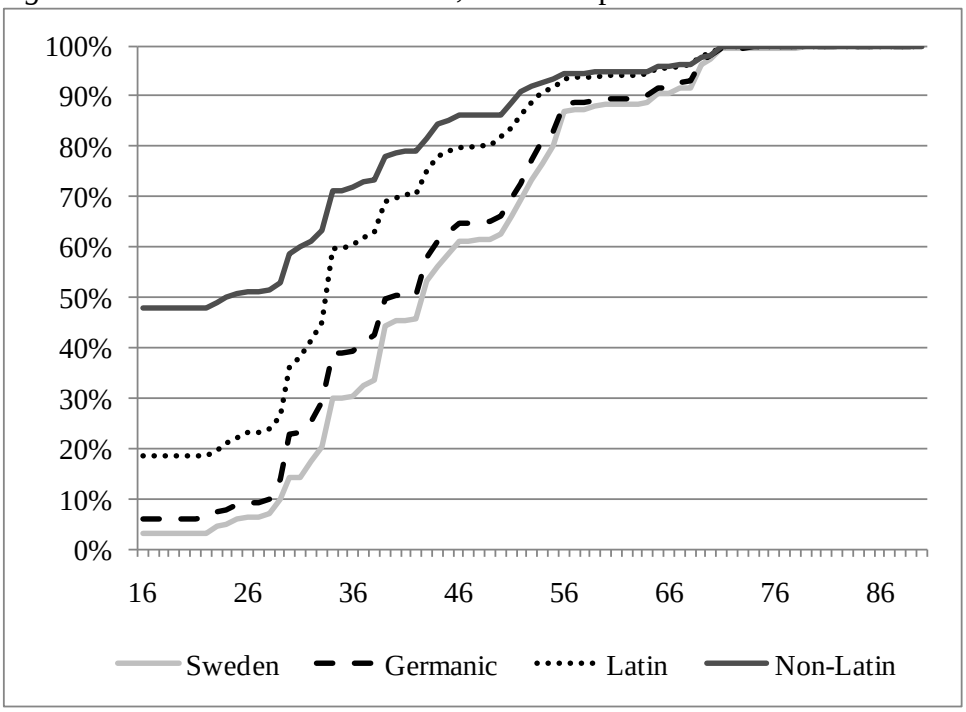
Source: Swedish Longitudinal Immigrant database, own calculations.
Y-axis: Cumulative distribution (percent), X-axis: ISEI occupational status

Figure 3.7: Cumulative distribution, ISEI occupational status. Public sector.



Source: Swedish Longitudinal Immigrant database, own calculations.
Y-axis: Cumulative distribution (percent), X-axis: ISEI occupational status

Figure 3.8: Cumulative distribution, ISEI occupational status. Private service sector.



Source: Swedish Longitudinal Immigrant database, own calculations.
Y-axis: Cumulative distribution (percent), X-axis: ISEI occupational status

Roughly 32,000 upward transitions are recorded in the data, where the median (and modal) transition represents a status improvement of 14 status points, translating to a jump from working as an administrative secretary to working as an accountant. As expected, the likelihood of experiencing upward mobility appears to be strongly linked to the formal education of the individual, with only 13 percent of primary-educated individuals observed to experience a transition, as compared to 20 percent of university-educated individuals, without taking into account the origin occupational status. This might be expected given that the likelihood of experiencing upward mobility from a given status origin should be increasing with educational level due to the higher skills necessary for success in higher-status occupation, thus typically favoring more skilled individuals.

Table 3.2: Upward status transitions by ISEI origin occupational status, percent

	Sweden		Germanic		Latin		Non-Latin	
Origin occupational status	male	female	male	female	male	female	male	female
16-32	22.88	22.48	19.62	19.26	18.67	18.16	18.3	11.4
33-49	17.12	20.4	16.31	17.34	9.35	12.45	11.59	8.44
50-66	12.7	6.16	11.16	7.2	9.54	6.33	9.75	7.1
67-85	1.8	1.66	1.51	3.3	1.27	2.29	3.59	0

Table 3.2 shows figures for non-sector specific transition likelihood by origin status categories, suggesting a rapidly decreasing probability of upward mobility as the occupational status increases. Using the native man as a benchmark category, the unadjusted likelihood of upward mobility at status origins below 66 always exceeds 10 percent, above which it approaches zero. This implies that upward transitions from such status origins are somewhat of an anomaly and that such occupations are largely "final destination" jobs. Non-Latin women represent the most evidently divergent pattern, with a very low proportion of those individuals originating with a status in the range of 16-49 experiencing an upward transition; in fact, this figure is about half as large as that for native men.

3.4.2. Estimation of empirical models

Models are run on the pooled sample, which is intended to capture how the sector specific mechanisms of career opportunities differ depending on region-of-origin, sex and formal human capital. Model 1 represents a somewhat naïve representation of the assumed reality, estimating a common payoff for a given educational level regardless of origin and sex. This basic model allows for the estimation of baseline effects associated with one's region-of-origin. However, it is merely included for comparative purposes[53]. The extended Model 2 is designed to more accurately capture the theoretical expectation that the payoff of a given skill set may vary depending on the individual characteristics in terms of linguistic background and gender. The models were estimated as multinomial logit models, although they therefore possess the unappealing feature that their unadjusted parameter estimates cannot be interpreted based on either the size or the direction of the estimate[54], thereby requiring alternative ways of interpreting the results.

Table 3.3 shows the relative probability[55] of upward mobility into occupations belonging to each of the three labor market sectors compared to that of a native male with a comparable formal education, using sample means. The degree to which between-group differences in the combined effect of formal education, gender and linguistic distance are statistically significant is determined using Wald tests. The estimates indicate a pattern in which the native male's experience is sector specific, along with distinct within-sector patterns based on linguistic distance and sex. Almost consistently, the native male experiences an advantage in terms of upward mobility in the private manufacturing and private service sector. Compared to an otherwise similar

[53] Models are found in the Appendix
[54] Borooah (2000)
[55] P(Other group)/ P(Native man)

native man, an immigrant woman in either of the mentioned sectors originating from a country with a mother tongue based on an alphabet other than the Latin one will experience a most considerable disadvantage in terms of her likelihood of upward mobility. Across all educational levels, the relative probabilities suggest that the likelihood of upward mobility experienced by a Non-Latin female never exceeds a probability being 10 percent that experienced by the native man. Furthermore, the increasing disadvantage of linguistic distance that can be observed in the private service sector is theoretically appealing because of the comparatively high demands for country specific skills expected in this sector. This explains the linguistic component of the varying payoff to formal human capital. A similar pattern arises in the private manufacturing sector with the accelerating decrease in the payoff of formal skills according to linguistic distance. Again, this finding reflects problems related to skill transferability. The pattern in the mentioned sectors is also consistent in terms of the distinction it makes between men and women, always favoring the former, albeit not always within the boundaries of statistical significance.

Table 3.3: Relative probabilities of upward mobility

	Primary education			Secondary education			University education		
	Manufacturing	Public	Service	Manufacturing	Public	Service	Manufacturing	Public	Service
Sweden male	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Sweden female	0.21 ***	5.47 ***	0.39 ***	0.14 ***	3.07 ***	0.34 ***	0.05 ***	1.74 *	0.15 ***
Germanic male	0.79	0.72	1.05	0.73	0.84	1.08	0.94	1.22	1.11
Germanic female	0.18 ***	3.03 ***	0.25 ***	0.15 ***	2.11 *	0.25 ***	0.10 ***	1.49	0.13 ***
Latin male	0.66 ***	1.82 **	0.40 ***	0.60 ***	1.46	0.49 ***	0.60 ***	1.46	0.66 ***
Latin female	0.20 ***	2.61 ***	0.14 ***	0.13 ***	2.08 **	0.18 ***	0.06 ***	1.56	0.12 ***
Non-Latin male	0.09 ***	0.11 ***	0.08 ***	0.12 ***	0.23 ***	0.16 ***	0.13 ***	0.18 ***	0.19 ***
Non-Latin female	0.08 ***	0.30 ***	0.03 ***	0.04 ***	0.28 ***	0.05 ***	0.05 ***	0.21 ***	0.06 ***

Notes: Relative probabilities calculated at sample means, showing the effect of a 1 unit change in the independent variable. Reference category is Swedish male with primary/secondary/university education

Figures are calculated using the estimates of Model 2, which simultaneously controls for age, civil status, children, years since migration, regional labor market characteristics, time period, origin occupational status, Swedish citizenship and Nordic/Non-Nordic immigrant.

Statistical significance refers to Wald test comparing estimate to that of the Swedish male at a given level of education

*** p<0.01, ** p<0.05, * p<0.1

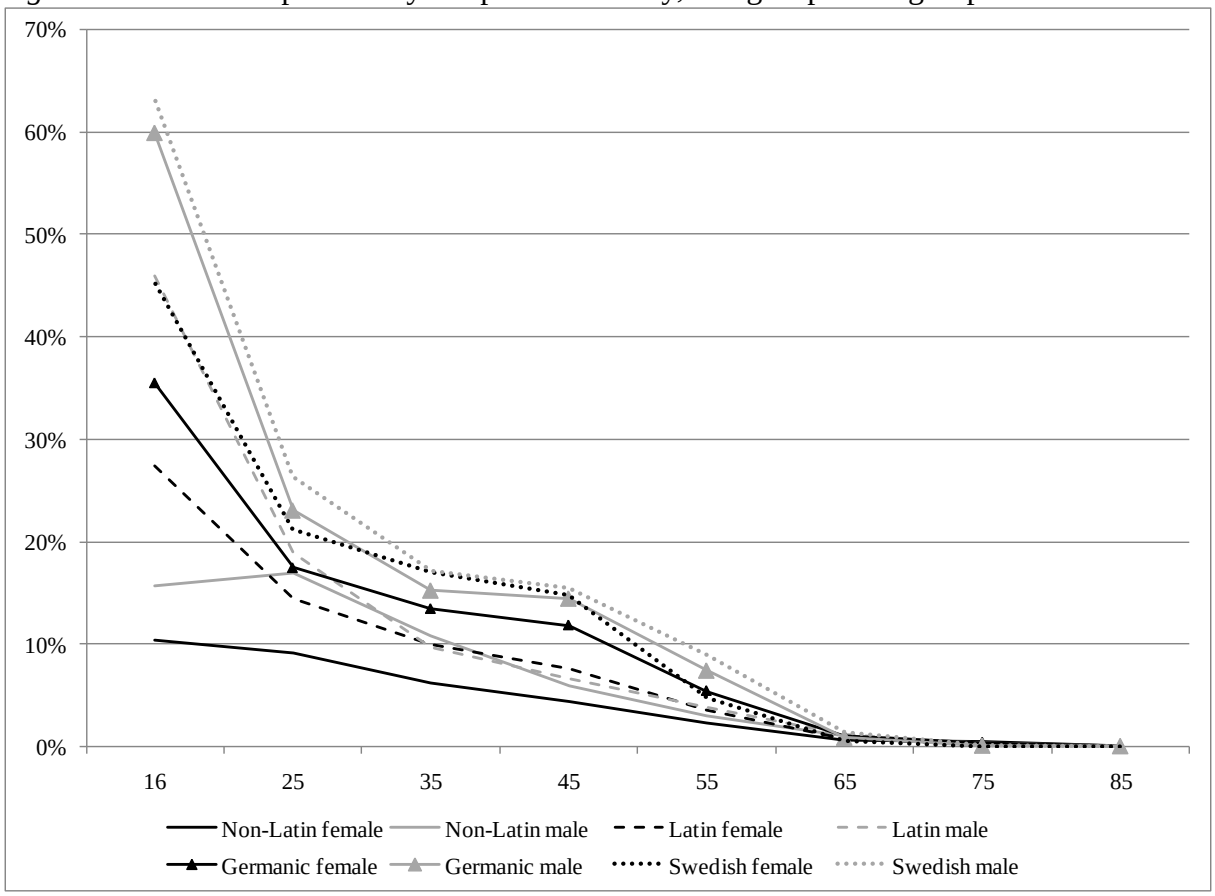
The landscape suggested by the relative probabilities in the public sector differs quite substantially from those in the private manufacturing and private service sectors. First, the gender pattern is reversed, suggesting that women on average are more likely to experience upward mobility than a male of a common linguistic origin. This tendency is particularly pronounced at lower educational levels, however, where all probabilities of upward mobility for obvious reasons is low. Despite the advantages observed, which are sometimes quite considerable, their real implications in terms of the differences between the groups' prospects for upward mobility should therefore not be exaggerated at the lowest educational level. With this in mind, although Swedish females' likelihood of upward mobility in the public sector is roughly 5.5 times that of

theSwedish male, the actual figures in question only amount to 2.7 and 0.5 percent, respectively. Another striking finding is that the favorable situation observed in this sector appears to apply to all groups apart from Non-Latin immigrants. While not as evident as in the manufacturing- and service sector, this group again emerges as disadvantaged. Again, there is a statistically significant disadvantage between this experience of disadvantage and the experience of the native male at the corresponding level of education according to the parameter estimate.

3.4.3. Interpreting the models using predicted probabilities

Until now, attention has been directed towards understanding the degree to which an individual's formal human capital generates a different labor market payoff depending on the person's background characteristics in terms of mother tongue and sex. From this exercise, quite considerable differences in the prerequisites for upward mobility across labor market sectors were observed, indeed linked to mentioned individual characteristics. This procedure, however, neglects the potential existence of differing opportunity structures in the labor market sectors because the influence of origin occupational status is treated as identical across groups. Attention must therefore directed toward predicting the probability of upward mobility using the groups' relevant characteristics and thereby presenting a more accurate illustration of the inter-group differences in transition probabilities. Figure 3.9 uses the respective groups' average characteristics to show the non-sector specific predicted probability of upward mobility, yielding findings that correspond quite well to indications already obtained from the relative probabilities presented in Table 3.3. Ignoring differences between the sectors and looking at the labor market as a whole by adding together the sector specific probabilities for upward mobility, linguistic distance can be observed to be more important than sex in determining labor market outcomes. The expectation that native men experience favorable conditions overall is confirmed, and this pattern is seemingly most accentuated for individuals with low-status origins, for whom the probability of upward mobility is about six times greater than it is for the average Non-Latin female.

Figure 3.9: Predicted probability of upward mobility, using respective group's means



Another consideration that emerges from the figure is that all probabilities approach zero at origin occupational status scores of 65 and above, evidence that occupations at such status levels to a large extent are "final destination" occupations. Note that this does not have any implications for the degree of mobility *into* such occupations; it only reflects the degree of mobility *out of* them.

As for the question whether a glass ceiling exists, the low probability of upward mobility for individuals with high-status origins has implications for the usefulness of comparing predicted probabilities. In the situation where the native man enjoys a probability of upward mobility being twice as large as that of another group, such probability differences only become meaningful if they can be considered to result in any tangible differences in terms of labor market opportunities. For instance, a probability of upward mobility of 0.2 percent, while twice as large as a probability of 0.1 percent, could be argued to represent an advantage with no real life implications. To keep such nonsense probabilities from potentially distorting the subsequent analysis, the predicted probabilities

will only be compared if the highest probability from a given origin exceeds an arbitrarily chosen threshold probability of two percent.

Whereas the results visible in Figure 3.9 show that individuals experience widely differing opportunities for career progress that are strongly associated with both sex and region-of-origin, the extent to which the disadvantage is due to a lower payoff to a given set of skills rather than resulting from possessing a less suitable set of characteristics cannot be determined. The following section therefore removes the influence of differences in the endowment of characteristics that are relevant in the labor market.

To observe differences in sector-specific probabilities that are due not to the groups' varying characteristics but instead to *differences in the payoff associated with a consistent and theoretically relevant skill set*, the average characteristics of the native man are used. Should an immigrant experience a lower probability of upward mobility when predicted using the characteristics for native men in immigrant and/or female parameter estimates, it will indicate that the group in question does indeed experience a less beneficial payoff to a consistent set of characteristics than a native man. To account for problems related to the asymmetric scale obtained when calculating relative probabilities, the advantage or the disadvantage experienced by the native man will be determined by calculating the difference between the logged probability of upward mobility for a native male and another individual who is otherwise identical but belongs to a different group. The figures in which the results are presented are intended to mirror an orthodox interpretation of the glass ceiling. Therefore, the superior likelihood of upward mobility experienced by the native man's is visualized as a relative probability greater than zero. Furthermore, consistent with the notion of an increasing advantage for higher status origins, such a dynamic should be reflected in a positively sloping curve. Lastly, sector specific probabilities are calculated to properly address whether career opportunities can be observed to differ depending on the sector into which the transition of status occurs[56].

3.4.4.1 Private manufacturing sector

As already observed in the descriptive section, the distribution of all three immigrant groups and that of natives in occupations with status scores below 30 in the manufacturing sector differed only to a negligible extent. However, a pattern of divergence according to linguistic distance among more advanced positions suggests the potential existence of different mechanisms of advancement into occupations belonging to the upper segment of the sector's occupational status hierarchy. Furthermore, such obstacles appeared to place the

[56] See figures 3.10 through 3.18

Latin- and Non-Latin immigrants at a disadvantage. According to the estimates of Model 2, predicted at the native male means, evidence of an accelerating disadvantage in the probability of upward mobility as the individual moves up the status hierarchy in the private manufacturing sector indeed exists for the Non-Latin immigrant group. This is demonstrated in Figures 3.10-3.12, which show the difference between the log-probability of upward mobility for the native man and all seven comparison groups.

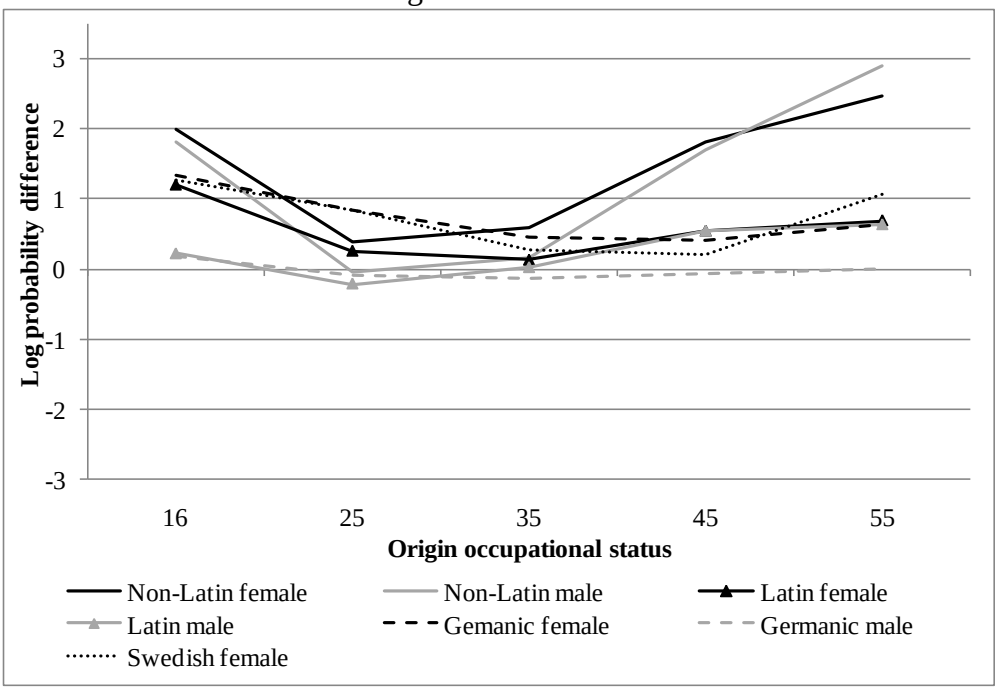
The results show an accentuated disadvantage at the lowest status origins for all groups except the Germanic and Latin males. This would suggest that individuals in the most elementary occupations as experiencing a substantial disadvantage in advancing into a higher status occupation within the private manufacturing sector. More specifically, a primary educated native man in the lowest status origin category experiences a predicted probability of upward mobility into an occupation in the private manufacturing sector amounting to 31 percent. The corresponding figure for a Non-Latin male with similar observable characteristics amounts to a mere 5 percent, indicative of quite a disadvantage. As the typical upward transition translates to an occupational status increase of 14 ISEI points, the Non-Latin groups' disadvantage in advancing from the lowest status origins should be interpreted as this group experiencing a considerably lower probability in obtaining employment in a low skill manufacturing job, with an occupational status around 30 ISEI points, such as a welder.

At higher levels of formal education, the disadvantage experienced by the peripheral groups becomes even more accentuated. Considering the private sector's believed greater reliance on informal recruitment methods in general and – particularly – for high skill occupations within management, this would appear as expected. The exception to the otherwise consistent advantage of the native male in attaining upward mobility is however the Germanic male's highly similar experience. Upward transitions into the private manufacturing sector from status origins of 45 and above will all but exclusively result in an occupation such as factory manager. Among individuals with university education, the Germanic male's likelihood for upward mobility into a management position in the private manufacturing sector from an origin occupational status of 45 even surpasses that of the native male, amounting to 10.7 and 8.7 percent, respectively. This is to be compared to the predicted probabilities of Non-Latin immigrant men and women amounting to 1.9 and 0.8 percent, respectively.

Another striking pattern contributing to the advantage of native males is observed along gender lines, where women consistently experience a lower probability of upward mobility than both native men and men belonging to the same linguistic group. The general pattern of disadvantage also clearly increases

with educational level, which generally can be assumed to be a prerequisite for achieving the highest-level status positions. Thereby, women would be suggested to be particularly disadvantaged when it comes to their opportunities to experience an upward transition into a high-status occupation in the private manufacturing sector. Particularly accentuated among the university educated, the disadvantage for women constantly remains greater than a difference of 0.5 log-probability units, implying the probability for a native man is consistently at least 65 percent higher than that of a woman[57].

Figure 3.10: Log differences in probability of upward mobility for individuals with primary education. Private manufacturing sector



[57] More specifically, a log probability difference of 0.5 translates to exp(0.5)=1.65, implying the reference group probability being 65 percent higher.

Figure 3.11: Log differences in probability of upward mobility for individuals with secondary education. Private manufacturing sector

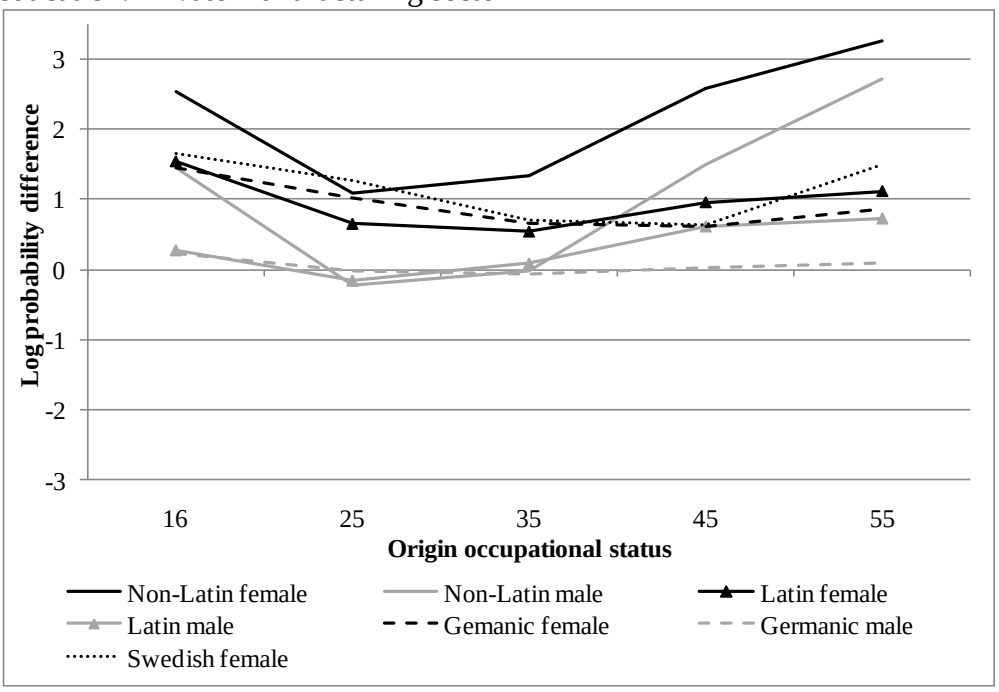
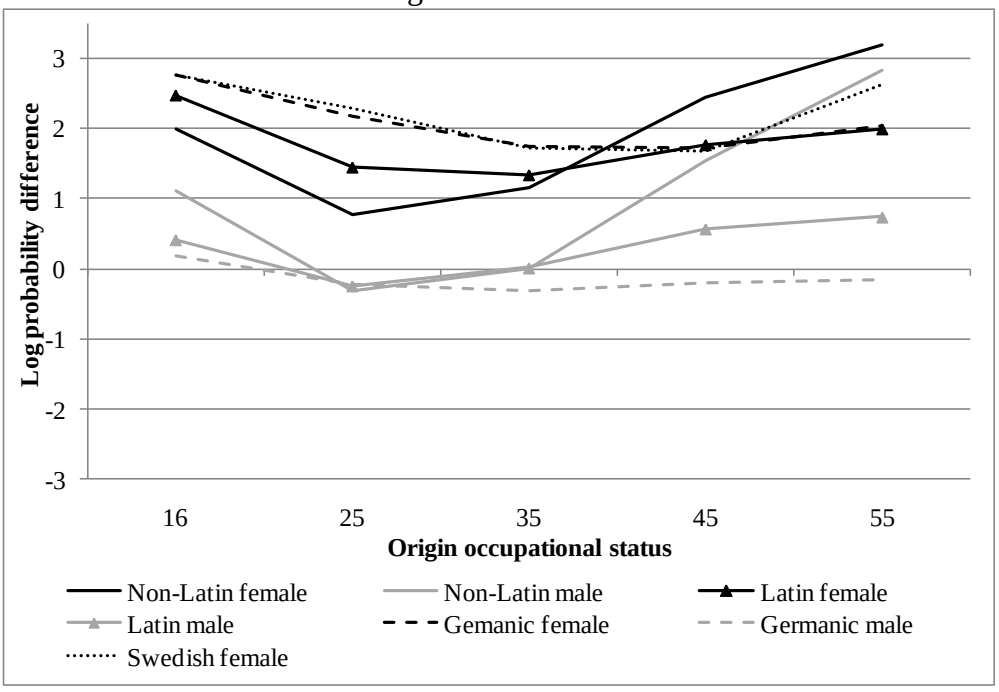


Figure 3.12: Log differences in probability of upward mobility for individuals with university education. Private manufacturing sector.



Differences in the log probability are calculated up to and including a status origin of 55, reflecting the low probability of upward mobility observed past this level of occupational status. On this basis, if one wishes to draw any conclusions regarding the existence of a glass ceiling up to and including occupations with status scores of 85, one must recognize that the figures converge for origin status levels above 65. Looking only at the above-displayed figures, we can conclude that no group strictly demonstrates the specific required characteristics of a group struggling against a glass ceiling. Instead, the main finding for the sector is that women experience a general disadvantage that appears to be rather constant across status origins but that also seems to increase with educational level.

3.4.4.2. Public sector

The public sector was argued to potentially be characterized by a relative absence of obstacles to upward mobility that would otherwise result from immigrants not possessing similar access to networks with valuable labor market information. More specifically, due to a recruitment process which relies more on formal channels, immigrants should to a considerably lesser extent be excluded from the public sector and therefore improving their opportunities for upward mobility. Indeed, when compared to the situation in the previously discussed private manufacturing sector, the native man experiences a considerably less advantageous position in the public sector.

Again, log-probability differences are calculated for the origin status range 16-55, and the general findings presented in Figure 3.13-3.15 indicate a distinctly different situation than previously observed in the private manufacturing sector. The main difference is that women are no longer a consistently disadvantaged category. Instead, with the exception of Non-Latin women, female individuals typically experience an advantage over both men of the same origin and native men. Given identical observable characteristics as the native male, the female advantage is largest for women with low-status origins, suggesting that this sector is a good candidate destination for status transitions into occupations in the middle of the status hierarchy among women[58]. In fact, originating from the lowest status origin, a primary educated female belonging to the Latin group experiences a probability of upward mobility amounting to almost 8 percent, compared to a probability of 2 percent for the native male, indeed suggesting a noteworthy advantage for upward mobility into a more high-status occupation in the public sector. Indicative of the immigrant's process of socioeconomic assimilation, the inflated probabilities of upward mobility

[58] Remembering the mean and mode size of status transitions, the typical upward transition from an origin status of 16 ends in an occupation enjoying an occupational status of 30.

from low status occupations could be evidence of such upward status adjustments as more likely to occur into occupations in the public sector. Among the aforementioned Latin women, predicted at the secondary and university educated individuals' parameter estimates, enjoy probabilities of upward mobility from the lowest occupational status origin amounting to 22 and 62 percent, respectively.

From status origins above 25, the probabilities of upward mobility into an occupation belonging to the public sector converge. The pattern of convergence as regards the predicted probabilities at high status origins suggests that the general female advantage is accentuated at low-status origins, most likely implying more similar prerequisites for mobility into the most advanced positions in the public sector. While the probabilities of upward mobility typically become more alike at high status origins, the consistent gender disadvantage that is observed in the private manufacturing sector is still elusive.

Figure 3.13: Log differences in probability of upward mobility for individuals with primary education. Public sector.

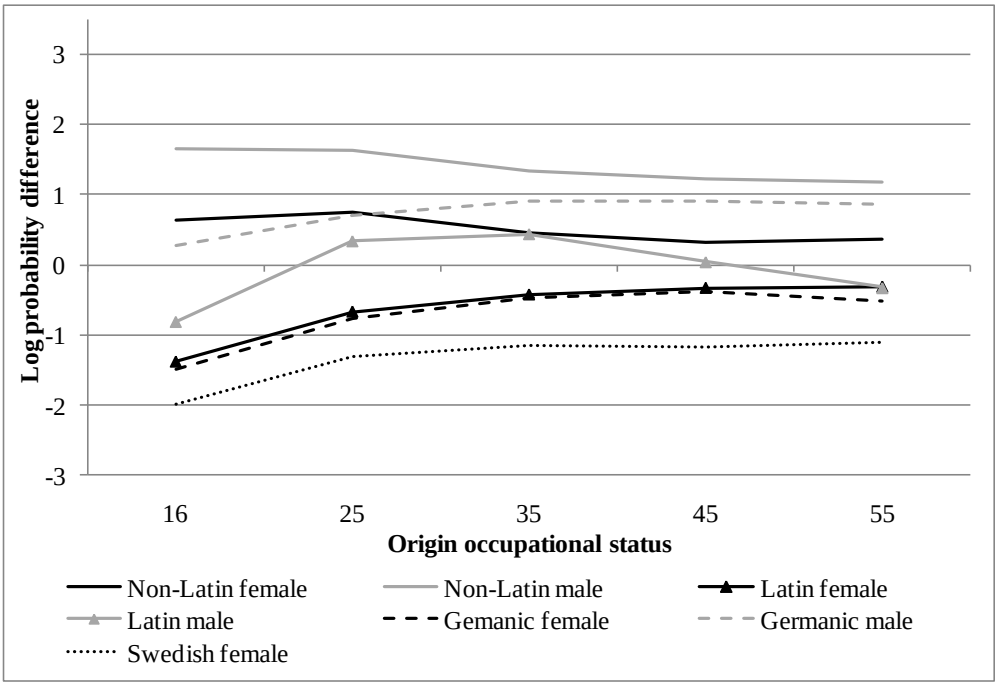


Figure 3.14: Log differences in probability of upward mobility for individuals with secondary education. Public sector

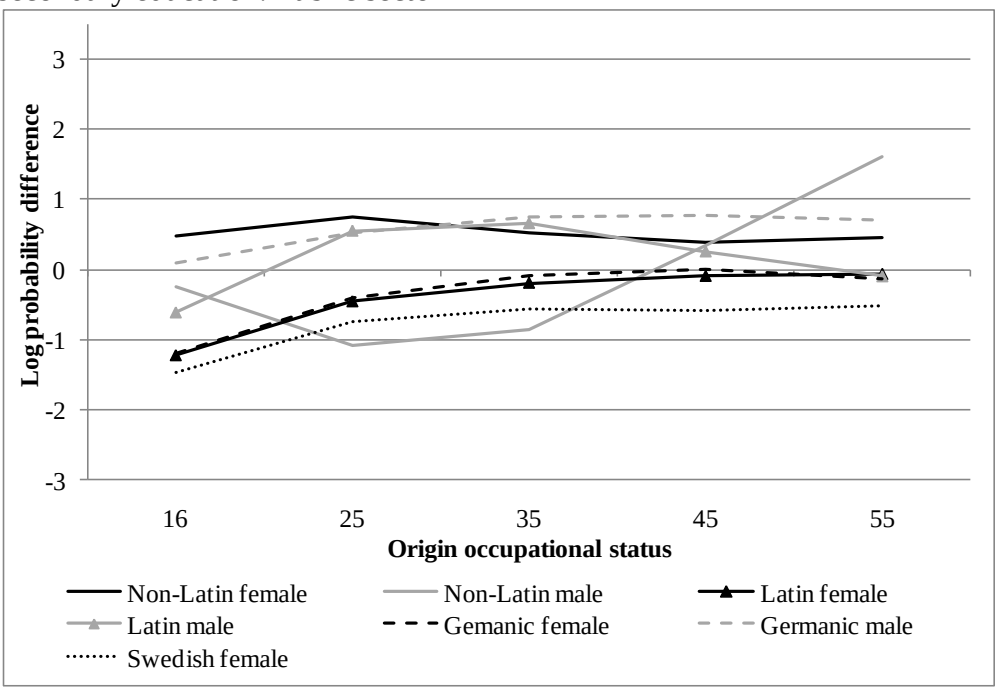
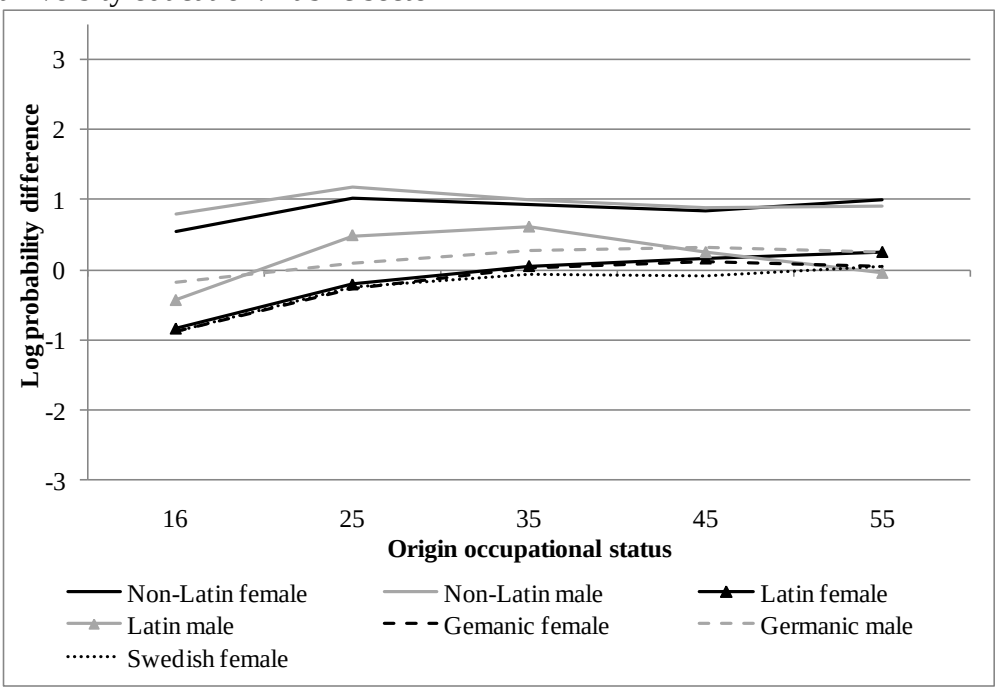


Figure 3.15: Log differences in probability of upward mobility for individuals with university education. Public sector



An exception to the gender specific pattern emerges among the Non-Latin women, who, together with men of similar linguistic characteristics, experience a constant disadvantage compared to native men. Although this disadvantage is quantitatively less severe than the situation experienced in the manufacturing sector, it suggests that problems of human capital transferability are an obstacle in the process of obtaining upward mobility in the public sector as well. Recalling the generous share of immigrants who belong to either the Non-Latin or the Latin group and are working in low status occupations, one might expect a relatively high degree of upward mobility from such occupational status origins as these individual undergo a process of socio-economic assimilation. However, whereas the average university-educated Latin female working in an occupation with a status of 35 experiences a predicted probability amounting to 19 percent, the corresponding figure for the Non-Latin female is 8 percent. Relating the situation illustrated by the public sector to what would be expected in the presence of a glass ceiling, the lack of a consistent and increasing native male advantage makes it easy to reject any such hypothesis.

3.4.4.3. Private service sector

The prerequisites for upward mobility into occupations under the heading of the private service sector were theoretically assumed to be the most likely to follow a pattern influenced by linguistic distance due to the comparatively high demands on country specific skills on the part of the employer. Furthermore, the disadvantage could also become increasingly accentuated for immigrants due to employers within the sector to a comparatively greater extent relying on informal recruitment methods.

Indications from the descriptive section indicated that the quantitatively most important differences were linked to linguistic distance at low-status levels, where a very large share of Non-Latin immigrants in the private service sector was concentrated in low-status occupations. Hence, distributional differences suggest that the linguistically most distant group potentially experiences difficulty advancing past the most low-status occupations of the private service sector. The differences in the log-probabilities of advancement for individual at low-status origins, as visible in Figures 3.16-3.18, indicate that individuals belonging to the Latin- or the Non-Latin group are at a considerable disadvantage in terms of the likelihood of their experiencing upward mobility into occupations in the private service sector, and this disadvantage remains constant across all educational levels. The disadvantage is however the most accentuated among the immigrants with no more than primary education, for whom status transitions from low status origin levels should be the most relevant.

Figure 3.16: Log differences in probability of upward mobility for individuals with primary education. Private service sector

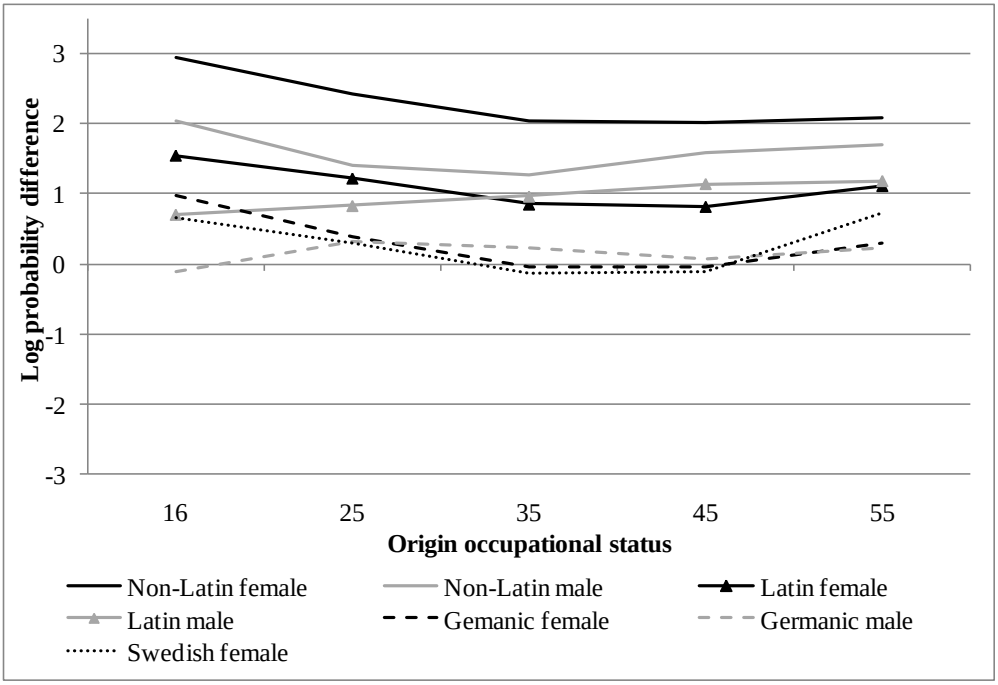


Figure 3.17: Log differences in probability of upward mobility for individuals with secondary education. Private service sector

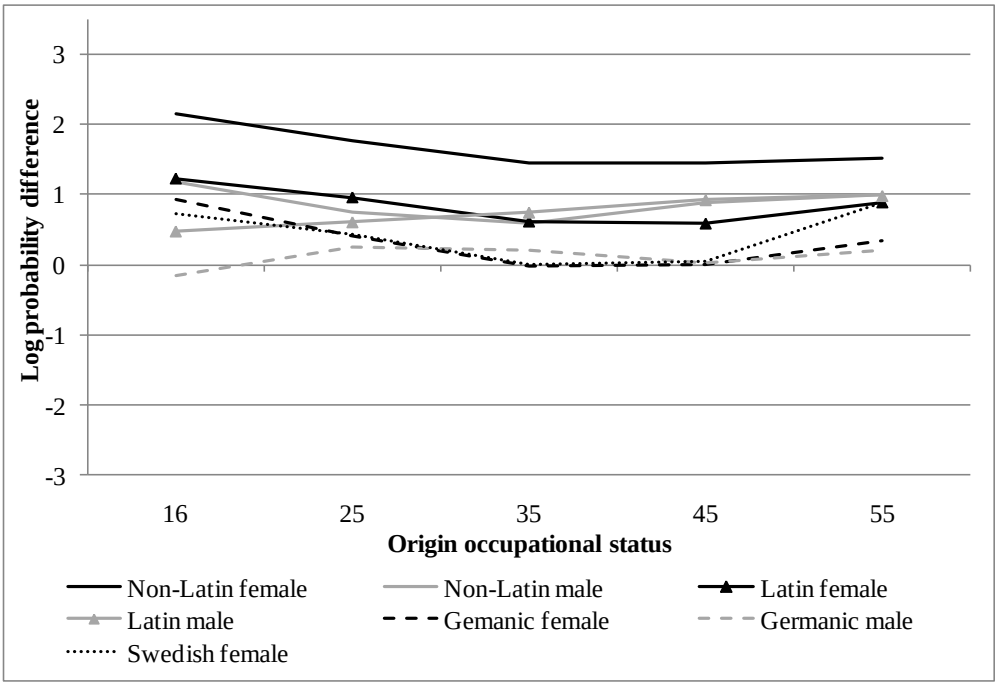
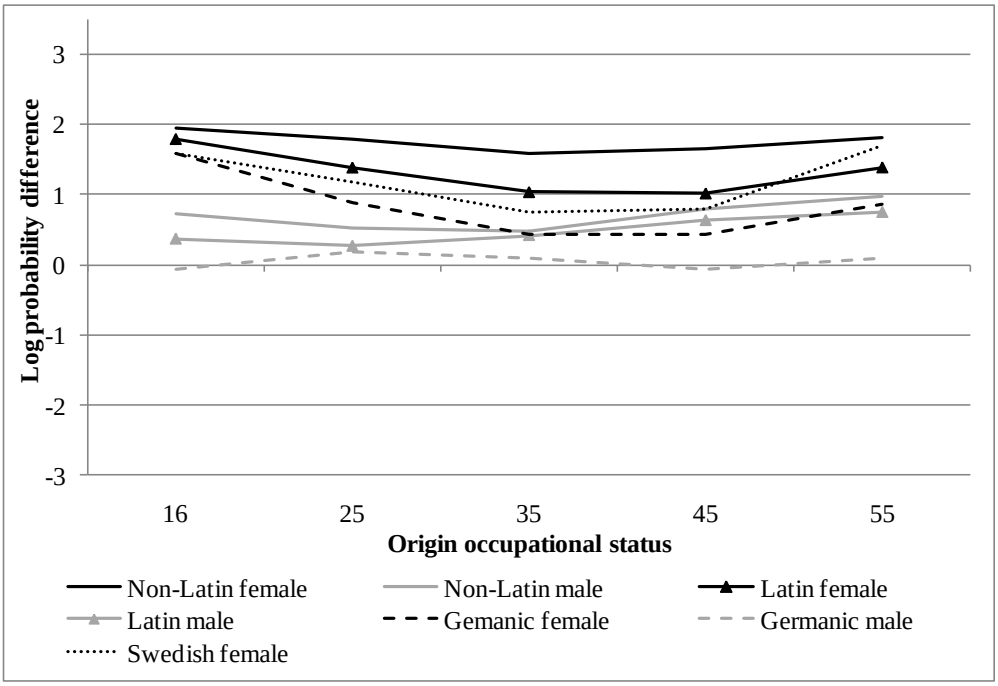


Figure 3.18: Log differences in probability of upward mobility for individuals with university education. Private service sector



From a status origin of 16, the native male enjoys a predicted probability of upward mobility into the private service sector amounting to 21 percent, to be compared with 4 and 1 percent for the Latin and Non-Latin female, respectively. The situation in the private service sectors corresponds to the à priori expectations in terms of a pattern of an increasing disadvantage according to linguistic distance. Again, the disadvantage does neither accentuate at high status origins, nor with an increasing level of formal education. While undoubtedly representing a considerable advantage for upward mobility from an occupational status origin of 45, the university educated native male enjoys a predicted probability of 16 percent, compared to 9 and 7 percent for the Latin- and Non-Latin male.

Similar to the private manufacturing sector, the Germanic man appears to enjoy a situation highly similar to that of the native male. While assumed to enjoy a rather unproblematic process of linguistic and cultural assimilation to the country of destination, the fact that both native and Germanic women are disadvantaged partly promotes an alternative explanation. The accentuating disadvantage among the university educated would indeed suggest women as partly excluded from the most advanced positions within the private service sector. As expected, the female disadvantage also applies to the Non-Latin and Latin women, suggesting the emergence of a gender pattern among university educated in the private service sector. Furthermore, as the predictions are

calculated at native man means, they are net of the influence of any compositional differences between the groups.

The a priori theoretical expectation suggested that the problems involved in the transferability of formal human capital are positively related to linguistic distance and increasing with the individual's level of formal education. Whereas it appears consistent with the findings that an increasing linguistic distance is associated with less access to channels offering the opportunity for upward mobility into the private service sector, the expectation that such obstacles increase with education must be rejected. Similar to the other sectors, the notion of a glass ceiling must also be rejected, in the private service sector instead promoting a pattern where a given comparison group experiences a disadvantageous situation vis à vis the native male that remains constant across status origins.

3.4.5. Sensitivity analyses

While the results presented appear consistent with the à priori expectations, in order to investigate their robustness to different sampling choices, comparison models were estimated. Table A3 presents marginal effects estimated at sample means and thus indicates the change in the probability of upward mobility in respective labor market sector resulting from a one unit increase in the independent variable in question. Therefore, the consistency of the estimated effect of a given parameter across model specifications can be obtained by comparing its direction and size.

In the main model specification of the chapter, an upward transition was defined as a status change of five ISEI status points or more, a definition which essentially was not guided by theory as much as by previous research. Model 3 instead defines an upward transition as occurring when the individual changes to an occupation with an ISEI status being no less than 10 points higher. Consequently, the model excludes individuals in occupations with status scores above 80, due to their inability to experience such a transition. Comparing the estimates of Model 3 with Model 2, while the size of the marginal effects typically become somewhat different as a result of the different specification, the direction of the effects remain consistent, with only very few exceptions. More specifically, as regards the influence of formal education, all estimates that were statistically significant according to Model 2 maintain the same direction in the alternative specification, labelled Model 3. Hence, it would appear that the parameters which according to the preferred specification of the chapter are estimated with sufficient precision to be statistically significant remain so regardless of how the model is specified.

Further evidence of this is provided by Model 4, which again shows the parameters of interest for this chapter as consistently estimated. While not necessarily the same parameters as in the previous Model 3 that are estimated with a different sign compared to Model 2, those that are remain the same variables estimated without sufficient precision to be statistically significant in the preferred specification of the chapter. Model 4 was estimated similarly to Model 2, but only on individuals over the age of 30, in order to ascertain that those included have entered the labor market properly. More specifically, the intention is to exclude upward transitions occurring for individuals who may be working part-time in an occupation requiring fewer skills during their studies, only to thereafter experience a substantial upward transition to an appropriate position subsequent to the studies. The similarity of the marginal effects as compared to Model 2 however strongly suggests the results as unaffected by such a sample characteristic.

3.5. Conclusions

An empirical observation from contemporary western societies is the over-representation of immigrants in disadvantaged positions in the labor market. The time period examined in this chapter represents a period of time when this disadvantage was emerging, along with a dramatically changing labor market structure. The glass ceiling represents a theoretically appealing concept in describing immigrants' exclusion from the most elevated positions in the labor market. More specifically, such an exclusion has in this chapter been examined in terms of differences in the probability of upward mobility into higher status occupations, where the native man advantage theoretically is believed to accentuate at high status origins.

Using a sample of 70,000 natives and immigrants in Sweden, the contributions of this chapter is that it delves deeper into how the labor market sector-specific opportunities for upward mobility varies across individuals depending on their linguistic distance, formal education and sex. By doing so, the chapter not only examines a previously unstudied research question as regards Sweden, but it also provides further precision into differences in the career opportunities of natives and immigrants. Furthermore, by comparing how opportunities for upward occupational mobility differ across labor market sectors, the chapter provides empirical evidence regarding the existence of differing demand mechanisms. While immigrants to a varying extent are observed to be disadvantaged in all three labor market sectors examined, the overall pattern clearly does not comply with an orthodox representation of a glass ceiling. Instead, the most common situation seems to be one of a

somewhat consistent pattern across status origins, with the most substantial real differences in career opportunities at low-status origins.

The private service sector, characterized by a comparatively large share of high-status occupations, becomes the largest sector across the time period examined in the chapter. The data furthermore indicated the sector as characterized by the most evident pattern according to linguistic distance, suggesting the sector as likely to be characterized by substantial differences in terms of probabilities of upward mobility. The results however show a consistent immigrant disadvantage across status origins, suggesting the peripheral group as about equally disadvantaged in advancing past a position in the low- or the medium-part of the occupational hierarchy. An explanation for such a pattern is that private service occupations at all but every level of occupational status are associated with demands for destination country specific skills. Thus, regardless of an individual applies for the job as a cashier, bank teller or financial analyst, knowing the Swedish language represents an advantage.

The private service sector was viewed as most likely to be excluding peripheral groups as a result of favoring the use of informal recruitment channels. However, the private manufacturing sector appears to be characterized by the most accentuated distributional differences according to linguistic distance at high status levels. From the results, a general immigrant and specific female disadvantage in attaining upward mobility into the private manufacturing sector emerges. The disadvantage suggests accentuated disadvantages at low- and medium-high status origins, possibly indicative of peripheral groups as less likely to be recruited for medium-level and management positions.

Such results can tentatively be understood more easily while considering the shrinking private manufacturing sector over time, combined with an increasing within-sector share of high-skill occupations. To the extent that management positions also in this sector are associated with greater demands on destination-country specific skills, this would support the increasing disadvantage with linguistic distance. Furthermore, the sector's male dominance is also evident, potentially suggesting a structural disadvantage for women. Despite the sector being characterized as comparatively low-skill, the labor market changes occurring over time also affected the organization of work in the private manufacturing sector, introducing a more horizontal hierarchy. Hence, an increasing horizontal organization with a greater emphasis on team work also characterized less-skilled jobs. As a result, also positions further down in the hierarchy may have become increasingly inaccessible for immigrants, thus explaining their disadvantage also at lower status origins.

The public sector emerges as the overall least advantageous sector for the native man, consistent with how the demand mechanisms were expected to vary

across sectors. Characterized by a substantial growth over time, particularly in high-status occupations, the public sector was yet not expected to be associated with a similar exclusion of peripheral groups from high-status positions. More specifically, a greater reliance from the part of the employers on formal recruitment methods as well as a generally more transparent employment process could result in peripheral groups enjoying a comparable access to career opportunities in the public sector. The results would largely appear as consistent with such a situation, as several groups experience non-negligible advantage of upward mobility into occupations the public sector. The results suggests the peripheral groups' advantage as most accentuated from the lowest status origins, indicating the public sector as a particularly common destination for an immigrant experiencing an increasing utility of their pre-migration skills on the Swedish labor market. At higher status origins, the results confirm the peripheral groups' advantageous situation compared to other sectors, while at the same time observing that their advantage compared to the native man is disappeared. Also in the public sector, individuals with the greatest linguistic distance are observed to be disadvantaged, suggesting mechanisms causing their exclusion from equal opportunities as seemingly consistent on the Swedish labor market. While the results would suggest that no group are effectively excluded from the formal recruitment methods to a greater extent used by the public sector, the disadvantage of the linguistically most distant group may be driven by such unobserved characteristics as health or motivation.

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Statistical Sources

Swedish Census of the Population, 1970/1975/1980/1985/1990

Swedish Longitudinal Immigrant Database, Centre for Economic Demography, Lund University

Appendix B

Table B1: Country codes

ISO 3166-1-alpha-2 codes:	Country:
CL	Chile
CZ	Czech republic (here referring to Czechoslovakia)
DE	Germany
DK	Denmark
ET	Ethiopia
FI	Finland
GR	Greece
HU	Hungary
IQ	Iraq
IR	Iran
IT	Italy
NO	Norway
PL	Poland
RU	Russia (here referring to the Soviet Union)
SE	Sweden
TR	Turkey
US	United States of America
VN	Vietnam
YU	Former Yugoslavia

Source: http://www.iso.org/iso/english_country_names_and_code_elements , retrieved April 13, 2010.

Table B2: Estimates

	Model 1 ("no transition" is reference category)			Model 2 ("no transition" is reference category)		
	manufacturing	public	service	manufacturing	public	service
Swedish man, primary schooling	-	-	-	ref	ref	ref
Germanic man, primary schooling	-	-	-	-0.241	-0.335	0.042
Latin man, primary schooling	-	-	-	-0.481***	0.541**	-0.972***
Non-Latin man, primary schooling	-	-	-	-2.480***	-2.334***	-2.713***
Swedish man, secondary schooling	-	-	-	0.486***	1.485***	0.404***
Germanic man, secondary schooling	-	-	-	0.143	1.284**	0.459
Latin man, secondary schooling	-	-	-	-0.101	1.780***	-0.388**
Non-Latin man, secondary schooling	-	-	-	-1.820***	-0.149	-1.637***
Swedish man, university schooling	-	-	-	1.306***	3.756***	1.215***
Germanic man, university schooling	-	-	-	1.203***	4.017***	1.381***
Latin man, university schooling	-	-	-	0.653***	3.952***	0.612***
Non-Latin man, university schooling	-	-	-	-1.236***	1.542***	-0.935***
Swedish woman, primary schooling	-	-	-	-1.626***	1.630***	-1.004***
Germanic woman, primary schooling	-	-	-	-1.813***	1.017***	-1.460***
Latin woman, primary schooling	-	-	-	-1.717***	0.859***	-2.067***
Non-Latin woman, primary schooling	-	-	-	-2.677***	-1.327***	-3.641***
Swedish woman, secondary schooling	-	-	-	-1.608***	2.500***	-0.785***
Germanic woman, secondary schooling	-	-	-	-1.557***	2.094***	-1.114***
Latin woman, secondary schooling	-	-	-	-1.678***	2.071***	-1.457***
Non-Latin woman, secondary schooling	-	-	-	-3.012***	0.029	-2.720***
Swedish woman, university schooling	-	-	-	-2.018***	4.080***	-0.924***
Germanic woman, university schooling	-	-	-	-1.374***	3.917***	-1.064***
Latin woman, university schooling	-	-	-	-1.854***	3.896***	-1.263***
Non-Latin woman, university schooling	-	-	-	-2.278***	1.618***	-2.326***
Swedish man origin occupational status	-0.285***	-0.133***	-0.262***	-0.280***	-0.123***	-0.258***
Swedish man origin occupational status, squared	0.011***	0.003***	0.012***	0.011***	0.003***	0.012***
Swedish man origin occupational status, cubed	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
Germanic man origin occupational status	-0.236***	-0.188***	-0.345***	-0.232***	-0.182***	-0.337***
Germanic man origin occupational status, squared	0.009***	0.005**	0.017***	0.009***	0.005*	0.016***
Germanic man origin occupational status, cubed	-0.000***	-0.000**	-0.000***	-0.000***	-0.000**	-0.000***
Latin man origin occupational status	-0.141***	-0.283***	-0.235***	-0.138***	-0.281***	-0.227***
Latin man origin occupational status, squared	0.002**	0.010***	0.010***	0.002**	0.010***	0.009***
Latin man origin occupational status, cubed	-0.000*	-0.000***	-0.000***	-0.000*	-0.000***	-0.000***
Non-Latin man origin occupational status	0.179***	-0.023	-0.047*	0.181***	-0.028	-0.044*
Non-Latin man origin occupational status, squared	-0.013***	-0.000	0.002	-0.013***	-0.000	0.002
Non-Latin man origin occupational status, cubed	0.000***	-0.000	-0.000**	0.000***	0.000	-0.000*
Swedish woman origin occupational status	-0.217***	-0.208***	-0.196***	-0.201***	-0.187***	-0.184***
Swedish woman origin occupational status, squared	0.012***	0.006***	0.012***	0.012***	0.006***	0.012***
Swedish woman origin occupational status, cubed	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
Germanic woman origin occupational status	-0.157***	-0.167***	-0.121***	-0.152***	-0.163***	-0.115***
Germanic woman origin occupational status, squared	0.007***	0.003**	0.008***	0.007***	0.003**	0.008***
Germanic woman origin occupational status, cubed	-0.000***	-0.000	-0.000***	-0.000***	-0.000	-0.000***
Latin woman origin occupational status	-0.042***	-0.153***	-0.143***	-0.036**	-0.156***	-0.149***
Latin woman origin occupational status, squared	-0.000	0.003***	0.009***	-0.001	0.003***	0.009***
Latin woman origin occupational status, cubed	-0.000	-0.000***	-0.000***	-0.000	-0.000***	-0.000***
Non-Latin woman origin occupational status	0.120*	-0.058	-0.073	0.129*	-0.061	-0.087*
Non-Latin woman origin occupational status, squared	-0.010**	0.001	0.005	-0.011**	0.001	0.005*
Non-Latin woman origin occupational status, cubed	0.000**	-0.000	-0.000**	0.000*	-0.000	-0.000**
Primary schooling	ref	ref	ref			
Secondary schooling	0.331***	1.171***	0.406***			
University schooling	0.759***	3.054***	0.829***			
Swedish male	ref	ref	ref			
Swedish female	-1.825***	1.202***	-1.087***			
Germanic male	-0.145	-0.182	0.0428			
Germanic female	-1.853***	0.634**	-1.548***			
Latin male	-0.487***	0.298	-0.889***			
Latin female	-1.837***	0.515***	-2.059***			
Non-Latin male	-2.472***	-2.074***	-2.551***			
Non-Latin female	-2.877***	-1.603***	-3.504***			
Constant	-0.455**	-5.344***	-1.650***	-0.597***	-5.700***	-1.742***
Observations		202168			202168	
Number of indiv		71747			71747	
P>Chi2		0			0	
Pseudo R2		0.1025			0.1057	

Notes: Models control for age, years since migration, civil status, children under the age of 2, Swedish citizenship, Nordic/Non-Nordic immigrant, regional labor market conditions and time period.
Apart for displayed parameters, all are estimated containing the same parameters, including their functional form
Models 1 and 2 is estimated on sample with ISEI occupational status origin<=85
*** p<0.01, ** p<0.05, * p<0.1

	Model 3 ("no transition" is reference category)			Model 4 ("no transition" is reference category)		
	manufacturing	public	service	manufacturing	public	service
Swedish man, primary schooling	ref	ref	ref	ref	ref	ref
Germanic man, primary schooling	-0.040	0.125	0.395	-0.060	-0.492	-0.209
Latin man, primary schooling	-0.286*	1.066***	-0.681***	-0.151	0.321	-0.950***
Non-Latin man, primary schooling	-2.202***	-1.920***	-2.517***	-2.277***	-2.503***	-2.510***
Swedish man, secondary schooling	0.528***	1.536***	0.457***	0.708***	1.679***	0.500***
Germanic man, secondary schooling	0.344	1.839***	0.851**	0.676*	1.413**	0.376
Latin man, secondary schooling	0.078	2.344***	-0.090	0.544***	1.661***	-0.304*
Non-Latin man, secondary schooling	-1.567***	0.422	-1.603***	-1.450***	-0.104	-1.401***
Swedish man, university schooling	1.317***	3.743***	1.241***	1.628***	4.046***	1.462***
Germanic man, university schooling	1.428***	4.478***	1.788***	1.727***	4.208***	1.416***
Latin man, university schooling	0.847***	4.510***	0.955***	1.298***	3.896***	0.761***
Non-Latin man, university schooling	-0.974**	2.091***	-0.752**	-0.702	1.525***	-0.594*
Swedish woman, primary schooling	-1.413***	2.092***	-0.673***	-0.886***	0.812***	-0.878***
Germanic woman, primary schooling	-1.566***	1.476***	-1.181***	-1.181***	0.068	-1.506***
Latin woman, primary schooling	-1.457***	1.410***	-1.649***	-1.048***	0.279	-1.950***
Non-Latin woman, primary schooling	-2.239***	-1.013**	-3.487***	-2.405***	-2.244***	-3.412***
Swedish woman, secondary schooling	-1.397***	2.932***	-0.438***	-0.581***	1.942***	-0.573***
Germanic woman, secondary schooling	-1.302***	2.513***	-0.882***	-0.807***	1.332***	-0.976***
Latin woman, secondary schooling	-1.335***	2.689***	-0.981***	-0.693***	1.711***	-1.235***
Non-Latin woman, secondary schooling	-2.576***	0.292	-2.685***	-2.554***	-0.678	-2.646***
Swedish woman, university schooling	-1.946***	4.344***	-0.662***	-1.010***	3.558***	-0.630***
Germanic woman, university schooling	-1.111***	4.256***	-0.860**	-0.680	3.160***	-0.911***
Latin woman, university schooling	-1.581***	4.414***	-0.778***	-0.519**	3.758***	-0.935***
Non-Latin woman, university schooling	-1.758**	1.881***	-2.088***	-1.359*	1.274**	-2.153***
Swedish man origin occupational status	-0.250***	-0.057**	-0.213***	-0.253***	-0.129***	-0.280***
Swedish man origin occupational status, squared	0.010***	0.001	0.010***	0.011***	0.003***	0.013***
Swedish man origin occupational status, cubed	-0.000***	-0.000	-0.000***	-0.000***	-0.000***	-0.000***
Germanic man origin occupational status	-0.219***	-0.180***	-0.337***	-0.280***	-0.174**	-0.319***
Germanic man origin occupational status, squared	0.009***	0.005*	0.017***	0.012***	0.005	0.015***
Germanic man origin occupational status, cubed	-0.000***	-0.000*	-0.000***	-0.000***	-0.000*	-0.000***
Latin man origin occupational status	-0.136***	-0.276***	-0.227***	-0.285***	-0.274***	-0.286***
Latin man origin occupational status, squared	0.003***	0.010***	0.010***	0.010***	0.010***	0.013***
Latin man origin occupational status, cubed	-0.000**	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
Non-Latin man origin occupational status	0.189***	-0.032	-0.022	-0.047	-0.035	-0.110***
Non-Latin man origin occupational status, squared	-0.013***	-0.000	0.001	-0.000	0.000	0.005**
Non-Latin man origin occupational status, cubed	0.000***	-0.000	-0.000	-0.000	-0.000	-0.000***
Swedish woman origin occupational status	-0.189***	-0.164***	-0.174***	-0.318***	-0.059***	-0.187***
Swedish woman origin occupational status, squared	0.011***	0.005***	0.012***	0.020***	0.000	0.012***
Swedish woman origin occupational status, cubed	-0.000***	-0.000***	-0.000***	-0.000***	-0.000*	-0.000***
Germanic woman origin occupational status	-0.148***	-0.158***	-0.081**	-0.278***	-0.009	-0.145***
Germanic woman origin occupational status, squared	0.007***	0.003**	0.006**	0.016***	-0.003	0.010***
Germanic woman origin occupational status, cubed	-0.000***	-0.000	-0.000***	-0.000***	0.000	-0.000***
Latin woman origin occupational status	-0.048***	-0.161***	-0.155***	-0.225***	-0.083***	-0.212***
Latin woman origin occupational status, squared	0.000	0.004***	0.009***	0.009***	0.000	0.013***
Latin woman origin occupational status, cubed	-0.000	-0.000***	-0.000***	-0.000***	-0.000	-0.000***
Non-Latin woman origin occupational status	0.101	-0.046	-0.111*	-0.173*	0.065	-0.081
Non-Latin woman origin occupational status, squared	-0.008	0.001	0.007*	0.007	-0.005	0.005
Non-Latin woman origin occupational status, cubed	0.000	-0.000	-0.000**	-0.000	0.000	-0.000*
Primary schooling						
Secondary schooling						
University schooling						
Swedish male						
Swedish female						
Germanic male						
Germanic female						
Latin male						
Latin female						
Non-Latin male						
Non-Latin female						
Constant	-1.415***	-4.789***	-1.955***	-2.664***	-6.391***	-2.724***
Observations		201479			164312	
Number of indiv		71549			65787	
P>Chi2		0			0	
Pseudo R2		0.1088			0.1074	

Notes: Models control for age, years since migration, civil status, children under the age of 2, Swedish citizenship, Nordic/Non-Nordic immigrant, regional labor market conditions and time period.
Apart for displayed parameters, all are estimated containing the same parameters, including their functional fo
Model 3 is estimated on sample with ISEI occupational status origin<=80, dependent variable indicating transition if change in occupational status>=10
Model 4 is estimated on sample with ISEI occupational status origin<=85 and age>30
*** p<0.01, ** p<0.05, * p<0.1

Table B3: Marginal effects, at means

	Model 1 ("no transition" is reference category)			Model 2 ("no transition" is reference category)		
	manufacturing	public	service	manufacturing	public	service
Swedish man, primary schooling	-	-	-	ref	ref	ref
Germanic man, primary schooling	-	-	-	-0.007	-0.008	0.002
Latin man, primary schooling	-	-	-	-0.013	0.014	-0.040
Non-Latin man, primary schooling	-	-	-	-0.065	-0.050	-0.105
Swedish man, secondary schooling	-	-	-	0.012	0.034	0.014
Germanic man, secondary schooling	-	-	-	0.003	0.029	0.017
Latin man, secondary schooling	-	-	-	-0.004	0.042	-0.017
Non-Latin man, secondary schooling	-	-	-	-0.049	-0.001	-0.064
Swedish man, university schooling	-	-	-	0.033	0.085	0.044
Germanic man, university schooling	-	-	-	0.029	0.091	0.051
Latin man, university schooling	-	-	-	0.015	0.090	0.020
Non-Latin man, university schooling	-	-	-	-0.035	0.038	-0.038
Swedish woman, primary schooling	-	-	-	-0.045	0.040	-0.041
Germanic woman, primary schooling	-	-	-	-0.050	0.026	-0.058
Latin woman, primary schooling	-	-	-	-0.046	0.023	-0.083
Non-Latin woman, primary schooling	-	-	-	-0.070	-0.025	-0.144
Swedish woman, secondary schooling	-	-	-	-0.046	0.060	-0.033
Germanic woman, secondary schooling	-	-	-	-0.044	0.051	-0.046
Latin woman, secondary schooling	-	-	-	-0.047	0.051	-0.059
Non-Latin woman, secondary schooling	-	-	-	-0.081	0.005	-0.107
Swedish woman, university schooling	-	-	-	-0.058	0.097	-0.039
Germanic woman, university schooling	-	-	-	-0.040	0.093	-0.046
Latin woman, university schooling	-	-	-	-0.053	0.093	-0.053
Non-Latin woman, university schooling	-	-	-	-0.062	0.041	-0.094
Swedish man origin occupational status	-0.008	-0.003	-0.010	-0.007	-0.002	-0.010
Swedish man origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Swedish man origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Germanic man origin occupational status	-0.006	-0.004	-0.014	-0.006	-0.004	-0.013
Germanic man origin occupational status, squared	0.000	0.000	0.001	0.000	0.000	0.001
Germanic man origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Latin man origin occupational status	-0.004	-0.007	-0.009	-0.003	-0.006	-0.009
Latin man origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Latin man origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Non-Latin man origin occupational status	0.005	-0.001	-0.002	0.005	-0.001	-0.002
Non-Latin man origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Non-Latin man origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Swedish woman origin occupational status	-0.006	-0.005	-0.008	-0.005	-0.004	-0.007
Swedish woman origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Swedish woman origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Germanic woman origin occupational status	-0.004	-0.004	-0.005	-0.004	-0.004	-0.004
Germanic woman origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Germanic woman origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Latin woman origin occupational status	-0.001	-0.004	-0.006	-0.001	-0.003	-0.006
Latin woman origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Latin woman origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Non-Latin woman origin occupational status	0.004	-0.001	-0.003	0.004	-0.001	-0.004
Non-Latin woman origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Non-Latin woman origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Primary schooling	ref	ref	ref			
Secondary schooling	0.008	0.027	0.015			
University schooling	0.018	0.072	0.029			
Swedish male	ref	ref	ref			
Swedish female	-0.052	0.032	-0.044			
Germanic male	-0.054	0.020	-0.060			
Germanic female	-0.015	0.008	-0.037			
Latin male	-0.052	0.018	-0.083			
Latin female	-0.067	-0.046	-0.100			
Non-Latin male	-0.077	-0.033	-0.145			
Non-Latin female	-0.008	-0.004	0.003			
Observations		202168			202168	
Number of indiv		71747			71747	
P>Chi2		0			0	
Pseudo R2		0.1025			0.1057	

Notes: Models control for age, years since migration, civil status, children under the age of 2, Swedish citizenship, Nordic/Non-Nordic immigrant, regional labor market conditions and time period.
Apart for displayed parameters, all are estimated containing the same parameters, including their functional form
Models 1 and 2 is estimated on sample with ISEI occupational status origin<=85

	Model 3 ("no transition" is reference category)			Model 4 ("no transition" is reference category)		
	manufacturing	public	service	manufacturing	public	service
Swedish man, primary schooling	ref	ref	ref			
Germanic man, primary schooling	-0.001	-0.008	-0.006	-0.001	0.003	0.014
Latin man, primary schooling	-0.002	0.006	-0.029	-0.007	0.025	-0.025
Non-Latin man, primary schooling	-0.035	-0.038	-0.074	-0.052	-0.040	-0.086
Swedish man, secondary schooling	0.011	0.027	0.014	0.012	0.034	0.014
Germanic man, secondary schooling	0.010	0.022	0.010	0.007	0.041	0.028
Latin man, secondary schooling	0.009	0.027	-0.010	0.001	0.053	-0.005
Non-Latin man, secondary schooling	-0.023	-0.001	-0.042	-0.039	0.012	-0.056
Swedish man, university schooling	0.025	0.064	0.041	0.030	0.083	0.040
Germanic man, university schooling	0.026	0.067	0.040	0.032	0.099	0.059
Latin man, university schooling	0.020	0.062	0.020	0.018	0.100	0.029
Non-Latin man, university schooling	-0.012	0.025	-0.018	-0.025	0.048	-0.028
Swedish woman, primary schooling	-0.014	0.014	-0.027	-0.037	0.049	-0.024
Germanic woman, primary schooling	-0.018	0.002	-0.045	-0.040	0.035	-0.042
Latin woman, primary schooling	-0.016	0.006	-0.059	-0.036	0.034	-0.059
Non-Latin woman, primary schooling	-0.037	-0.034	-0.101	-0.053	-0.019	-0.121
Swedish woman, secondary schooling	-0.010	0.032	-0.018	-0.037	0.067	-0.017
Germanic woman, secondary schooling	-0.013	0.022	-0.030	-0.034	0.058	-0.032
Latin woman, secondary schooling	-0.011	0.028	-0.038	-0.035	0.062	-0.036
Non-Latin woman, secondary schooling	-0.040	-0.009	-0.079	-0.063	0.010	-0.094
Swedish woman, university schooling	-0.017	0.058	-0.020	-0.051	0.100	-0.025
Germanic woman, university schooling	-0.011	0.052	-0.029	-0.030	0.097	-0.033
Latin woman, university schooling	-0.009	0.061	-0.030	-0.042	0.101	-0.030
Non-Latin woman, university schooling	-0.021	0.022	-0.065	-0.044	0.045	-0.074
Swedish man origin occupational status	-0.004	-0.002	-0.008	-0.006	-0.001	-0.007
Swedish man origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Swedish man origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Germanic man origin occupational status	-0.004	-0.003	-0.009	-0.005	-0.004	-0.012
Germanic man origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.001
Germanic man origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Latin man origin occupational status	-0.004	-0.004	-0.008	-0.003	-0.006	-0.008
Latin man origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Latin man origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Non-Latin man origin occupational status	-0.001	-0.001	-0.003	0.005	-0.001	-0.001
Non-Latin man origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Non-Latin man origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Swedish woman origin occupational status	-0.005	-0.001	-0.005	-0.005	-0.003	-0.006
Swedish woman origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Swedish woman origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Germanic woman origin occupational status	-0.004	0.000	-0.004	-0.004	-0.003	-0.003
Germanic woman origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Germanic woman origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Latin woman origin occupational status	-0.004	-0.001	-0.006	-0.001	-0.003	-0.005
Latin woman origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Latin woman origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Non-Latin woman origin occupational status	-0.003	0.001	-0.002	0.003	-0.001	-0.004
Non-Latin woman origin occupational status, squared	0.000	0.000	0.000	0.000	0.000	0.000
Non-Latin woman origin occupational status, cubed	0.000	0.000	0.000	0.000	0.000	0.000
Primary schooling						
Secondary schooling						
University schooling						
Swedish male						
Swedish female						
Germanic male						
Germanic female						
Latin male						
Latin female						
Non-Latin male						
Non-Latin female						
Observations		201479			164312	
Number of indiv		71549			65787	
P>Chi2		0			0	
Pseudo R2		0.1088			0.1074	

Notes: Models control for age, years since migration, civil status, children under the age of 2, Swedish citizenship, Nordic/Non-Nordic immigrant, regional labor market conditions and time period.
Apart for displayed parameters, all are estimated containing the same parameters, including their functional fo
Model 3 is estimated on sample with ISEI occupational status origin<=80, dependent variable indicating transition if change in occupational status>=10
Model 4 is estimated on sample with ISEI occupational status origin<=85 and age>30

Table B3: Full Estimates, Models 1 and 2

	Model 1			Model 2		
VARIABLES	manufacturing	public	service	manufacturing	public	service
age	0.064***	0.120***	0.033***	0.067***	0.122***	0.036***
age2	-0.001***	-0.002***	-0.001***	-0.001***	-0.002***	-0.001***
ysm_ger	-0.015	0.011	0.004	-0.015	0.010	0.004
ysm_ger2	0.001	0.000	-0.000	0.001*	0.000	-0.000
ysm_lat	-0.022***	-0.024**	-0.014	-0.022***	-0.025**	-0.016
ysm_lat2	0.000	0.000	0.000	0.000	0.000	0.000
ysm_nonlat	-0.011	0.156***	0.078**	-0.013	0.151***	0.068*
ysm_nonlat2	-0.001	-0.007***	-0.004**	-0.001	-0.006***	-0.004**
hi_share	-0.016***	0.026***	0.042***	-0.017***	0.026***	0.042***
ger_man_pri				-0.241	-0.335	0.042
lat_man_pri				-0.481***	0.541**	-0.972***
nonlat_man_pri				-2.480***	-2.334***	-2.713***
swe_man_sec				0.486***	1.485***	0.404***
ger_man_sec				0.143	1.284**	0.459
lat_man_sec				-0.101	1.780***	-0.388**
nonlat_man_sec				-1.820***	-0.149	-1.637***
swe_man_uni				1.306***	3.756***	1.215***
ger_man_uni				1.203***	4.017***	1.381***
lat_man_uni				0.653***	3.952***	0.612***
nonlat_man_uni				-1.236***	1.542***	-0.935***
swe_fem_pri				-1.626***	1.630***	-1.004***
ger_fem_pri				-1.813***	1.017***	-1.460***
lat_fem_pri				-1.717***	0.859***	-2.067***
nonlat_fem_pri				-2.677***	-1.327***	-3.641***
swe_fem_sec				-1.608***	2.500***	-0.785***
ger_fem_sec				-1.557***	2.094***	-1.114***
lat_fem_sec				-1.678***	2.071***	-1.457***
nonlat_fem_sec				-3.012***	0.029	-2.720***
swe_fem_uni				-2.018***	4.080***	-0.924***
ger_fem_uni				-1.374***	3.917***	-1.064***
lat_fem_uni				-1.854***	3.896***	-1.263***
nonlat_fem_uni				-2.278***	1.618***	-2.326***
swe_man_isei	-0.285***	-0.133***	-0.262***	-0.280***	-0.123***	-0.258***
swe_man_isei2	0.011***	0.003***	0.012***	0.011***	0.003***	0.012***
swe_man_isei3	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
ger_man_isei	-0.236***	-0.188***	-0.345***	-0.232***	-0.182***	-0.337***
ger_man_isei2	0.009***	0.005**	0.017***	0.009***	0.005*	0.016***
ger_man_isei3	-0.000***	-0.000**	-0.000***	-0.000***	-0.000**	-0.000***
lat_man_isei	-0.141***	-0.283***	-0.235***	-0.138***	-0.281***	-0.227***
lat_man_isei2	0.002**	0.010***	0.010***	0.002**	0.010***	0.009***
lat_man_isei3	-0.000*	-0.000***	-0.000***	-0.000*	-0.000***	-0.000***

	Model 1			Model 2		
VARIABLES	manufacturing	public	service	manufacturing	public	service
nonlat_man_isei	0.179***	-0.023	-0.047*	0.181***	-0.028	-0.044*
nonlat_man_isei2	-0.013***	-0.000	0.002	-0.013***	-0.000	0.002
nonlat_man_isei3	0.000***	-0.000	-0.000**	0.000***	0.000	-0.000*
swe_fem_isei	-0.217***	-0.208***	-0.196***	-0.201***	-0.187***	-0.184***
swe_fem_isei2	0.012***	0.006***	0.012***	0.012***	0.006***	0.012***
swe_fem_isei3	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
ger_fem_isei	-0.157***	-0.167***	-0.121***	-0.152***	-0.163***	-0.115***
ger_fem_isei2	0.007***	0.003**	0.008***	0.007***	0.003**	0.008***
ger_fem_isei3	-0.000***	-0.000	-0.000***	-0.000***	-0.000	-0.000***
lat_fem_isei	-0.042***	-0.153***	-0.143***	-0.036**	-0.156***	-0.149***
lat_fem_isei2	-0.000	0.003***	0.009***	-0.001	0.003***	0.009***
lat_fem_isei3	-0.000	-0.000***	-0.000***	-0.000	-0.000***	-0.000***
nonlat_fem_isei	0.120*	-0.058	-0.073	0.129*	-0.061	-0.087*
nonlat_fem_isei2	-0.010**	0.001	0.005	-0.011**	0.001	0.005*
nonlat_fem_isei3	0.000**	-0.000	-0.000**	0.000*	-0.000	-0.000**
cs	0.075***	-0.115***	0.048**	0.072***	-0.114***	0.052***
child_under2	-0.170***	-0.015	-0.247***	-0.166***	-0.013	-0.246***
unem	-0.092***	-0.017	-0.161***	-0.095***	-0.018	-0.162***
p80	-0.197***	0.112***	0.082***	-0.199***	0.114***	0.083***
p85	-0.082**	-0.071	0.018	-0.079**	-0.060	0.030
p90	-0.615***	-0.750***	-0.485***	-0.610***	-0.728***	-0.469***
nordic	0.142***	-0.089	-0.062	0.151***	-0.067	-0.040
cit_latin_man	0.244***	0.570***	0.589***	0.228***	0.546***	0.539***
cit_latin_fem	0.184**	0.476***	0.662***	0.255***	0.470***	0.637***
cit_nonlatin_man	0.352**	0.540***	0.479***	0.296**	0.470**	0.373***
cit_nonlatin_fem	0.334	0.522***	0.681***	0.411*	0.522***	0.614***
cit_germanic_man	-0.050	0.342**	0.269***	-0.044	0.375**	0.276***
cit_germanic_fem	-0.242	0.128	0.058	-0.249	0.125	0.043
secondary	0.328***	1.153***	0.390***			
university	0.753***	3.026***	0.804***			
swe_fem	-1.826***	1.196***	-1.091***			
germanic_fem	-1.925***	0.692***	-1.490***			
otherlatin_man	-0.548***	0.277	-0.900***			
otherlatin_fem	-1.880***	0.573***	-2.040***			
othernonlatin_man	-2.484***	-2.081***	-2.533***			
othernonlatin_fem	-2.892***	-1.621***	-3.612***			
germanic_man	-0.286	-0.164	0.064			
Constant	-0.455**	-5.344***	-1.650***	-0.597***	-5.700***	-1.742***
Observations	202168	202168	202168	202168	202168	202168

*** p<0.01, ** p<0.05, * p<0.1

Chapter 4.

Post-migration human capital investments and immigrants' income assimilation in Sweden, 1983-2001

4.1. Introduction and background

This chapter examines the determinants of income assimilation among a sample of immigrants in Sweden during the period between 1983 and 2001. By taking an immigrant's pre-migration education and occupation into account, the outcome variable of the chapter measures the immigrant's income relative to that of a comparable native. The contributions of the chapter are twofold. First, the chapter differentiates between different types of advanced formal skills, providing empirical estimates regarding their differing applicability to the Swedish labor market. Second, the chapter attempts to identify formal post-migration human capital investments relevant to an individual's pre-migration formal skills, thereby examining the extent to which they influence the income assimilation trajectory.

A major weakness concerning much research on labor market outcomes of immigrants relates to the absence of parameters gauging conditions prior to migration. The result of this weakness is that the researcher is forced to make a number of assumptions regarding immigrants' pre-migration experiences that may or may not be accurate. This chapter overcomes a few such limitations by exploiting a small but well-defined dataset of immigrants to Sweden that contains ample pre-migration information on occupation and formal education. The selected sample primarily consists of immigrants with advanced formal degrees. The subjects thereby represent a highly skilled segment, which, if fully utilized, could provide the destination country's labor market with a highly competent pool of labor. However, indications from previous research have consistently indicated that formally highly skilled immigrants have accentuated difficulties in obtaining a full return to their skills. More specifically, such failures are typically characterized by an immigrant not succeeding in obtaining an occupation requiring similar formal skills as that enjoyed prior to migration (Chiswick & Miller: 2008, 2009, Green, Kler & Leeves: 2007, Lindley: 2006). Because working in an occupation for which one is overqualified is associated

with a lower return on skills, this arguably represents a key dimension in explaining immigrants' lower earnings.

The situation in Sweden is similar to that in many other European welfare states, hosting populations that during the last 60 years have become increasingly influenced by ethnic minorities. Following World War II, the continuous inflow of migrants resulted in a share of first-generation immigrants exceeding 10 percent of the Swedish population at the beginning of this millennium (Hammarstedt & Palme: 2006). Today, a multitude of studies exist that have examined the labor market as well as other outcomes of the growing foreign-born population. These studies generally conclude with observations of multi-faceted immigrant disadvantages. Furthermore, these disadvantages typically become increasingly pronounced for the more recently arriving cohorts. In the Swedish case, the specific disadvantages according to the country of origin are typically associated with frequently unobserved characteristics, such as the cultural, linguistic or institutional distance to the destination country (see Bengtsson, Lundh & Scott (2005) for an overview of labor market research on immigrants to Sweden).

Recent research has put an increasing and explicit focus on measuring the incidence of and understanding the consequences of job-skill mismatch. More specifically, the phenomenon is characterized by an individual's failure to attain an occupation for which the skill requirements match the individual's formal skills (see Sloane (2003) for an overview). The situation experienced by an individual working in an occupation for which they are overqualified is considered to be unfavorable for the collective good as well as for the individual. The under-utilization of an individual's skills is likely to reduce the government's tax revenues and to negatively affect the individual's consumption behavior, as low-skill occupations are generally associated with lower earnings. Furthermore, similar to the process associated with unemployment, the failure to fully utilize one's skills may result in the individual experiencing skill depreciation, according to the *use-it-or-lose-it* hypothesis (Mincer & Ofek: 1982, Stafford & Sundström: 1996, Albrecht et al: 1999). Individuals who are overqualified for the job they are performing have also been empirically shown to be associated with a higher job turnover rate, lower work satisfaction and a higher incidence of quitting (McGuinness: 2004).

In many labor markets across the world, overqualification appears to be quite a common phenomenon, as reported by McGuinness (2006). Based on empirical studies in several different countries and spanning the time period from 1960 to 2000, the mean share observed in occupations for which they have more formal skills than required is 22 percent. Emerging from the same studies is also evidence of a substantially lower return on schooling investment for education superseding the required amount, indeed suggesting a less efficient

use of human resources among those who are over-educated. A study of Sweden using register and survey data for the time period of 1993-2002 and focusing on gender differences showed a wide incidence of skill mismatching. The study suggested that 1/3 and 1/4 of the employed women and men, respectively, are overqualified for the jobs that they are performing. Again, the return for a year of education that qualifies as over-education was observed to be considerably lower than that for a year of education at an appropriate level (Johansson & Katz: 2007). In their study of Sweden for the time period between 1974 and 2000, Korpi and Tåhlin (2006) largely found similar results, suggesting that over-educated individuals, on average, are indeed penalized by a lower return on schooling investment.

The results of Johansson and Katz (2007) further suggested that the incidence of over- or under-education may vary depending on the field of education to which an individual's degree belongs. For example, among both sexes, individuals with degrees within Service, Transport & Communications or Teacher/Education were significantly more likely to be working in an occupation for which they were overqualified compared to the reference category, represented by individuals with education within Social Sciences, Law or Commerce. In related research, Rooth, Nordin and Persson (2010) performed a cross-sectional study on a sample of native Swedes in 2003 to estimate the wage return associated with working in an occupation that matches the field of education in which an individual obtained his/her formal degree. The authors found a substantial and negative effect from educational mismatch, where, compared to an otherwise similar individual within the same educational field and with the same number of years of schooling, the income penalty for educational mismatch is about 20 percent for men and 12 percent for women.

The difficulty in obtaining an occupation that matches an individual's formal qualifications can be assumed to be particularly accentuated for immigrants. More specifically, this can potentially result from the inability to fully transfer foreign-obtained formal skills to the destination country's labor market. For example, such difficulties are linked to requirements for formal licensing or technological differences between the occupational practices or educational systems in the home and destination countries. Consequently, such factors could potentially affect the extent to which an individual's formal degree is applicable in the destination country's labor market (Chiswick & Miller: 2009). Utilizing a sample from the 2000 U.S. census, Chiswick and Miller (2009) examined the payoff for overqualification in various occupational groups and, unsurprisingly, found a greater prevalence of job-skill mismatch among immigrants than among natives. Restricting the analysis to only focus on individuals with a Bachelor's degree or above, the average income effect of an additional year of over-education was observed to be considerably lower than

the payoff of an additional year of schooling up to and including the required level of education. The results thus suggest that the most considerable problems in attaining an appropriate income are among immigrants with advanced formal degrees. The results also show heterogeneous returns on qualifications between different occupational groups, suggesting that the payoff of immigrants' skills do indeed differ across various educational types.

The utility of an individual's human capital is also influenced by their trajectory of social and linguistic assimilation, traditionally modeled as a function of time spent in the country of destination (Borjas: 1995, 1994, 1985, Chiswick: 1978). Separate from this process, experience in the destination country's educational system may represent a mechanism positively influencing the applicability of an immigrant's formal degree and, subsequently, the labor market outcome. This results from both the signal it transmits to the employer in terms of ambition and intent, and also the objectively greater ease with which an employer can interpret a given destination country's specific formal credentials. Duvander (2001) estimated the influence of both of these mechanisms and indeed found a strong and significant effect from obtaining a degree in Sweden on the probability of employment and on the likelihood of being overqualified. Using cross–sectional survey data from 1993, the results support a negative and statistically significant effect of proficiency in the Swedish language on the probability of overqualification.

4.2. Recognizing formal education obtained abroad

The limited transferability of formal credentials across contexts is linked to the inability of a prospective employer in the destination country to interpret a given foreign obtained credential's relevance. Particularly regarding access to high-status occupations, the greater reliance on advanced formal skills to become eligible for employment increases the importance of being able to present a prospective employer with interpretable credentials (Bauder: 2003, Reitz: 2005). The optimal situation would hence arguably be when a Swedish employer values a foreign-obtained degree as being of equal value to one obtained in Sweden.

Individuals with foreign obtained degrees for occupations such as physicians and lawyers require Sweden-specific professional license in order to practice their profession. The awarding of licenses for occupations with such a requirement is performed by the occupation's respective regulatory agency. Therefore, a foreign-educated medical doctor is required to follow the

certification program outlined by the National Board of Health and Welfare[59] in order to fully transfer the degree to be used in Sweden.

The lack of similar opportunities in transferring foreign-obtained degrees associated with occupations without licensing requirements was recognized as a potential problem in the beginning of the 1980s (Riksrevisionsverket, 1992). Since 1984, *Universitets- och Högskoleämbetet* (UHÄ), the highest administrative authority for tertiary education in Sweden, was formally assigned the duty of evaluating foreign-obtained formal degrees intended for occupations without licensing authorities. The evaluation undertaken by the UHÄ of a foreign degree would take the level, extent and content of the degree into account, subsequently issuing an official statement regarding an individual's educational competence. This credential could thereafter be presented to a prospective employer in an immigrant's job search process. If the foreign-obtained formal degree was deemed not to be equivalent to the Swedish degree, the statement would potentially be combined with a recommendation of supplementary studies. As a result of organizational changes, essentially the same duties have been assumed by *Högskoleverket* (HSV) since 1995 (Högskoleverket 1998).

An immigrant's particular formal degree thus determines which authority becomes responsible for evaluating how it compares to a degree obtained in Sweden. The effort associated with obtaining the Sweden-specific recognition of one's formal human capital varies substantially between different types of education, in some cases requiring not only a formal evaluation of an individual's theoretical competence and a period of internship, but also the completion of several courses in the Swedish language. As a result, the average time required to complete the process of obtaining the Swedish certification for a foreign-trained physician amounts to between four and five years (Riksrevisionsverket, 1992). To the extent that the amount of evaluations performed by the UHÄ/HSV are representative of those from all evaluating authorities, the number of incoming applications increased steadily during the 1980s and into the 1990s, as the evaluation process generally became more formalized, gained greater momentum and potentially obtained wider recognition among the immigrant population in Sweden. During the 1990s, between 1,000 and 1,500 evaluations were performed yearly. On the eve of the new millennium, Kyrklund (2001) reports that roughly 16,000 immigrants with tertiary educational degrees had had their formal qualification evaluated in Sweden. While a share of the 84,000 foreign born living in Sweden at the time with advanced formal credentials possess degrees obtained in Sweden, the

[59] The National Board of Health and Welfare corresponds to Socialstyrelsen

figures undoubtedly suggest a minority of foreign schooled immigrants choosing to transfer their degrees.

According to qualitative evidence based on interviews with a sample of immigrants, among those having obtained a formal evaluation of their degree, the unemployment office in Sweden appears to have been the most common channel where the immigrant was informed regarding this opportunity. While recognizing the limited sample size, among the immigrants not having had their degree evaluated, the lack of knowledge regarding the existence of such an opportunity emerges as a major obstacle. Thus, despite the increasing number of yearly applications to the respective evaluating authorities, immigrants' exposure to the relevant information appears to be limited at best (Kyrklund: 2001).

4.3. Data

This chapter examines a subsample selected from the Swedish Longitudinal Immigrant database (SLI), characterized by containing ample pre- as well as post-migration information on immigrants to Sweden. More specifically, the subsample used in this chapter contains information regarding the individual's occupation, language skills, visa status and formal education obtained prior to migration, among immigrants from a total of 11 different countries of origin[60]. The pre-migration information was obtained from the records maintained by the immigration authorities and was compiled during the immigrant's application process for various visas and permits.

A potential problem of the data pertains to the absence of documentation to support an immigrant's stated pre-migration information, naturally introducing a risk of bias. This risk appears to primarily be correlated with whether an immigrant believes that the information provided will influence the outcome of the permit application process. With regards to the pre-migration information of interest for this particular study, on aspects of attained education and occupation, neither influenced the decision of the immigration authority. The extent to which this ascertains that immigrants indeed provided truthful information could, however, be argued to be linked to whether each individual was aware of this. While it remains important to treat weaknesses in data originating from self-reported information with appropriate caution, visual inspection of the data, and comparisons with larger samples of the same database do not suggest the data to be unrepresentative. Furthermore, the

[60] A list of countries of birth included in the sample is found in Table C2, in Appendix C.

uniqueness and potential gains from the analysis of the type of data used here should greatly outweigh its potential weaknesses.

Individuals were selected based on their indications of working in a subset of pre-migration occupations and having completed the appropriate formal training for the occupation in question. As a result of this selection process, individuals can be assumed to have enjoyed a favorable job-skill match prior to migration and thus do not represent a selection of immigrants characterized by an unsuccessful pre-migration career. The pre-migration occupations included in the analysis are displayed in Table 4.1, sharing the characteristic of typically requiring advanced formal schooling. As a result, problems of skill transferability could represent an important mechanism in determining the inability to achieve income assimilation.

Table 4.1. Pre-migration occupations

Accountant	Laboratory technician
Agronomist	Land surveyer
Architect	Lawyer
Biochemist	Librarian
Biologist	Midwife
Civil engineer	Nurse
Computer consultant	Optician
Computer programmer	Pharmacist
Dental hygienist	Physical therapist
Dental technician	Physician, Medical Doctor
Dentist	Physicist
Ecologist	Priest
Economist	Primary/Secondary school teacher
Engineer	Psychologist
Geologist	Social worker
Geophysisist	Translator
Interpreter	University assistant professor
Journalist	University professor
Laboratory assistant	Veterinarian

4.4. Variable design

This chapter argues that income assimilation should be treated as a relative concept, where an immigrant's experience should not be compared to the performance of just any native. Rather, the performance should be compared to a native enjoying a similar situation as that enjoyed by the immigrant prior to migration.

Based on the NYK78[61] occupational classification used in the censuses administered by Statistics Sweden, the mean incomes from work among natives in a given age group, sex and occupation were created for the years 1985 and 1990. The work income was provided by the tax register and was recorded on a yearly basis for the roughly 550,000 unique individuals in the SLI database. To estimate mean incomes for the years between the censuses, individuals were assumed to maintain their recorded occupation in subsequent years. More specifically, a given occupation's mean income for the years following 1990 was calculated based on the sample of individuals observed in that occupation in 1990. Based on the relevant estimated mean income and the actual recorded income from the work of an individual, a continuous dependent variable was created, indicating an individual's income relative to their comparison income. Resulting from occupations' varying income distributions, the comparison incomes will differ across individuals depending on an individual's characteristics according to the parameters used to create the comparison income.

The explicit interest of the chapter was to examine how relative income trajectories are influenced by immigrants' differing types of migrated formal skills. Largely following the categorization of Swedish educational data in Berggren and Omarsson (2001), pre-migration formal education was categorized into four discrete *educational types*, according to the SUN2000[62] educational classification. As displayed in Table 4.2, the educational types display considerable between-type heterogeneity in terms of the typical skills associated with the respective category.

[61] Statistics Sweden (1989)
[62] Statistics Sweden (2000)

Table 4.2: Educational types

Educational type	SUN 2000 code	SUN 2000 Educational category
Science and Technology	42	Biology and environmental science
	44	Physics, chemistry and earth science
	46	Mathematics and other natural sciences
	52	Technology and technological industry
	54	Materials and manufacturing
	58	Urban development and construction technology
Health Care	64	Animal care
	72	Health care
	76	Social work and care
Education and Teaching	14	Pedagogy and teaching education
Social and Computer Sciences	21	Arts and media
	22	Humanities
	31	Social and behavioral sciences
	32	Journalism and information
	34	Business administration, trade and administration
	38	Law and legal science
	48	Computer science

Source: Statistics Sweden (2000)

The educational type *Social and Computer Science* is believed to contain highly country-specific degrees within law and accounting and is frequently associated with requiring considerable country-specific skills. This category also includes degrees that are arguably more transferable across countries, such as computer science. Degrees within *Education and Teaching* should also require considerable communicative skills to result in access to the intended occupation render a full payoff on the Swedish labor market. Depending on the degree, the theoretical competence may also be more or less country-specific, where immigrant teachers specializing in certain subjects may experience very low post-migration demands. As a comparison, degrees within *Science and Technology*, such as engineering, as well as subjects within the natural sciences emerge are associated with non-country-specific theoretical skills, potentially also positively affecting their international transferability. Lastly, the theoretical skills associated with the educational type *Health Care* are also believed to be comparatively consistent across countries.

Following one of the most central arguments of the relevant literature, an individual's labor market assimilation is to a considerable extent assumed to be a function of the time spent in the country of destination. More specifically, proficiency in the destination country's language and familiarity with informal and formal institutions and customs should gradually increase over time, improving an individual's ability to properly relay the true value of a given set

of skills. Theoretically, the rate of assimilation to the country of destination is associated with decreasing marginal returns. Despite this, an immigrant should obtain increasingly suitable characteristics for the requirements and organizational structures typically characterizing high-skill jobs from additional time spent in the country of destination. To capture differences in the relative income trajectories between different types of skills, here the immigrant's educational type was analyzed with respect to the time spent in Sweden.

Another key mechanism believed to influence an individual's post-migration labor market outcome is represented by whether an individual conducts formal human capital investments relevant to their pre-migration degree after arrival. Although any post-migration investments in Swedish schooling may serve to increase an immigrant's labor market rewards, the interest of this chapter is more specific. First, information on the receipt of student assistance is used to identify an individual's investment in any formal post-migration schooling. Second, the chapter attempts to distinguish between post-migration educational investments into schooling related to the individual's pre-migration degree from such investments indicative of a human capital *divestment*. By using information provided by the educational register, post-migration schooling that differs from an individual's pre-migration degree either in terms of its level or type is considered to represent a post-migration educational divestment. Therefore, it is here considered to be irrelevant to the utility of an immigrant's pre-migration degree. If, however, the post-migration information corresponds to the immigrant's pre-migration degree and is combined with the receipt of student assistance, it is treated as a *relevant formal post-migration human capital investment* and is subsequently utilized in the analysis.

Apart from the parameters of key importance to this chapter, characteristics distinguishing between individuals sharing a common region-of-origin are included to the greatest extent possible. Due to the small number of contributing individuals from some of the included countries of birth, individuals are divided into three region-of-origin groups: non-European, European and US/German immigrants[63]. While the former two groups are obviously distinguishable largely based on their geographic distances to Sweden, the latter group is primarily motivated based on its historically minor problems in assimilating to the Swedish society, both economically and culturally. While the region of origin is intended to capture a range of essentially unobserved characteristics that are associated with an individual's origin, the models also control for the individual's language skills and motivations for migration. Using self-reported

[63] The countries of birth included in the region-of-origin groups are indicated in Table C2 in Appendix C.

information on the individual's mother tongue and knowledge of up to three additional languages, individuals were categorized into three groups depending on whether they i) command a language belonging to the same Germanic language tree as Swedish and whether they ii) have prior knowledge of the Latin alphabet[64]. The immigrant's visa status is also self-reported information and distinguishes between refugee, family reunification and labor migrants.

4.5. Method

The chapter examines the influence of various types of formal skills obtained prior to migration on an individual's relative income, measured as a continuous variable. As also outlined, investments in Swedish schooling relevant to an individual's pre-migration degree are believed to influence the trajectory of income assimilation. A potential problem arising from the analysis of the research problem at hand pertains to the issue of selection bias[65]. In particular, individual's choice to conduct a human capital investment subsequent to migration may not be randomly assigned but instead may be driven by an ability bias, where either high- or low-performing individuals choose to do so to a larger extent. High-performing individuals may be more likely to recognize the superior payoff that could be attained by investing in Sweden-specific human capital, thereby making them more likely to do so and positively biasing the estimates of a cross-sectional regression. In the situation where low-performing immigrants instead disproportionately make such investments, signaling it as a secondary strategy, the estimate from a similar regression would correspondingly underestimate the true effect. More specifically, this would arguably be the case if the option to invest in formal post-migration schooling typically becomes known to an immigrant after failing an initial attempt to properly enter the labor market.

[64] A complete list of languages indicated by immigrants in the SLI subsample is listed in Table C1 in Appendix C and also indicates the relevant language groups.

[65] See for example Björklund et al (2007), Ashenfelter & Rouse (1998) or Clotfelter et al (2007) for a discussion on selection bias and fixed effect modeling when estimating the returns to education.

The empirical strategy furthermore promotes the use of a method of analysis that fully captures the dynamics of post-migration events, such as the outlined formal human capital investments, fully exploiting the opportunities of the panel data structure of the SLI database. The individual fixed effects estimator, specified in (1) below, possesses a number of desirable features for dealing with endogenous variables when analyzing panel data with repeated observations on a particular unit of observation.

$$y_{it} = a + \theta Z_{it} + \delta X_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

Also known as the within-effects estimator, the fixed effects estimator recognizes the clustering of observations and restricts the estimation of parameters to those displaying within-cluster variation, rather than treating observations as independent. More specifically, the effect of a post-migration educational investment is only estimated for individuals who display variation in the parameter in question, hence estimating the effect on individuals with an arguably consistent set of characteristics with regards to the aforementioned potential bias. While the individual fixed effects estimator provides a solution for the aforementioned selection problem, it does not however solve any bias from the potential non-random selection into the different educational types prior to migration.

A parameter is required to display variation within the chosen level of clustering for its effect to be estimated within a fixed effects framework. As a result, baseline estimates of the effects of the region of origin or gender will become unidentified parameters, thereby canceling out of the regression. As long as the variables in question do not represent parameters of key interest for the research question, this is only a minor problem. However, for a time-invariant parameter such as the outlined educational type of the formal degree obtained prior to migration, its influence is in the fixed effects analysis interacted with the individual's years since migration, an arguably appropriate way to model different paths of labor market assimilation across the educational types.

In the fixed effects specification above, y_{it} denotes the immigrant's income compared to a native in the immigrant's pre-migration occupation and of the same gender and age at time *t*, and theoretically ranges from zero to infinity. X_{if} is a vector of time-varying control variables, similar to the Z_{it} vector, containing the variables of particular interest for this study, measuring years since migration and post-migration human capital investments with variations by educational types. Lastly, individual-specific and time-constant characteristics are captured by μ_i, whereas ε_{it} is an individual- and time-specific i.i.d. error

term. For comparative purposes and to investigate the existence and nature of a bias, cross-sectional OLS regression models are also estimated and discussed.

4.6. Descriptive statistics

Based on the requirements outlined for inclusion in the sample, 678 individuals were selected from the SLI database, with a mean time under observation from arrival in Sweden amounting to 8.7 years. Individuals were included in the sample if arriving in Sweden before the age of 50 and followed on a yearly basis, given being observed with a *positive income from work*. Immigrants were subsequently followed until what occurs first out of the year 2001, turning 60 years of age, or retirement[66]. Although the average immigrant in the sample was observed for an arguably sufficiently long time to allow for both formal post-migration human capital investments as well as a few years of labor market experience in Sweden, only 232 individuals (34 percent) managed to obtain work incomes equal to or exceeding those of their comparison group during the time that they were observed.

Included in the sample were immigrants from eleven different countries, with the largest shares (between 15-21 percent) represented by migrants from Poland, Germany, the USA and Iran[67]. Individuals were selected based on having worked in a subset of occupations and having stated possession of the necessary formal education prior to migration. In Sweden, the included occupations typically require formal competence from a tertiary educational institution. Although such requirements may vary between countries, the selected occupations appear to share rather consistent requirements for formal qualifications across the countries of origin. This is supported by the fact that 81 percent of the sample noted the possession of tertiary education at the time of migration. Table 4.3, containing variable means, indicates the sample's distribution across the four educational types, indicating at least 100 individuals in each of the four categories.

[66] Retirement is operationalized as occurring from the first year where the income from retirement related sources exceed the income from i) employment, ii) unemployment assistance and iii) student assistance respectively.

[67] A complete list of the countries of origin is found in Table C2 in Appendix C.

Table 4.3: Variable means

	Science and Technology	Health Care	Education and Teaching	Social and Computer Science
Relative income (%)	67.26	69.50	51.78	60.34
Relative income (%), median	62.77	70.68	48.04	54.83
Log income	11.45	11.47	10.91	11.29
Swedish schooling (%)	15.96	29.61	20.69	12.94
Age	42.66	43.29	41.88	43.11
Years since migration	6.75	6.61	6.69	6.60
Women (%)	28.31	75.91	65.24	47.23
Married (%)	70.85	72.16	72.08	68.35
Parent, with child age<7 (%)	17.42	23.88	27.14	19.37
Municipal unemployment rate (%)	4.37	4.58	4.38	4.44
Metropolitan residence (%)	28.66	33.06	27.53	40.01
Year	1993.44	1993.64	1993.33	1993.68
Language group (%):				
Germanic	74.25	72.16	55.62	73.83
Latin	23.46	17.94	24.53	18.17
Non-Latin	2.29	9.91	19.86	8.00
Region of origin (%):				
US/Germany	29.56	32.22	32.09	31.83
Europe	48.16	46.92	17.58	42.9
Non-Europe	22.28	20.86	50.33	25.27
Visa category (%):				
Labor migrant	15.54	12.83	11.07	16.91
Refugee	33.24	29.82	42.77	25.51
Reunification migrant	51.21	57.35	46.16	57.58
Observations	1441	959	1798	1662
Individuals	168	107	217	186

Individuals with degrees within *Education and Teaching* emerge as on average experiencing the least successful labor market outcomes, with a mean relative income amounting to 52 percent. As the relative income variable is created to cancel out differences linked to gender or age, the fact that this group is dominated by women (65 percent) is not necessarily driving this observation. Furthermore, an even higher share of women (76 percent) is found among immigrants with degrees within *Health Care*, yet characterized by enjoying a considerably higher average relative income, amounting to 70 percent. More likely suspects in explaining the less fortunate outcomes among immigrants with degrees within *Education and Teaching* are instead characteristics such as visa status and language group. To the extent that such characteristics influences the individual's relative income trajectory, the average immigrant with a teacher's

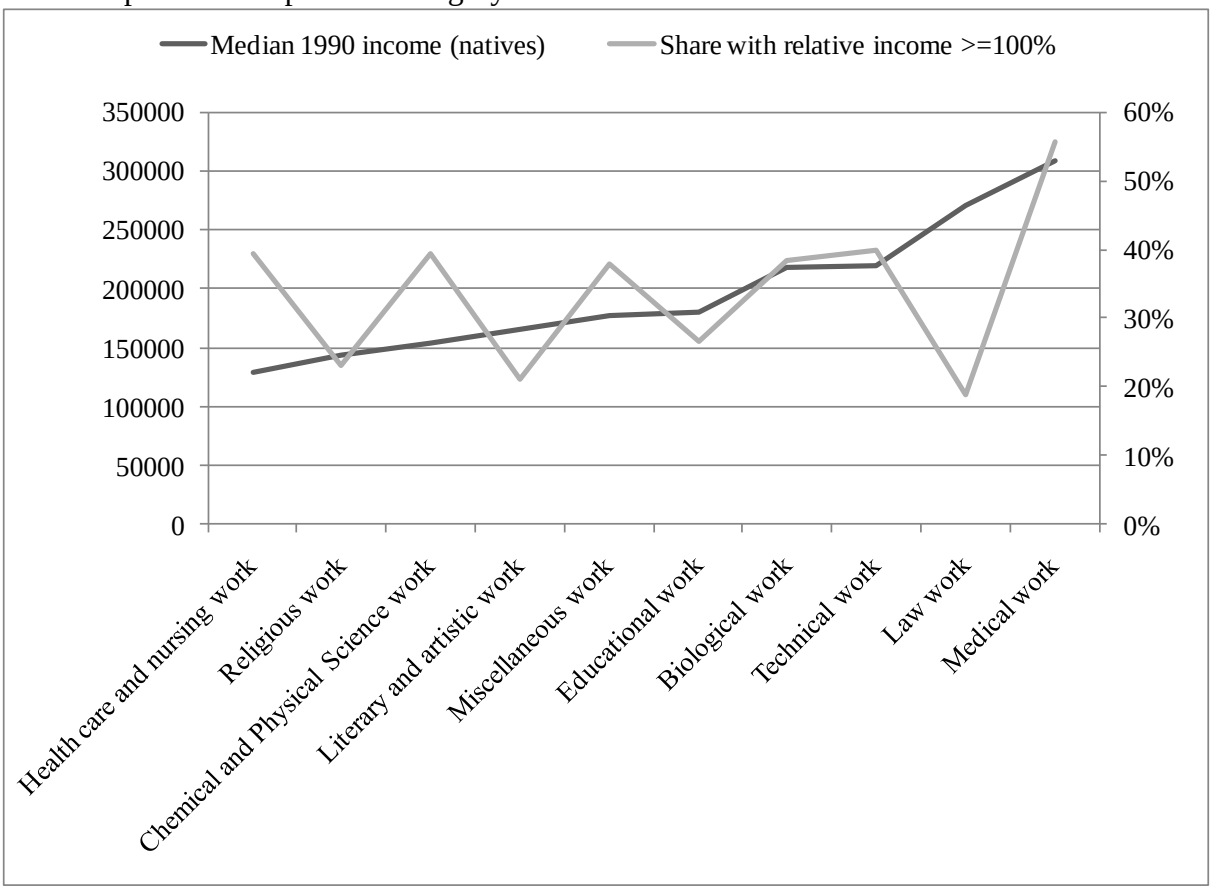
degree can be observed to be over represented among immigrants migrating as refugees and without familiarity with a Germanic language.

Attained relative income could also be linked to the typical income of an occupation, where those with particularly elevated median incomes may be synonymous with greater difficulties in attaining income assimilation. The educational types examined in the chapter were intended to be internally homogeneous, in that its incumbents experiences a rather similar transition to the destination country labor market in terms of the difficulties in applying their formal degrees. Several educational types, however, host degrees associated with a number of different occupations. Figure 4.1 displays the native median incomes in 1990 for occupational groups represented by the educational types selected for the analysis[68]. Also displayed in the figure are the shares that belong to each occupational group who manage to attain an income equal to or higher than their comparison income. Because a given occupational category is consistent regarding the educational type of its representatives, this may provide indications as to what extent the individuals belonging to a given educational type experience homogeneous outcomes. As the median incomes for the respective occupational groups are calculated for the year 1990, an implicit assumption is naturally that the internal ordering of the occupations' median incomes remain more or less constant over time.

Whereas the educational type *Education and Teaching* contains school teachers, high school teachers and university professors, all belonging to the category *Educational work*, four different occupational categories can be observed to belong to the educational type *Social and Computer Science*. With the exception of *Miscellaneous work*, including economists and computer professionals, occupational groups within the *Social and Computer Science* educational type emerge as characterized by a consistently lower income assimilation probability. More specifically, this is illustrated by immigrants' occupations belonging to the *Law*, *Religious* and *Literary and artistic work* categories. These are occupations arguably associated with substantial requirements for highly country-specific formal qualifications and being able to express oneself in the destination country's language orally and in writing. Thus, the lower likelihood for income assimilation observed for priests, journalists and teachers may be linked to a comparatively greater focus on informal skills, thus translating to a lower average formal skill transferability.

[68] The median incomes are calculated based on the 1990 census.

*Figure 4.1:*Median native 1990 income and share of sample attaining income assimilation within respective occupational category



Source: Swedish Longitudinal Immigrant database. Swedish Census of the Population, 1990. Own calculations.

Despite the quite substantial differences between the median incomes of natives belonging to the *Medical work* and the *Health care and nursing* work categories, their common type of schooling in *Health Care* appears to be associated with a comparatively high share of immigrants achieving income assimilation. Especially immigrants, who prior to migration worked in occupations belonging to the occupational group *Medical work*, including physicians, enjoy the highest likelihood for income assimilation than the other occupational categories, amounting to roughly 55 percent. This being the case despite this group characterized by the most elevated median income. Thus, despite the comparatively time-consuming investments associated with transferring foreign-obtained degrees within the educational type *Health Care* to the Swedish context, this type of migrated formal competence undoubtedly appears to be associated with a high payoff subsequent to migration.

As previously indicated, investing in relevant schooling in the destination country could favorably affect an individual's outcome. This would result from increasing the applicability of the migrated set of skills as well as signaling an

intention to participate in the destination country's labor market. The variable means suggest that conducting such human capital investments is not entirely uncommon, which in some cases should also be expected. More specifically, this would follow from obtaining employment in some occupations as characterized by such a requirement. Immigrants with degrees within *Health Care* can be observed to be the most likely to conduct formal post-migration human capital investments, with almost a third of the sample doing so. Table 4.4 suggests that the benefits of doing so within this educational type are also quite substantial. Those having performed such investments are observed to enjoy an unadjusted median relative income that is 21 percent higher than that of individuals who failed to conduct post-migration human capital investments. Despite considerably smaller shares investing in Swedish schooling among the remaining educational types, associations suggesting considerable relative income premiums from doing so can also be observed among immigrants with degrees within *Education and Teaching* and *Social and Computer Science*.

Table 4.4: Median relative income, by educational type and educational investment

		Educational type:			
		Science and Technology	Health Care	Education and Teaching	Social and Computer Science
Formal post migration	no	0.630	0.658	0.446	0.519
educational investment:	yes	0.632	0.796	0.572	0.692
Relative income difference		0.30%	20.95%	28.20%	33.17%

4.7. Results

The descriptive section suggests differences in the immigrant's prerequisites for labor market success in terms of relative income that appear to be linked to an individual's educational type. Furthermore, this almost consistently remains true regarding formal post-migration human capital investments relevant to an immigrant's pre-migration degree. To properly understand the nature of these mechanisms on individuals' experienced outcomes, net of unobserved characteristics, such as ability, requires individual fixed effects modeling. The initial part of the analysis however focuses on estimates from cross-sectional OLS regression. Whereas the latter method undoubtedly is sensitive to unobserved heterogeneity biasing the results, the combination of methods emerges as useful to satisfactorily arrive at conclusions regarding the policy implications of the results. Parameter estimates for all discussed models are displayed in Table 4.5.

Table 4.5.: Estimates[69]

VARIABLES	OLS Model 1	OLS Model 2	OLS Model 3	FE Model 4	FE S1	FE S2	FE S3
Region of birth							
USA/Germany	ref	ref	ref				
Europe	-0.188***	-0.173***	-0.175***				
Non-Europe	-0.286***	-0.212***	-0.218***				
Visa category							
Labor migrant		ref	ref				
Family reunification migrant		-0.159***	-0.158***				
Refugee migrant		-0.189***	-0.186***				
Linguistic distance							
Germanic		ref	ref				
Latin		-0.022	-0.023				
Non-Latin		-0.033	-0.034*				
Years since migration	0.056***	0.058***					
Years since migration, squared	-0.002***	-0.002***					
Years since migration * Educational type							
YSM * Science & Technology			0.032***	0.045***	0.043***	0.028***	0.048***
YSM, squared * Science & Technology			-0.001*	-0.002***	-0.002***	-0.001*	-0.002***
YSM * Health Care			0.074***	0.068***	0.069***	0.053***	0.066***
YSM, squared * Health Care			-0.002***	-0.002***	-0.002***	-0.001**	-0.002***
YSM * Education and Teaching			0.069***	0.051***	0.051***	0.035***	0.050***
YSM, squared * Education and Teaching			-0.003***	-0.002***	-0.002***	-0.001***	-0.002***
YSM * Social and Computer Science			0.056***	0.067***	0.067***	0.041***	0.070***
YSM, squared * Social and Computer Science			-0.002***	-0.003***	-0.003***	-0.002***	-0.003***
Educational type							
Science and Technology		ref	ref				
Health Care		0.008	-0.212***				
Education and Teaching		-0.146***	-0.291***				
Social and Computer science		-0.072***	-0.160***				
Educational match, Swedish schooling							
Science and Technology			-0.027	0.085*	0.086*	0.061	0.081
Health Care			0.011	0.177***	0.175***	0.144**	0.174***
Education and Teaching			0.054**	0.082**	0.081**	0.057	0.083**
Social and Computer science			0.089***	0.151***	0.154***	0.119**	0.145***
Constant	0.568***	0.723***	0.831***				
Observations	5860	5860	5860	5860	5532	4483	5860
R-squared (OLS) / Within R-squared (FE)	0.132	0.165	0.175	0.176	0.176	0.101	0.1722
Number of indiv	678	678	678	678	534	594	678

Models additionally control for civil status, a child under the age of seven, the municipal unemployment rate, metropolitan residence (Stockholm, Gothenburg, Malmö) and period effects. OLS models also control for age at migration and gender.

Models 1-4 and S3 are estimated on full sample. Model S1 restricts analysis to immigrants observed with a positive labor income for no less than five years. Model S2 restricts analysis to observations with relative incomes no less than 20% that of the respective comparison group.

*** p<0.01, ** p<0.05, * p<0.1

[69] Complete regression output in Table C3, Appendix C

4.7.1. OLS estimates

Model 1 estimates differences between individuals' predicted relative incomes as linked to essentially unobserved pre-migration characteristics assigned at the region of origin level. Holding everything else constant, an individual originating from the non-Europe region experiences a substantially lower and statistically significantly predicted relative income compared to a US/German immigrant. More specifically, given two individuals of identical pre-migration occupations and otherwise sharing consistent observable characteristics, the estimates of Model 1 predict the American immigrant as enjoying a relative income that is 29 percentage points higher than someone from Iran or Iraq. Estimated as significantly different from both other region-of-origin categories, the disadvantage predicted for the European vis-à-vis the US/German immigrant is smaller but still substantial, suggesting a relative income that is 19 percentage points lower. Clearly an imperfect specification in addressing the research questions posed by this chapter, Model 2 is therefore extended to include parameters gauging an individual's language skills at arrival in Sweden and motivations for migration, thereby allowing for varying outcomes within a common region-of-origin. Of more relevance for the purpose of the chapter, this model also estimates separate effects for the immigrants' educational types. The specification examines baseline differences in the predicted relative incomes yet imposing a common trajectory of the influence of time spent in Sweden.

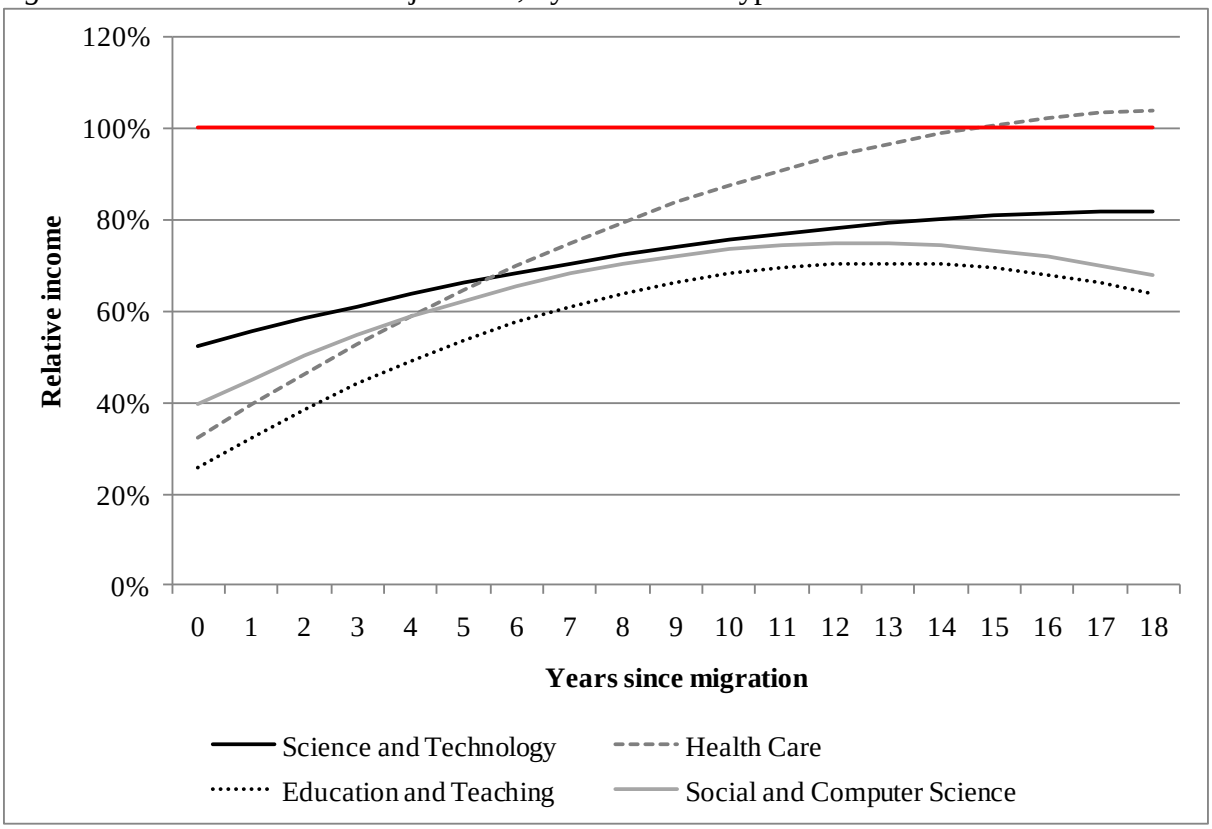
Adding the above-mentioned covariates considerably diminishes the magnitude of the disadvantage previously observed for the non-European group. This indeed suggests that a substantial part of the region-of-origin effect is linked to this group's characteristics in terms of their motivations for migration and, albeit to a considerably lesser extent, the language skills upon arrival. Model 2 still predicts a statistically significant advantage vis à vis the other two immigrant groups for the US/German immigrant. The baseline estimates for the European and the non-European group are, however, no longer different from one another. Hence, the groups' characteristics regarding the parameters introduced in Model 2 explain a large part of the region-of-origin effects that were suggested in Model 1. Turning to the baseline estimates for the educational types, consistent with the indications from the descriptive section, immigrants with degrees from *Education and Teaching* and *Social and Computer Science* are observed to experience significantly lower relative incomes. The disadvantages amount to relative incomes that are 14.6 and 7.2 percentage points lower, respectively, compared to an immigrant with a degree from *Science and Technology*.

The return to a degree obtained prior to migration did, according to the descriptive section, appear constant among immigrants with degrees within the

Science and Technology category, regardless of whether they chose to invest in Swedish schooling. Regarding individuals with degrees associated with comparatively language-intensive occupations, typically within the *Education and Teaching* as well as the *Social and Computer Science* educational field, immigrants could be expected to suffer disproportionately immediately following migration. Upon increasing their destination-country-specific informal human capital, these groups could be expected to subsequently experience comparatively greater gains from the time spent in Sweden. Model 3 is therefore extended to allow the relative income trajectories to differ between the educational types, confirming the initial advantage enjoyed by immigrants with degrees within *Science and Technology*, suggesting a greater return on such formal skills immediately after migration and translating into at least a 16-percentage-point relative income premium compared to the other educational types.

The effects from an immigrant's increasing destination-country-specific informal human capital are modeled as the time since migration. The results suggest that the educational categories experiencing the least return on their skills immediately after migration indeed enjoy steeper trajectories of relative income assimilation. Figure 4.2 shows predicted relative income trajectories for all educational types, estimated at the sample means for immigrants with degrees within *Health Care*. The trajectories therefore show the predicted relative incomes at different years since migration, net of differences in the groups' respective observable characteristics. Clearly, the process of catching-up occurs well into an immigrants' post-migration experience across all educational types. The predicted trajectories for immigrants with degrees within *Education and Teaching* and *Social and Computer Science* suggest a greater payoff from an additional year spent in Sweden during the first ten years subsequent to migration compared to immigrants with degrees in *Science and Technology*.

Figure 4.2.: Relative income trajectories, by educational type



As a result, the initial relative income advantage enjoyed by the latter category diminishes as the immigrant increases their endowment of destination country specific informal skills. From a level of 27 percentage points higher than the *Education and Teaching* group directly after migration, the predicted relative income is only 8.6 percentage points higher at thirteen years after arrival in Sweden. The relative income trajectory predicted for individuals with degrees in *Social and Computer Science* also displays a similar trend. Resulting from the greater return to an additional year in Sweden, the educational type almost catches up with the trajectory predicted for immigrants with degrees in *Science and Technology* at ten years after migration. Within the overall progress observed for immigrants belonging to the discussed educational types, the most impressive trajectory is observed for individuals with degrees within *Health Care*. The trajectory not only suggests the highest relative income of all educational types from six years after migration and onwards, but also shows that this category is the only one achieving income assimilation, occurring after fifteen years in Sweden.

The relative income trajectories confirm the diminishing marginal gains from additional years spent in Sweden. The trajectories typically peak sometime between ten to fifteen years after migration, after which they flatten out or even become downward-sloping. The effect of time since migration is intended to

primarily represent informal human capital investments, such as increasing language skills and familiarity with the institutional and cultural context. Also included in the model are formal post-migration human capital investments, expected to shift the relative income trajectory upwards at as a result of an instantaneously increasing applicability of an individual's degree to the Swedish labor market.

The seemingly weak link between such investments and a subsequently improved relative income, also observed in the descriptive analysis for immigrants with degrees in *Science and Technology*, is again confirmed by the cross-sectional OLS analysis. The influence of formal post-migration educational investments among immigrants with degrees belonging to this category is estimated to be basically zero. When combined with the relative income trajectory from time spent in Sweden, this would suggest that the formal skills in this category are associated with a high degree of transferability directly after migration. For this educational type, formal as well as informal educational investments subsequent to migration hence translate into comparatively small gains in the individual's post-migration experience. The absence of an estimated relative income premium among immigrants with degrees within *Health Care*, according to the OLS estimates, emerges as highly unexpected. Given the indications of a substantial relative income premium in the descriptive section combined with the comparatively high proportion of occupations explicitly requiring post-migration investments within this educational type, a positive effect would emerge as highly expected. For the remaining two educational types, the results indeed indicate a statistically significant relative income premium associated with conducting relevant post-migration human capital investments, amounting to relative income increases of 5.4 and 8.9 percentage points for immigrants with *Education and Teaching* and *Social and Computer Science* degrees, respectively.

4.7.2. Individual fixed effect estimates

To approach an unbiased estimation of the effects of the parameters of interest, individual fixed effects models were estimated, canceling out the influence of characteristics (observed and unobserved) that do not change over time within a given individual. The individual's ability is obviously a key factor that influences the outcome of interest in this chapter yet unobserved in the data. This becomes problematic for the purpose of this study if ability, or any other unobserved and time invariant characteristic, is correlated with the individual's decision to make a formal investment in their human capital subsequent to migration. The same remains true if unobserved characteristics influence the number of years the individual is observed with a positive income from work.

As previously mentioned, the disadvantage associated with fixed effects modeling is however that the estimation of observed characteristics that remain time invariant within the level of clustering are not identified parameters. Model 4, estimated with individual fixed effects, therefore fails to provide baseline estimates for region/origin, linguistic distance or visa category, as was the case in the cross-sectional OLS analysis.

The individual fixed effects estimates of Model 4 promote a story that differ quite substantially from that suggested by the results of the OLS. Comparing the estimates, the results consistently suggest, albeit to varying extents, the effect of investing in relevant Swedish schooling as greater according to the individual fixed effect estimates than in the cross-sectional OLS regression. A possible explanation for a more beneficial influence according to the fixed effects estimates, illustrated in Table 4.6, could be if immigrants generally are negatively selected into performing such formal human capital investments. More specifically, this could be the case if individuals choosing to do so are disproportionally selected among those failing to obtain a satisfactory destination country labor market outcome. Considering the typical motivations for migration that characterizes individuals in the sample, their immediate priority may be to obtain a sufficient income in *any job*. Hence, the desire to pursue the career initiated prior to migration, possibly requiring transferring the formal degree to the Swedish context, may not be a priority. Therefore, the difference between the OLS and the fixed effect results may suggest making such educational investments as primarily being a secondary strategy, where immigrants failing in their initial attempt to gain a foothold in the Swedish labor market are introduced to the option of doing so. This would also be consistent with existing evidence regarding the selection mechanisms into formally transferring the foreign obtained degree. Apart from being information seemingly inaccessible to most immigrants, it also emerges as sometimes requiring an extended time period of human capital adjustment, which may appear unappealing to immigrants planning to return home as soon as the opportunity presents itself.

Table 4.6.: Estimated effect from Swedish schooling, by educational type

	Science and Technology	Health Care	Education and Teaching	Social and Computer science
OLS, Model 3	-0.027	0.011	0.054**	0.089***
FE, Model 4	0.085*	0.177***	0.082**	0.151***
*** p<0.01, ** p<0.05, * p<0.1				

The educational types *Health Care* and *Social and Computer Science* were indicated as containing a disproportionally large share of degrees that require formal investments in Swedish schooling in order for an individual to become eligible for employment in the associated occupation after migration. Based on this, the substantial income premium associated with having conducted an investment in relevant Swedish schooling should not emerge as surprising among these groups. More specifically, a foreign trained physician or nurse is according to Model 4 observed to enjoy an 18 percentage point higher relative income after having completed a period of formal post-migration human capital investment. The corresponding figure for the immigrant lawyer or accountant, in the *Social and Computer Science* category amounts to 15 percentage points.

Degrees obtained within *Science and Technology* were argued to potentially be characterized by a comparatively high degree of transferability, as also indicated by the OLS analysis, suggesting a comparatively minor need for Swedish schooling. Whereas Model 4 indeed suggests that such formal human capital investments are a beneficial strategy, the relative income premium is comparatively small, amounting to 8.5 percentage points. The educational type *Education and Teaching*, often associated with highly language-intensive occupations, emerges as associated with a similar relative income premium, amounting to 8.2 percentage points. Within this category, the estimated relative income effect from a formal human capital transfer differs only to a negligible extent between the OLS and fixed effects regression, suggesting a comparatively minor bias due to selection.

The change with regards to the parameter estimates between the OLS and individual fixed effects regression of the influence of formally transferring the foreign-obtained degree suggests the existence of non-negligible selection mechanisms. Consistently, the results point to a beneficial effect from formal post-migration educational investments, but also that the selection of individuals choosing to do so appears to be dominated by immigrants experiencing comparatively greater labor market difficulties. The influence of time spent in Sweden, illustrating the influence of informal human capital investments across educational types is displayed in Table 5.7. According to the fixed effect results of Model 4, the relative income increase from another year spent in Sweden amounts to between 4.3 percent and 6.6 percent. Largely confirming the indications from the OLS regression, the least relative income increase is observed for immigrants with degrees within the *Science and Technology* category.

Table 4.7.: Effects from a one unit increase in years since migration.

	Science and Technology	Health care	Education and Teaching	Social and Computer Science
OLS, Model 3	2.79%	6.44%	5.37%	3.74%
FE, Model 4	4.30%	6.60%	4.90%	6.40%

Note: Estimated at educational type means for OLS Model 3. Estimated as one unit deviation from individual mean for FE Model 4.

While the individual's contribution of years spent in Sweden may be randomly assigned, an immigrant's experience in the country of destination may influence his/her propensity to return-migrate or exit the labor market. Similar to the situation regarding the decision to conduct a post-migration human capital investment, if individuals on either the lower or the upper end of the ability distribution are more likely to exit the labor market, the OLS estimates will be biased. The largest marginal effects from an additional year spent in Sweden are found, similar to the effect of Swedish schooling, among the educational types of *Health Care* and *Social and Computer Science* according to the fixed effects estimates. For both types, the effect is indicated as being downwardly biased according to the OLS estimates. This is also true for immigrants with degrees within Science and Technology. The effect of the influence of informal human capital investments for individuals belonging to the educational type *Education and Teaching* is however indicated as upwardly biased according to the OLS estimates.

4.8. Sensitivity analyses

Despite an average time under observation amounting to 8.7 years, the estimated relative income trajectories across educational types as well as how they are influenced by post-migration human capital investments may be affected by the inclusion of individuals who are only observed for a shorter period of time into the sample. By restricting the sample to individuals who are observed for no less than five years subsequent to migration, remaining in the sample are 534 immigrants on average contributing with 10.4 years of post-migration experience. By doing so, any influence on the results originating from including individuals unlikely to have spent a sufficiently long time in Sweden to have had time to conduct formal human capital investments combined with properly entering the labor market will effectively be excluded from the sample. Table 10 in the appendix presents the results of Model *S1*, maintaining an identical specification as Model 4 as well as suggesting almost identical parameter estimates.

Another source of bias may arise from including individuals with very low incomes from labor, suggesting that they only provide a very limited supply of labor. Within each occupation, observations with incomes not exceeding 20 percent of the respective comparison income are therefore excluded. Removing a little less than 100 individuals from the sample, the story suggested by Model S2 largely remains consistent with the models previously reported. While all estimated effects from obtaining an educational match become slightly less in this specification, the effects remain statistically significant for immigrants with degrees within *Health Care* and *Social- and Computer Science*.

Lastly, Model S3 uses the individual's income relative to their particular native comparison groups' median rather than mean income as the dependent variable. Various occupations (occupational groups) were in the descriptive section indicated as characterized by differing income distributions, why the individual's outcome potentially could differ substantially whether compared to the mean or the median. Estimated on the identical sample as Model 4, which the main analysis of the chapter focused on, the results again however consistently suggest choosing neither of these distributional measures as affecting the conclusions regarding differences in the relative income trajectories of this sample of immigrants to Sweden.

4.9. Conclusions

This chapter examines a sample of highly-skilled immigrants to Sweden, focusing on the determinants of income assimilation. Aiming to contribute to the literature on immigrants' labor market assimilation, this chapter examines the determinants of the individual's relative labor income trajectory, distinguishing between different types of formal skills. Furthermore, the chapter examines the influence of formal post-migration human capital investments, by exploiting longitudinal data and individual fixed effect regression to cancel out the potential influence of ability bias.

Examining the time period 1983-2001, the results support the bleak prospects for labor market assimilation of formally high-skilled immigrants as also proposed by previous research. With a mean relative income ranging between 50 and 70 percent, the results however suggest substantial differences in the applicability of various types of skills in the Swedish labor market. Despite being an educational type not hosting occupations associated with the highest incomes, immigrants with advanced degrees within Education and Teaching are observed as least likely to attain an income equal to their comparable native. Thereby, this suggests this type of skills as the least applicable in the Swedish labor market. The other side of the coin is represented

by immigrants whose skills belong to the educational type *Health Care*, including nurses, physicians and veterinarians, enjoying comparatively favorable outcomes.

The differences in results suggested by cross-sectional OLS and individual fixed effect regression suggest the former as affected by bias to a substantial extent. The problems primarily pertain to the issues involved in estimating an unbiased effect from formal human capital investments conducted subsequent to migration. Consistently, the influence from such investments is negatively biased in the OLS specification, likely to suggest individuals choosing to conduct such investments as being selected from the lower end of the skill distribution. Here, it is argued to reflect the typical individual in the sample unlikely to be exposed and encouraged to making any such formal human capital investments until after failing the initial attempt to assimilate into the labor market. Furthermore, if the immigrant's intention is to return to the country of origin as soon as the opportunity presents itself, this is likely to diminish any intention to transfer their formal human capital to the Swedish labor market. Therefore, the most able immigrants who manage to gain a foothold in the Swedish labor market rapidly are unlikely to consider or even be introduced to the option of investing in Swedish schooling.

Directing a particular focus towards netting out the influence of unobserved heterogeneity on the estimated effect of investing in relevant Swedish schooling subsequent to migration, parameter estimates suggest this as a highly beneficial strategy. Relying on the individual fixed effect estimates for a more accurate estimation of the true effect, the results show a substantial income premium associated with formally investing in Swedish education among individuals belonging to all educational types. From a policy perspective, efforts aiming towards encouraging immigrants to transfer their advanced formal degrees to become useful on the Swedish labor market should therefore clearly be a priority.

While acknowledging the limited size of the sample, this chapter has provided numerous indications regarding the mechanisms determining immigrants' labor market outcomes while focusing on horizontal rather than vertical educational differentiation. Combining the influence from predicted relative income trajectories and formal human capital investments subsequent to migration would according to both methods of analysis, but particularly according to the fixed effect estimates, suggest skills belonging to the educational type *Health Care* as associated with the most favorable labor market return in terms of relative income. While it is beyond the scope of this chapter to determine whether the comparatively favorable outcomes enjoyed by immigrants with degrees within *Health Care* primarily is due to supply or demand factors, this naturally emerges as important. If it would be the result of a

strong link between becoming introduced to and recruited into the appropriate occupation while completing the formal human capital transfer process among individuals with such formal degrees, it could present other occupational groups with indications regarding how to benefit the most from the formal skills of the immigrant population.

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Statistical Sources

Swedish Census of the Population 1990

Swedish Longitudinal Immigrant Database, Centre for Economic Demography, Lund University

Appendix C

Table C1.: Languages

Language	Latin alphabet	Non-Latin alphabet	Language	Latin alphabet	Non-Latin alphabet
Albanian	X		**Jiddish**		X
Amharic		X	Kurdish (Iran & Iraq)		X
Arabic		X	Kurdish (Turkey)	X	
Armenian		X	Latin	X	
Azari		X	Macedonian		X
Azerbaijani (Iran)		X*	**Norwegian**	X	
Bosnian	X		Persian		X
Bulgarian		X	Polish	X	
Croatian	X		Portuguese	X	
Czech	X		Rumanian	X	
Danish**	X		Russian		X
Dutch	X		Serbian		X
English	X		Slovenian	X	
Farsi		X	Somali	X	
Finnish	X		Spanish	X	
French	X		**Swedish**	X	
German	X		Syriac		X
Greek		X	Tibetan		X
Hebrew		X	Tigrigna		X
Hungarian	X		Turkish	X	
Italian	X		Urdu		X
Japanese		X	Vietnamese	X	

Notes: *Azerbaijani speakers in Iran uses the Perso-Arabic script
** Germanic languages in bold

Source: Lewis: 2009

Table C2: Countries/Region of birth

Countries of birth	Region of birth
Chile	Non-Europe
Somalia	Non-Europe
Former Yugoslavia	Europe
Germany	US/Germany
Greece	Europe
Iran	Non-Europe
Iraq	Non-Europe
Poland	Europe
Turkey	Non-Europe
USA	US/Germany
Vietnam	Non-Europe

Table C3: Complete estimates

VARIABLES	OLS Model 1	OLS Model 2	OLS Model 3	FE Model 4	FE S1	FE S2	FE S3
1b.breg_alt	0.000	0.000	0.000				
2.breg_alt	-0.188***	-0.173***	-0.175***				
3.breg_alt	-0.286***	-0.212***	-0.218***				
1b.visa_alt		0.000	0.000				
2.visa_alt		-0.159***	-0.158***				
3.visa_alt		-0.189***	-0.186***				
lat_other		-0.022	-0.023				
nonlat_other		-0.033	-0.034*				
eduatmig3		0.008	-0.212***				
eduatmig4		-0.146***	-0.291***				
eduatmig5		-0.072***	-0.160***				
eduswe2			-0.027	0.085*	0.086*	0.061	0.081
eduswe3			0.011	0.177***	0.175***	0.144**	0.174***
eduswe4			0.054**	0.082**	0.081**	0.057	0.083**
eduswe5			0.089***	0.151***	0.154***	0.119**	0.145***
ysm_edu2			0.032***	0.045***	0.043***	0.028***	0.048***
ysm2_edu2			-0.001*	-0.002***	-0.002***	-0.001*	-0.002***
ysm_edu3			0.074***	0.068***	0.069***	0.053***	0.066***
ysm2_edu3			-0.002***	-0.002***	-0.002***	-0.001**	-0.002***
ysm_edu4			0.069***	0.051***	0.051***	0.035***	0.050***
ysm2_edu4			-0.003***	-0.002***	-0.002***	-0.001***	-0.002***
ysm_edu5			0.056***	0.067***	0.067***	0.041***	0.070***
ysm2_edu5			-0.002***	-0.003***	-0.003***	-0.002***	-0.003***
aam	-0.005***	-0.005***	-0.005***				
manmar	0.133***	0.139***	0.143***	0.002	0.006	-0.032	0.011
femmar	-0.032*	-0.012	-0.018	0.019	0.021	0.022	0.028
manchild	-0.019	0.000	0.003	-0.004	-0.001	-0.031	-0.013
femchild	-0.022	0.042	0.045*	-0.132***	-0.135***	-0.121***	-0.126***
femnonchild	0.132***	0.175***	0.180***				
unemprate	-0.023***	-0.022***	-0.022***	-0.014***	-0.014***	-0.007***	-0.016***
metro	0.021*	0.022*	0.021*	-0.076***	-0.080***	-0.061***	-0.072***
y_85	-0.040	-0.031	-0.035	-0.031	-0.041	-0.003	-0.022
y91_95	0.071***	0.063***	0.058***	-0.009	-0.010	-0.008	-0.003
y96_01	0.021	0.022	0.012	-0.034	-0.033	-0.034	-0.039
ysm	0.056***	0.058***					
ysm2	-0.002***	-0.002***					
Constant	0.568***	0.723***	0.831***				
Observations	5860	5860	5860	5860	5532	4483	5860
R-squared	0.132	0.165	0.175	0.176	0.176	0.101	0.1722
Number of indiv				678	534	594	678

*** p<0.01, ** p<0.05, * p<0.1

Chapter 5.

Early-Life Conditions and Income Attainment in Sweden During 1968-2001: Using Sibling Data to Further Explain Why Country of Origin Should Matter

5.1. Introduction

Similar to many other countries in the Western hemisphere, Sweden has experienced considerable immigration over the course of the last half a century. This has dramatically altered the Swedish demographic composition, where at the turn of the millennium about 20 percent of the population was either a first- or second generation immigrant (Statistiska Centralbyrån: 1999, Ekberg & Rooth: 2003). Over the course of time, the socioeconomic integration of newly arrived immigrants has become increasingly problematic, arguably linked to the bulk of later arriving immigrant cohorts largely being refugees originating from non-European countries. In the literature, this is typically linked to the later immigrants being characterized by a larger linguistic and cultural distance to Sweden. Despite the vast amount of research on immigrants' labor market experiences in Sweden, and the numerous efforts to provide a better understanding of the causal mechanisms underlying several groups' poorer labor market outcomes, a substantial role is still assigned to unobservable country of origin characteristics (See for example Scott: 1999, Le Grand & Szulkin: 2002).

Apart from differences in a multitude of labor market outcomes, empirical evidence from Sweden has also suggested differences between natives and immigrants regarding a number of health related indicators. More specifically, immigrants and natives have been observed to differ in terms of outcomes such as adulthood mortality (Sundqvist & Johansson: 1997), sickness benefit consumption (Bengtsson & Scott: 2006), disability pension consumption (Österberg & Gustafsson: 2006) and self reported health (Lindström, Sundquist & Östergren: 2001). This suggests that the disadvantage experienced by certain immigrant groups is quite multifaceted and not confined to the labor market.

There are plenty of hypotheses proposing why the country-of-origin effect persists even after controlling for a range of covariates that influences the outcome variable. Including discrimination-based explanations emphasizing the immigrants' ethnic origin, to arguments based on the idea that immigrants have poorer skills specific to the destination country, researchers have generally been unable to refine their understanding of the origin country effect.

A potentially contributing explanation to the poorer outcomes experienced by certain immigrant groups has been proposed as linked to the empirically established association between exposure to adverse conditions during gestation and early-life, and its link to the individual's health both during childhood and into adulthood (Elo & Preston: 1992, Kuh & Ben-Schlomo: 2004). The proposed mechanism suggests a risk of suffering from a permanent physiological debilitation or an increased incidence of various diseases as a result of exposure to malnutrition or an unusually high disease load during early-life. Being exposed to adverse conditions that negatively affect the individual's health during early-life could thereby have persisting repercussions on the individual's capabilities throughout the life course. The results of previous research would therefore suggest the existence of a mechanism through which exposure to adverse early-life conditions not only affects the individual's health, but where the resulting debilitation may also negatively affect the individual's performance in areas such as schooling as well as their labor market outcomes.

The growing body of empirical research in support of the early-life hypothesis makes it well founded to suggest the existence of a direct causal link between conditions experienced during early-life and the individual's later life health. Furthermore, exposure to adverse early-life conditions is also likely to affect the individual's health indirectly, through its influence on the person's socioeconomic attainment (See Bengtsson & Mineau (2009) for an overview). Based on the socioeconomic and ethnic gradient in adult mortality as well as other health outcomes, a better understanding of how early-life conditions may influence the generation of socioeconomic outcomes thus emerges as being of great importance. According to the early-life hypothesis; if immigrants on average have been subjected to comparatively more adverse early-life conditions than have native Swedes, this may have influenced the health gradient between natives and immigrants that is frequently empirically observed. While the direct influence on the individual's health is rather evident, an early-life debilitation is also likely to result in suboptimal schooling as well as labor market outcomes. As individuals belonging to the lower socio-economic categories are less likely to make investments into their health, the initial health disadvantage may furthermore become reinforced, thereby illustrating the indirect effect between early and later life health.

This chapter attempts to empirically quantify to what extent the individual's health context during infancy affects the individual's labor market outcomes in adulthood. This will be accomplished using a sample of natives and immigrants living in Sweden between 1968 and 2001. By studying a sample of biological siblings selected from longitudinal administrative records, the analysis will exploit within-family variation in both the dependent and independent variables. Furthermore, unobserved characteristics at the family level will be canceled out by means of fixed effect regression. As a result, the estimates can to a greater extent be interpreted in causal terms.

5.2. The potential role of early-life conditions on immigrant-native differences in adulthood outcomes

A growing body of research has found empirical support for the hypothesis that exposure to adverse conditions in terms of nutrition or disease load during gestation and infancy has a negative and permanent effect on the individual's health. Hence, with an effect lasting throughout childhood, empirical evidence also supports a link between early-life conditions and health outcomes during adulthood and old age. Barker (1995, 1997) particularly underlined that favorable circumstances during the fetal stage, when cells are dividing at their most rapid pace, is of paramount importance. Exposure to a lack of nutrients or oxygen while in utero slows the process of cell division, which may lead to a permanent disruption of the developmental trajectory of certain organs. This, in turn, sets the stage for the onset of diseases later in life. Included among the diseases observed to be associated with the individual's in utero conditions are, among others, coronary heart disease, stroke, diabetes and hypertension.

After birth, the development of organs and several major physiological functions continues. This process is especially concentrated to the first year of life, when vulnerability to various forms of environmental insults consequently is very high (Wadsworth & Butterworth: 2006, Ben-Schlomo & Kuh: 2004). Such adverse conditions are on the individual level believed to manifest in the form of low birth weight or exposure to various infections, causing a permanent physical or cognitive debilitation, or setting the stage for the onset of disease later in life. While the direct effect of exposure to adverse early-life conditions is believed to be represented by its negative and persisting influence on the individual's health, ample empirical research also suggests a bi-directional relationship between an individual's socio-economic and health outcomes (Kim & Durden: 2007, Cutler & Lleras-Muney: 2006). Despite the difficulties of isolating whether poor health causes suboptimal labor market outcomes or vice

versa, it is plausible that poor health and suboptimal labor market performance are mutually reinforcing mechanisms.

The link between early-life conditions and labor market outcomes could be a contributing explanation to certain immigrant groups' poorer labor market outcomes. Given Sweden's history as a forerunner in public and universal health care, many immigrant groups can be assumed to have been exposed to comparatively unfavorable health conditions during early childhood. Crimmins and Finch (2004, 2006) suggest that patterns of age-specific mortality across birth cohorts to a large extent are the result of variations in the exposure to infections during early-life. More specifically, exposure to infection during early-life results in a higher incidence of chronic inflammations among birth cohorts characterized by elevated mortality risks. The risk of contracting a range of environmental insults during early-life is in the same study linked to the general public health situation of a given context. Birth cohorts exposed to high-mortality circumstances are more likely to, for example, contract the *H. pylori* bacterium. The contraction of the bacteria commonly takes place during childhood and is associated with the incidence of coronary disease later in life (Harvey et al: 2002). Furthermore, diseases such as chronic tuberculosis and diarrhea are considerably more prevalent in high-mortality contexts. Elo and Preston (1992) additionally report a number of conditions affecting adulthood mortality that are directly linked to the individual's early-life experience, including rheumatic heart disease.

Hemminki *et al* (2002) as well as Gadd et al (2006) show significant differences in various forms of health outcomes between natives and immigrant groups in Sweden. Their lack of a valid measurement of early-life conditions however makes it impossible to infer to what extent such differences are due to differences in exposure linked to the country of origin. Furthermore, Hemminki *et al* (2002) show that certain immigrant groups experience different mortality risks in their new country of destination compared to a reference group remaining in their country of origin. Such differences may naturally be a result of selection, such that those individuals who are more likely to migrate already share certain health characteristics prior to migration.

Research that explicitly examines the influence of early-life factors on differences between natives' and immigrants' health outcomes in a Swedish context are few but nevertheless support the early-life hypothesis. Klinthäll and Lindström (2009) find evidence of a negative effect on adult mortality from exposure to adverse conditions during infancy among a number of immigrant groups in late 20th century Sweden. Another study by van den Berg *et al* (2009) has also provided evidence supportive of the early-life hypothesis, showing a strong effect of exposure to home country conditions on adolescent height based on a sample of immigrants to Sweden. Furthermore, by comparing siblings, they

are able to control for within family unobserved characteristics and yet find an almost linearly decreasing attained height at the age of 18 with time spent in country of origin prior to migration. This would indicate that the duration of exposure to the conditions in the country of origin as has an increasingly negative influence on the individual's stature.

However, the damage to physiological functions associated with exposure to adverse conditions during early childhood may also negatively affect the individual's capabilities in a way that indirectly affects the individual's health via attained socioeconomic outcomes. The interest in understanding the effect of early-life conditions on adult socioeconomic outcomes has resulted in numerous research articles, generally supporting the existence of a link between in utero or early-life exposure to adverse conditions and suboptimal cognitive or labor market outcomes later in the life course. To this date, no investigation into such a mechanism on a modern Swedish context has however been performed. Using birth weight as an indicator of early-life conditions, Richards et al (2001) find that being born with a low birth weight is associated with a statistically significant negative effect on the individual's cognitive ability, while simultaneously canceling out the effect of the individual's social background. Several studies using the British NCDS dataset, following a cohort born in 1958 in the United Kingdom, have also shown that adult educational attainment, earnings and socio-economic status are negatively related to factors such as poor childhood health, low birth weight and adverse "pre- and postnatal childhood conditions" (Case et al: 2005, Currie: 1998). Palloni *et al* (2009) apply a more sophisticated approach to the same dataset but essentially come to similar conclusions, confirming the influence of early childhood health on adult socioeconomic status. These mechanisms are largely confirmed on a US context, primarily based on the PSID dataset covering the time period from the end of the 1960s and until the mid 1990s (see for example Conley & Bennett (2000)).

Empirical research has also shown a significant relationship between indicators of socioeconomic status, such as educational level attained, and various health outcomes. Studies in a number of different contexts on the effect of an exogenous policy change resulting in an increase in the number of years of schooling have been observed to have had a causal and positive effect on health outcomes – as indicated, for example, by a decreased adult mortality rate (Oreopolous: 2007, Arendt: 2005, Lleras-Muney: 2005). The strong association between socioeconomic status and health could therefore also have implications for an individual's vulnerability to adverse early-life conditions. Numerous studies have showed that less educated mothers not only are less likely to adhere to recommendations regarding preventive care such as vaccinations, but they also have a greater probability of being overweight, a smoker or drink excessively. Health correlations across generations have also suggested that

children of well educated mothers are less likely to experience infant death and low birth weight, the latter with effects persisting well into adulthood (Case et al: 2005, Currie & Moretti: 2003). The results from previous research thus suggest that differences in health behavior and health outcomes operates across generations, potentially implying well educated parents may possess resources that increases their children's resilience to exposure to adverse early-life conditions.

5.3. Study sample and data

In the analysis, a sample of roughly 11,000 biological siblings born in a subset of twelve countries, including Sweden, and belonging to about 4,700 unique mother-father pairs were selected from the Swedish Longitudinal Immigrant database (SLI). The database consists of essentially longitudinal individual-level information from various Swedish administrative registers, including the tax register and the censuses. Siblings belonging to a total of 3,414 families (~8,200 individuals) share the feature of being born in Sweden, whereas the remaining 3,000 individuals, belonging to roughly 1,300 families were all born outside of Sweden.

Siblings were only included in the sample if they were born in the same country, as individuals who are born in different countries may be an indication of the early-life conditions not being exogenously assigned. The rationale guiding this concept is that a birth family's choice to migrate by itself may be a direct result of the early-life conditions to which the first child/children were exposed. The sample studied in the chapter includes individuals belonging to sibling combinations ranging from two to nine children, a majority of whom (73 percent) were born in Sweden. Among the other countries of origin, Chile, Finland, Denmark and Yugoslavia stand out as the largest contributors to the sample. The two-sibling families represent about 70 percent of those selected, and families including five or more siblings constitute less than three percent.

The data covers the time period from 1968 and until 2001, and individuals are included in the sample if they are either born in Sweden or immigrated prior to turning 21 years of age. The empirical strategy of the chapter relies on the selection of siblings as useful in estimating effects that may be interpreted in causal terms. Therefore, the sampling strategy by definition excludes singletons and individuals who enter the labor market but whose sibling(s) fail to do so. Furthermore, it is only possible to identify biological siblings if both the mother and the father of the individual lived in Sweden at some point in time.

Assessing an individual's labor market performance is undoubtedly a complex task that numerous researchers have undertaken. As a result, several

measures of socioeconomic or occupational status exist, each with its own particular focus in terms of the factors that determine the desirability of an individual's position. While such measurements, typically utilized in the sociological literature, generally focus on the characteristics of occupations, the economics literature has put greater emphasis on the importance of income as indicative of an individual's labor market performance. Based on data availability as well as in order to utilize a dependent variable displaying a high degree of variation, this chapter draws on the latter tradition.

The individual's labor market performance is in this chapter measured in terms of log income. The information necessary to derive the outcome variable is available on a yearly basis and was adjusted using the consumer price index, calculated by Statistics Sweden, to accurately gauge changes over time independent of the influence of inflation. It becomes possible to distinguish between various sources of income from 1979 and onwards, when the outcome measure in the chapter explicitly refers to the individual's work income. Between 1968 and 1978, the individual's disposable income is instead used as a measurement of the individual's labor market performance. This is based on the rationale that remuneration from sources other than the employer are to a large extent correlated with – if not directly based on - the individual's labor income[70].

Essentially following the methodological strategy applied by Böhlmark (2008), all individuals' labor market outcomes are observed within a common age-range. Using Swedish data, earnings attained in the mid-thirties was empirically shown to be a good predictor of lifetime earnings (Böhlmark & Lindquist: 2006), which motivates choosing this age span as appropriate to gauge an individual's labor market outcome[71]. The dependent variable in the analysis is the individual's mean income between the ages 32 and 36, used in order to avoid the risk of a single year with an unusually high or low income to affect the results. More specifically, this implies that every individual included in the analysis is represented by a single observation. Furthermore, the dependent variable is created only including observations with incomes exceeding two base amounts, as individuals with incomes below this threshold are unlikely to be working full time in any occupation[72].

[70] Sensitivity checks on the period before and after the 1979 break point have been performed (not shown), suggesting the change in the income definition as not affecting the results. Therefore, the choice was made to favor being able to examine a more extended time period.

[71] Whereas variation across the sexes as well as across birth cohorts are observed in Böhlmark & Lindquist (2006), for the sake of consistency as well as obtaining a sizeable sample, the choice was made to choose a common age range for the entire sample.

[72] All income is standardized and expressed in terms of 'base amounts', which are essentially price-indexed values used by the Swedish government for the calculation of social welfare benefits and transfers. In 2009, one base amount was equal to SEK 42,800.

Table 5.1:Variable means

	Sweden	Denmark	Norway	Germany	USA	Finland
Log income	12.13	12.05	12.09	12.18	12.19	12.05
Infant Mortality Rate	17.22	22.14	19.24	28.49	32.86	23.32
Infant Mortality Rate variation >= 5 % (%)	7.78	2.72	5.83	3.57	0.00	18.63
Age	32.25	32.33	32.29	32.27	32.32	32.35
Age at migration	0.00	11.19	11.71	8.86	9.77	10.52
First born sibling	0.34	0.31	0.37	0.39	0.36	0.30
Sex (% female)	0.47	0.50	0.49	0.52	0.45	0.48
Primary education (%)	14.82	27.72	16.59	16.90	8.93	26.71
Secondary education (%)	56.77	61.14	53.36	57.75	46.43	60.50
University education (%)	28.41	11.14	30.04	25.35	44.64	12.80
Parents primary education (%)	36.52	37.50	28.25	18.31	19.64	66.09
Parents secondary education (%)	42.54	51.36	46.64	59.15	50.00	29.07
Parents university education (%)	20.94	11.14	25.11	22.54	30.36	4.84
Unemployment rate (%)	4.29	4.48	4.57	4.18	3.71	4.65
Metro residence (Stockholm/Gothenburg/Malmö) (%)	21.14	11.96	18.83	23.94	33.93	12.05
Year of observation	1991.41	1992.15	1991.91	1995.27	1990.86	1992.45
Individuals	8237	368	223	71	56	805

	Czechoslovakia	Poland	Italy	Greece	Yugoslavia	Chile
Log income	12.21	12.14	11.95	12.00	12.06	12.02
Infant Mortality Rate	30.10	59.48	52.08	39.91	84.63	106.65
Infant Mortality Rate variation >= 5 % (%)	17.69	3.57	5.75	4.88	4.68	4.43
Age	32.38	32.26	32.31	32.39	32.37	32.55
Age at migration	9.74	12.17	11.33	11.46	10.37	14.16
First born sibling	0.46	0.41	0.36	0.39	0.41	0.33
Sex (% female)	0.47	0.45	0.51	0.43	0.46	0.50
Primary education (%)	7.69	10.71	18.39	37.63	21.60	12.20
Secondary education (%)	43.08	54.46	70.11	44.95	64.37	63.86
University education (%)	49.23	34.82	11.49	17.42	14.03	23.95
Parents primary education (%)	8.46	27.68	71.26	88.15	59.69	32.82
Parents secondary education (%)	38.46	38.39	26.44	11.15	37.86	39.69
Parents university education (%)	53.08	33.93	2.30	0.70	2.45	27.49
Unemployment rate (%)	5.00	5.35	3.96	4.56	5.23	4.90
Metro residence (Stockholm/Gothenburg/Malmö) (%)	29.23	48.21	29.89	44.25	38.98	31.71
Year of observation	1992.73	1992.82	1989.31	1992.34	1993.12	1996.54
Individuals	130	112	87	287	449	451

Table 5.1 suggests a largely homogenous sample in terms of their observed labor market outcomes. The average Czech immigrant is observed to enjoy the highest work income expressed in 2001 Swedish crowns, with the worst performing Italian immigrant experiencing a mean income being 23 percent lower.

5.4. Methods

The unrestricted sample used in the chapter consists of 11,276 biological siblings from 4,697 families, with the explicit objective of estimating how variation in exposure to early-life conditions influences the individual's attained income. Essentially, the basic cross-sectional equation of interest (1) expresses the individual's log income as a function of $EarlyLifeConditions_i$, denoting a set of variables denoting the early-life conditions experienced by individual i. X_i represents a vector of controls for observable individual and family characteristics, including birth cohort as well as geographical residence and regional labor market conditions. Lastly, ε_i represents an unobserved error term.

$$ln\, y_i = \alpha + \beta EarlyLifeConditions_i + \delta X_i + \varepsilon_i \quad (1)$$

The design of the dependent variable warrants the use of linear regression models which, as specified above however, ignores the clustered nature of the dataset. To the extent that the sample truly is randomly selected, the cross-sectional approach remains a suitable empirical strategy in obtaining unbiased estimates. As neither migrants nor survivors of the most extreme early-life conditions can be believed to be randomly selected, there is an apparent risk that such non-randomly assigned and unobserved characteristics will be absorbed by the error term. In this case, the estimated parameters would be affected by an omitted variable bias. More specifically, if certain unmeasured individual or family characteristics are correlated with how exposure to early-life characteristics influences the individual's attained relative income, the estimation of β will be biased in a cross-sectional framework.

In a panel data setting, characteristics that are unobserved and invariant at the given level of clustering can however be cancelled out by means of fixed effects regression technique, thereby allowing for the unbiased estimation of β. Individuals included in the sample are observed at one point in time – consistently at about the same age – implying that the panel structure of the data here used pertains to the family level clustering, by the inclusion of at least two

siblings from every family. The family fixed-effect models[73] that will be estimated is specified below (2), where the *f,i* subscript now denotes that the observation on individual *i* belongs to family *f*, thereby indicating the clustering of the data. μ_f denotes the family fixed-effect, capturing all characteristics that are identical across members belonging to the family in question, ranging from country of emigration to family traditions and values. Note that variables in the *X* vector requires within-family variation in order to be estimated, implying that covariates that remain invariant between siblings in all families cancel out.

$$ln\, y_{f,i} = \alpha + \beta EarlyLifeConditions_{f,i} + \delta X_{f,i} + \mu_f + \varepsilon_{f,i} \qquad (2)$$

By selecting siblings, the objective of the family fixed effect analysis becomes to treat the labor market outcomes of an individual's siblings as their counterfactual outcomes. In the framework of this chapter, the interest naturally concerns examining how variations in such outcomes result from differences in exposure to early-life conditions. Choosing the sibling approach also largely solves the problem of selection, where the effect of early-life conditions in a cross-sectional framework may be influenced by aforementioned unobserved characteristics of individuals subjected to extreme conditions during infancy. The counterfactual assumption of the sibling approach suggests the possibility to observe the outcome an individual *would have enjoyed* should they have been exposed to other conditions during infancy. The family fixed effects furthermore cancel out such unobserved family level characteristics as norms and values which otherwise may have influenced the estimated effect from the early-life conditions of interest. The approach identifies the effect from early-life conditions within families, and not across families, implying that the estimated effect is to be interpreted as the result of the manipulation of any *X*-covariate compared to another member of the same family.

In the analysis, despite its shortcomings, cross-sectional models will also be estimated and compared to the results of the family fixed effects models. Excluded from all models are covariates which are likely to affect the dependent variable, but which themselves are affected by the key independent variable of the study. Hence, whereas an individual's attained educational level undoubtedly affects their income, it represents a confounding parameter in this context as it by itself represents a partial outcome of the independent variable of interest. For this reason, controls for attained education as well as civil status are not included in estimated models.

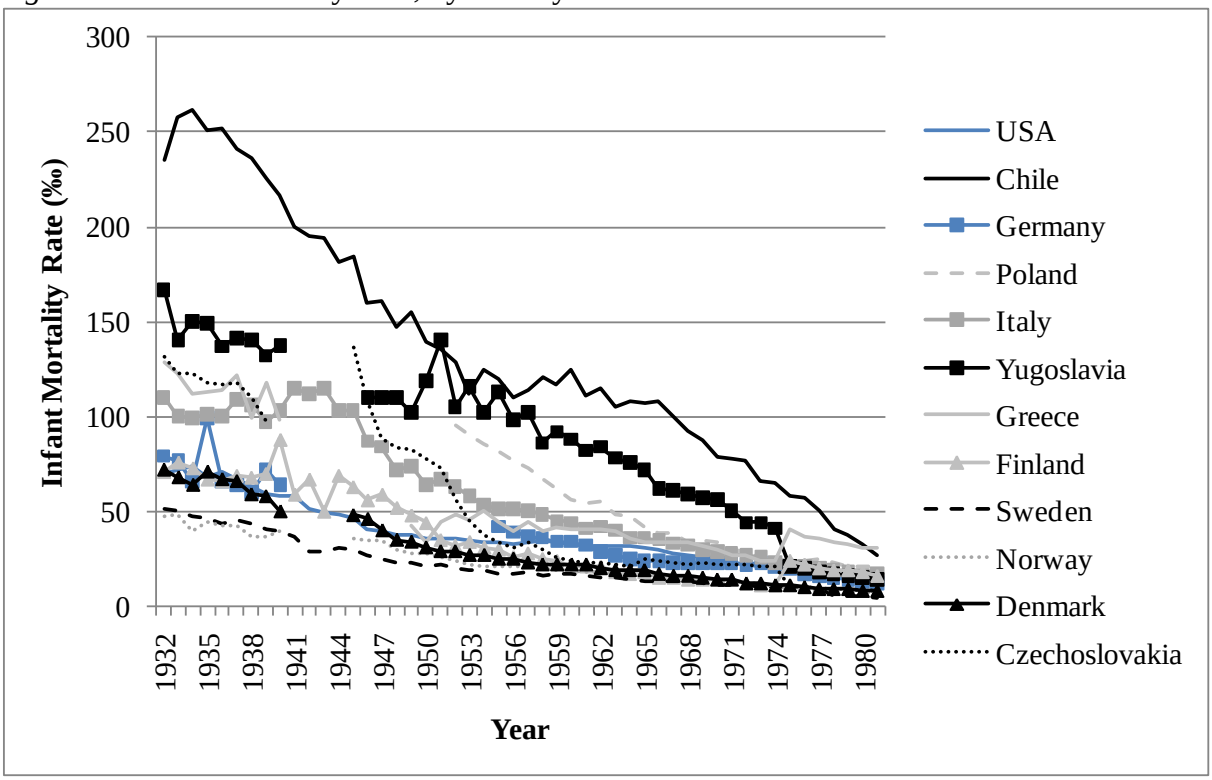
[73] The empirical strategy of the chapter draws on the work of Böhlmark (2008) and van den Berg et al (2009)

5.5. Early-life conditions

The infant mortality rate (IMR) has been considered to be a good indicator of the state of a given region's public health and hygiene according to previous research. The IMR decreased dramatically worldwide during the 1900s, illustrated by the fact that whereas Sweden was the only country that had achieved an IMR below 100 per thousand live births in 1900, all but 19 in a set of 187 countries had succeeded in this feat one hundred years later (Abouharb & Kimball: 2007). Despite this, noteworthy differences between the IMR's of countries remain even to this day. Thereby, the average individual born in Sweden can be expected to have been born under more favorable circumstances than the average immigrant belonging to the same birth cohort but born elsewhere during the period here studied.

Based on the earlier sections of the chapter, exposure to disease load during infancy is considered to be exogenous to the individual, and to typically expose the entire birth cohort of a given year and context. Following the empirical research of Forsdahl (1978), Bengtsson & Lindström (2000, 2003), Bengtsson & Broström (2009) and Finch & Crimmons (2004, 2006), the infant mortality rate can be used as an indicator of the degree of exposure to infection during the key phase of physiological development that is the first year of life. The data used to measure such conditions were compiled from various sources, including the UN Demographic Yearbooks and national statistics offices, measuring the infant mortality rate on a yearly basis and at the country level (Abouharb & Kimball: 2007). This means that seasonal and geographic variations in the infant mortality rate (IMR) within a given country are ignored, which is an unfortunate, but unavoidable, feature of the data which nevertheless is assumed to reflect important differences in the early-life conditions experienced by individuals from different countries and over time. Figure 1 shows the infant mortality rates for all birth countries in the sample, clearly illustrating a secularly declining trend over time in all countries of origin.

Figure 5.1: Infant Mortaliy Rate, by country of birth



Source: Abouharb & Kimball (2007)

Because siblings consistently share a common birth country as well as being born within a relatively narrow period of time, the typical difference between siblings in terms of the IMR conditions experienced during the first year of life is rather small. Close to 90 percent of the sample was born into an IMR context that did not differ by more than +/- 5 units from the family average IMR. Typically, the largest within family IMR deviations are observed for individuals from countries displaying the most considerable IMR improvements over time, as well as within families represented by many siblings, as a result of the more extended time elapsed from first to last birth. Whereas the median time from first to last birth among families represented by two or three siblings is 3 and 6 years respectively; the roughly 100 families in the sample including five or six siblings displayed a median period of 10 years.

Individuals belonging to the same birth family hence consistently experienced very similar early-life conditions. Therefore, when estimating the effect of *within-family* differences in exposure to disease during infancy in the family fixed effect approach, using the unadjusted infant mortality rate is considered to be unproblematic. However, the substantial differences in IMR between countries and over time make the effect of early-life conditions more problematic to estimate in the cross-sectional context. More specifically, this

pertains to the considerable variation which characterizes the variable and which therefore is likely to measure more than between individual variation in short term exposure to disease. For example, the roughly 112 unit IMR difference between two individuals representing the highest and lowest IMR at birth in the sample is more likely to gauge other general differences between two contexts than variations in short term exposure to infectious disease.

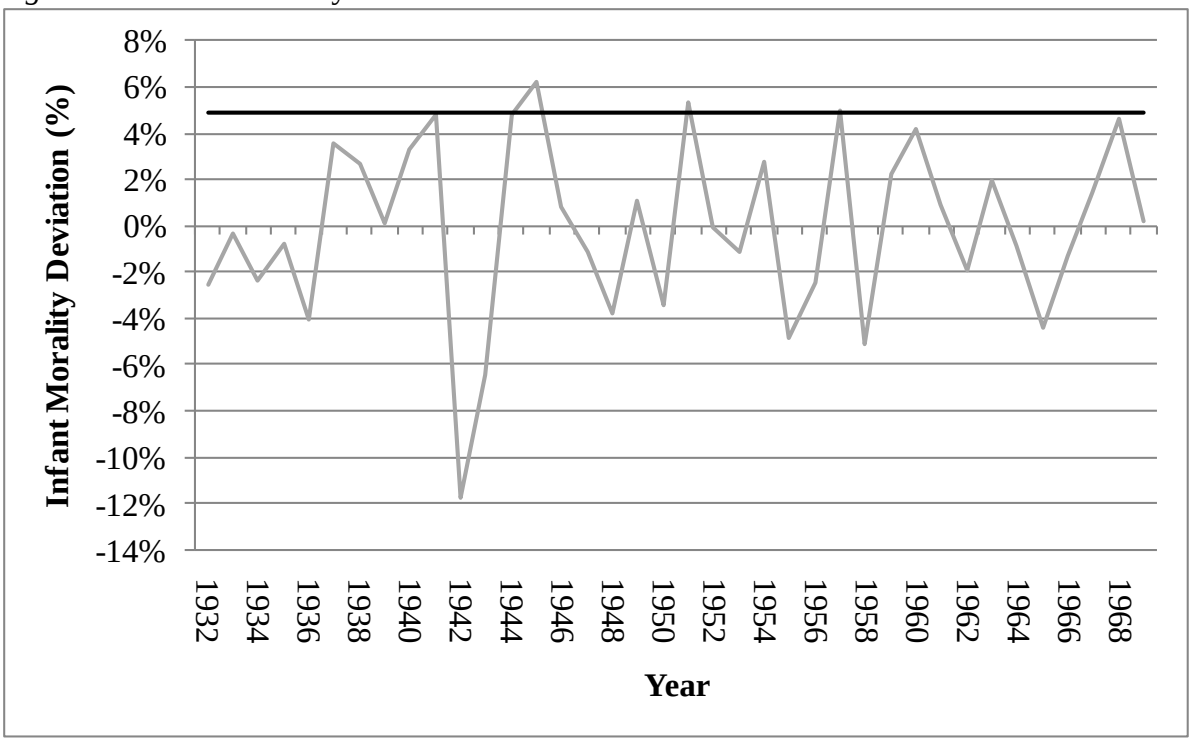
In order to examine the influence of exposure to disease load during infancy in the cross-sectional framework, the raw data needs to be adjusted to identify birth cohorts exposed to particularly unfavorable conditions (Bengtsson & Lindström: 2000, 2003). For example, while the 1980 birth cohort from a given country would have been subject to considerably more favorable average conditions in terms of general health care practices and hygiene than the 1955 birth cohort, short-term variation in exposure to disease does not necessarily follow the same pattern. Hence, an unusually severe strand of the influenza virus may negatively and persistently affect survivors of the latter birth cohort despite this cohort enjoying a more favorable overall health situation. Having the IMR as a measurement of early-life exposure to disease, the Hodrick-Prescott filter was therefore used on the unadjusted IMR-data to separate the short term variation from the long term trend (see for example Johansson: 2003, Bengtsson & Lindström: 2000, 2003). Due to the data on IMR being available at yearly intervals, the data was adjusted using a filtering factor of 6.25[74]. The resulting trend represents a measurement of the IMR regime into which the individual was born, varying quite considerably from the Swedish and Finnish birth cohorts of the late 1970's and early 1980's, experiencing an IMR trend below 7 per 1000 live born babies. This is to be compared to an IMR trend above 115‰ in Chile and Yugoslavia during the 1950's. Thus, regardless of whether the individual's birth year is considered favorable or unfavorable, differences in the IMR trend may indicate variations in the baseline exposure to infectious disease.

The interest of the chapter is however into the effects of short term variations in early-life exposure to disease and not into the influence of the secular decline in IMR on the individual's later life labor market outcomes. Therefore, in the cross-sectional analysis, the influence from early-life conditions will be captured by the cyclical component of the IMR, indicating short term deviations from the IMR trend. Previous research has directed particular attention to the consequences of being born during years characterized by an IMR variation above the trend, suggesting that individuals born in years above a given threshold are likely to have been exposed to an elevated disease load (Bengtsson & Lindström: 2000, 2003). However, determining what magnitude of deviation from the infant mortality rate trend that should indicate a

[74] This smoothing filter was suggested by Ravn & Uhlig (2001)

year with an elevated disease load is not a straightforward task, particularly on theoretical grounds. In this chapter, the chosen threshold is represented by an IMR deviation above the trend exceeding five percent, shown in Figure 5.2 below for Swedish birth cohorts. Also displayed in the figure are the birth cohorts adjudged to have been born under particularly unfavorable circumstances.

Figure 5.2: Infant Mortaliy Rate deviation



Source: Abouharb & Kimball (2007)

The decision to consider the relative rather than the absolute deviation stem from the fact that the absolute deviation is strongly correlated with the IMR trend. Hence, whereas an absolute IMR deviation exceeding five *units* is not uncommon in contexts characterized by an IMR trend exceeding 100, it is very uncommon in lower IMR contexts. In order to arrive at a threshold which is less driven by the IMR trend, and therefore more comparable across birth contexts, the decision became to opt for the relative rather than the absolute deviation.

In the family fixed effects regression, the small within-family differences in IMR at birth promote using the unadjusted IMR data as a measure of variation in early-life conditions. The effect is however not necessarily linear, why polynomials of the IMR will be included in the models.

As indicated by previous research, an individual's vulnerability to exposure from adverse early-life conditions may also depend on the inter-generational

transmission of resources. While the IMR is considered to be an essentially exogenous measurement of variations in exposure to disease, characteristics of an individual's birth family may influence the magnitude of its effect. Resulting from greater opportunities to redirect resources to a child exposed to comparatively more adverse early-life conditions, children with parents possessing plentiful intellectual and material resources may respond less negatively from exposure to adverse early-life conditions. In order to investigate the relevance of such mechanisms, the parents' approximated level of resources – measured as their highest educational level – is interacted with the measures of early-life conditions.

5.6. Results

Estimated models are displayed in Appendix D, originating from a standard way of modeling labor market outcomes in the absence of measurements of early-life conditions, primarily for comparative purposes. The modeling is subsequently extended to include measurements of early-life conditions, followed by the introduction of family fixed effects which cancel out the influence of unobserved and time invariant characteristics shared by siblings. The first section focuses on the results of the cross-sectional OLS regression analysis, where the influence from early-life conditions is modeled as the association between being born in a year characterized by an IMR variation being five percent or more above the trend, and later life income attainment. The subsequent section examines the determinants of attained income by means of fixed effects modeling, therefore estimating within-family effects. Due to the ability to control for family specific characteristics as well as the largely similar context of birth between siblings, the effect of early-life conditions is in the fixed effect models operationalized as unadjusted IMR. Lastly, the robustness of the results will be examined by means of sensitivity analyses.

5.6.1. Early-life conditions without family fixed effects

Model 1 is estimated using cross-sectional OLS regression, modeling the individual's labor market outcomes without controlling for any factors gauging the conditions at the time the individual was born. Observing the country of origin effects, a generally familiar pattern from Swedish labor market research emerges, with an often statistically significant baseline advantage experienced by the native born. More specifically, the advantage is most accentuated *vis à vis* the Chilean and Greek immigrant who experiences an income approximately 18 percent lower than that of an otherwise similar native. While undoubtedly suggesting substantial baseline disadvantages for a few of the immigrant groups,

the majority of the baseline country of origin effects are either statistically insignificant or indicative of a predicted income less than ten percent lower than a comparative native. Immigrants from Germany, Norway and USA emerge among the insignificant country of origin effects, a frequent finding in research on Sweden and indicative of these nationalities' relative lack of difficulties in the Swedish labor market.

Model 2 is extended to control for the influence of exposure to conditions in the individual's country of birth, indicated in previous research as influencing the magnitude of the country of origin effect. Results indeed suggest a part of the country of origin effect that is observed in model one as dependent on the amount of exposure to home country conditions, as parameter estimates suggest a significant and negative linear average effect for age at migration. Estimated as a joint effect for all countries of immigration, the estimates suggest an on average 0.4 percent lower predicted income with each one year increase in the individual's age at migration. Given the country of origin, an individual migrating at the age of 20 hence experiences an 8 percent lower predicted income than an otherwise comparable individual having migrated before the age of one.

The baseline country of origin effects in the model now represent the predicted income effect from being born abroad, but migrating before the age of one which in the majority of the cases can be observed to be associated with a less substantial disadvantage in terms of predicted income. A number of the country of origin effects which were statistically significant in model one are now not only associated with a smaller coefficient but have also become insignificant. The exceptions are represented by immigrants from Chile, Greece and Italy who still are observed to be disadvantaged compared to the native. This remains the case even if having only experienced less than a year's exposure to home country conditions. Opting instead for a categorical representation of the age of migration effect in Model 3, primarily in order to allow for a different functional form of its effect, does little or nothing to alter the interpretation of the baseline country of origin effects, neither regarding their statistical nor economic significance. As regards the influence from age at migration, the categorical representation of the effect suggests less than a linear influence. In fact, compared to the reference category represented by individuals having migrated before the age of three, only those having migrated after turning 18 are observed to suffer from a disadvantage that is statistically significant.

The baseline country of origin effects estimated in Models 1 through 3 capture the average influence of all unobserved factors that are shared by individuals originating from a common country, containing parameters such as cultural traits as well as the influence from the general level of well-being and

the overall health care standard. Turning to the potential influence from variations in early-life conditions on adulthood income attainment, Model 4 takes the parents' socioeconomic status into account. Furthermore, the model also explicitly examines the influence of early-life conditions, measured whether the individual was born during a year characterized by an elevated disease load. Introducing these measures consistently further diminishes the importance of the explicit country of origin parameters. This promotes the importance of the intergenerational transmission of resources, measured by parental educational level, as key in determining the individual's adulthood labor market outcomes. The limited importance of the country of origin effects may seem surprising in contrast with previous research, which consistently points to a potent influence of where one was born. However, it should be remembered that the influence of country of origin is frequently linked to adult immigrants suffering from limited capabilities both in terms of language skills and possibilities to obtain an adequate payoff to a formal degree obtained abroad. Hence, bearing in mind that the median age of migration among the immigrants in the sample amounts to eleven years of age, the average immigrant will have spent over 20 years, as well as having obtained their most advanced formal degree in Sweden, thus at least partially eliminating a few motivations for the existence of a country of origin effect.

As previously explained, in the cross-sectional analysis, exposure to adverse early-life conditions is measured vis à vis a pre-defined threshold, in order to identify individuals born during years likely to have been characterized by an unusually elevated disease load. Using a threshold of a positive deviation from the IMR trend exceeding five percent, Model 4 provides little evidence of such an experience as influencing the individual's attained income, represented by the statistically insignificant 0.5 percent disadvantage associated with birth in a year of an elevated IMR. Model 5 interacts the early-life covariate with the parents' socioeconomic status in order to obtain an indication whether the inexistent overall early-life effect potentially could be a result of varying degrees of resilience to adverse conditions according to the amount of resources available to the parents. Whereas the average effects indeed suggests the existence of a socioeconomic gradient where children of parents with no more than primary schooling experiences a 2.5 percent lower predicted income than a child with tertiary educated parents, the parameter estimates are all statistically insignificant.

5.6.2. Early-life effects, controlling for family level unobserved characteristics

Models are in the remainder of the chapter estimated by fixed effect regression technique, aiming to take unobserved family level characteristics into account. This also alters the interpretation of coefficients, as within-family rather than between-individual effects are estimated. Before, all observations were treated as independent from each other, and the effect of a change in a parameter was therefore interpreted as compared to a randomly selected and otherwise similar individual in the sample. Here, effects are instead estimated as compared to an otherwise similar individual within the same family.

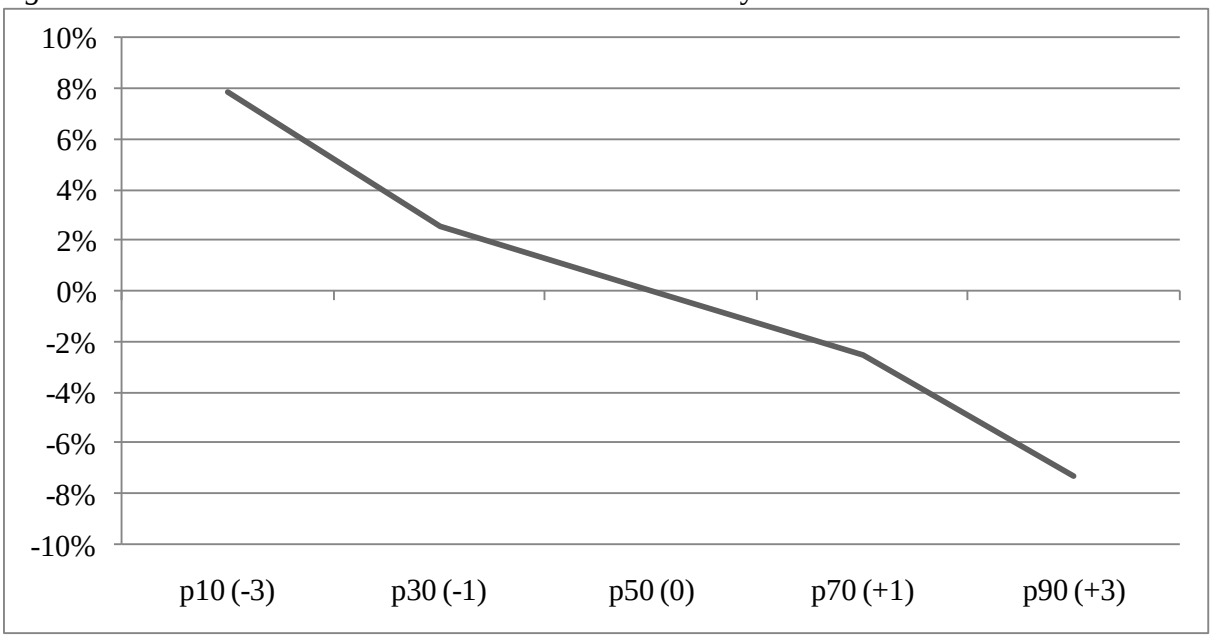
Apart from adjusting the econometric modeling to include family fixed effects and thereby controlling for time constant unobserved characteristics shared by individuals belonging to the same family, Model 6 follows the approach by van den Berg *et al* (2009). More specifically, the model does not explicitly gauge the individual's early-life conditions, but instead examines the influence of varying duration of exposure to home country conditions. The results, focusing on between-sibling differences, no longer support the downward sloping trajectory suggested by the OLS cross-sectional regression. While the reference category represented by immigrant siblings migrating before the age of three still is observed to enjoy an on average slight advantage compared to the majority of the other age at migration categories, the advantage is consistently statistically insignificant. Furthermore, the pattern suggested is now somewhat erratic as not all categories representing ages of migration subsequent to the age of three are estimated as associated with negative effects. Indeed, among immigrants, the results would suggest between-sibling differences in attained income as virtually unaffected by the duration of exposure to the conditions in the country of origin. The story remains consistent when opting for a linear effect of age at migration (not shown), indeed resulting in a slightly negative but insignificant parameter estimate.

Focusing explicitly on the individual's experiences during their first year of life, reported parameter estimates are no longer solely estimated on the immigrant population but instead on the entire sample. Model 7 is hence extended by measuring the infant mortality rate during the year in which the individual was born, and estimating the influence of within-family variation in the IMR on the attained adulthood income. The estimates strongly suggest a negative influence on Swedish labor market outcomes from exposure to increasingly adverse conditions during the first year of life. Consistently associated with the best model fit when estimated as a nonlinear effect, the unadjusted as well as the squared and cubed IMR parameters are all statistically significant.

Recalling that the effect is estimated as within-family effects, a reasonable way of interpreting the influence of early-life conditions is to predict income differences between siblings belonging to – for this sample - typical families. Therefore, the predictions are made according to the distribution of the sample's IMR deviation from the family mean, whose median observation, more or less per definition, centers around zero. The predictions will focus on the predicted income effects from early-life conditions at 20 and 40 percentiles above and below the median, thereby illustrating situations common for typical sibling combinations in the sample.

As a result of the sample being dominated by native Swedes, the average individual is observed to belong to a family characterized by a mean IMR of 26‰, with 80 percent of the deviations from the family mean existing within a span ranging between +/-3 IMR units. Figure 5.3 illustrates the predicted income difference from deviations from the family mean, according to the estimates of Model 7.

Figure 5.3: Income effect from deviation from IMR family mean. Percent



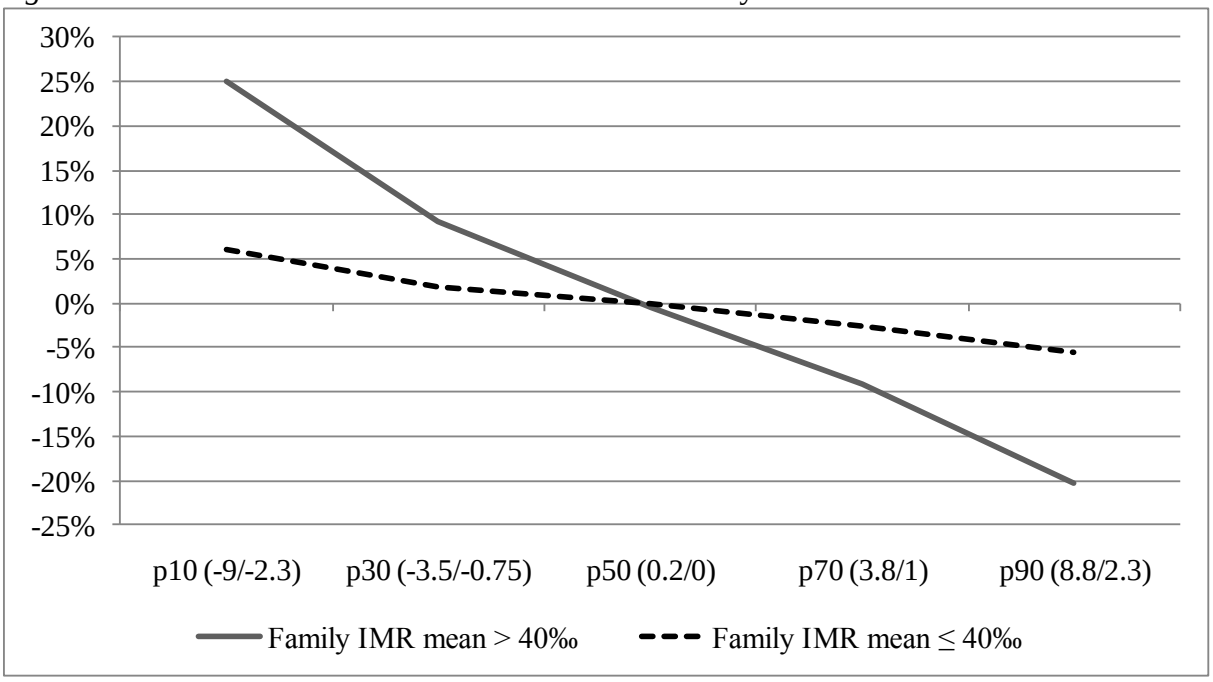
Note: X-axis represent percentiles of IMR deviation from family mean. Actual deviations in parenthesis.

The results suggest a lower predicted income for siblings born into comparatively unfavorable early-life conditions. As previously pointed out, the typical situation is however represented by siblings from a common birth family experiencing very similar early-life conditions. This is illustrated by 40 percent of the observations representing a deviation from their family mean not exceeding one IMR unit in either direction. Being born into conditions representing the 70th and 90th percentile, translates to experiencing a deviation

from the family mean amounting to +1 and +3 IMR units. In terms of predicted income, such situations translate to an income penalty amounting to about 2 and 7.5 percent, respectively.

Among sibling combinations born in higher IMR contexts, the early-life experience is characterized by a considerably more sizeable variation in early-life conditions. Among families where siblings were exposed to conditions represented by a mean family infant mortality rate up to and including 40‰, 80 percent of the siblings' deviation from their respective family mean fit within a +/- 2.3 IMR interval. This is to be compared with siblings born into contexts with a mean family IMR exceeding 40‰, where the same proportion of observations represent deviations from their family mean between -9 and 8.8 IMR units. The effect of IMR on the individual's income was in Model 7 estimated as a common effect for all subjects, regardless of the IMR context at birth. Therefore, this typically translates to greater differences in the predicted income among siblings born in high IMR countries, as shown in Figure 5.5.

Figure 5.4: Income effect from deviation from IMR family mean. Percent.



Note: X-axis represent percentiles of IMR deviation from family mean. Actual deviations in parenthesis (Family IMR mean > 40‰ / Family IMR mean ≤ 40‰.).

An individual born in a high mortality context and characterized by an IMR deviation representing the 70th percentile was according to the data exposed to an infant mortality rate being 3.8 units above the family mean. Compared to a sibling representing the family mean, such conditions according to the results translate to a 9 percent lower income, all else equal. While a substantial effect

also in economic terms, the lasting disadvantages that are suggested to be produced by such exposure emerge even more clearly when considering that an individual experiencing similar conditions but born in a low-mortality context is characterized by a predicted income disadvantage amounting only to 2.5 percent.

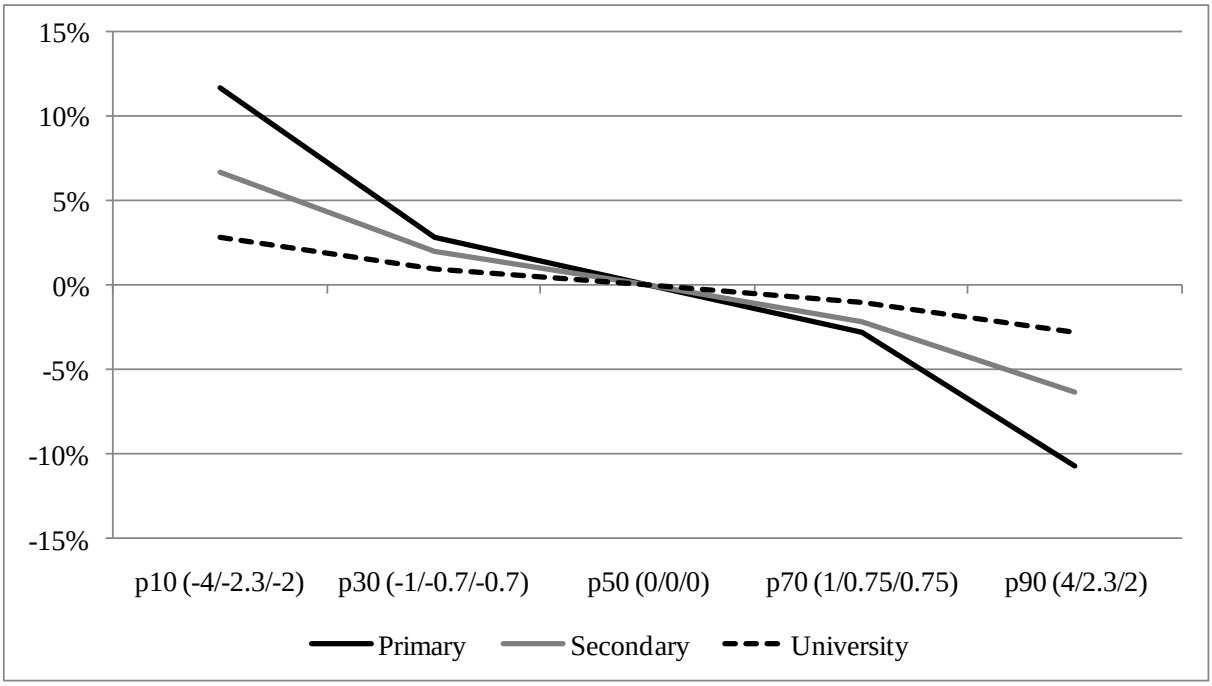
The cross-sectional analysis confirmed the mechanism of intergenerational transfer of resources as highly influential in determining the individual's labor market outcome. Apart from providing the child with a set of resources directly influencing the individual's attitudes towards academic studies and career choice, an individual's vulnerability to a health shock may depend on the intellectual as well as the material resources possessed by their parents. Model 8 therefore aims to examine whether exposure to adverse conditions may affect individual's differently depending on the approximated level of resources available to the family at the time of the child's birth, measured as the parents' educational level.

The results suggest that children of parents with more ample resources are considerably more resilient to differences in early-life conditions during the first year after birth. Not only is the effect of IMR at birth insignificant among siblings of university educated parents, the predicted trajectory of the effect is considerably less steep than for the other categories. The lack of such an effect among the children of university educated parents would suggest that these families possess the resources to largely offset the negative influence from being exposed to an elevated disease load. The results suggest no such capabilities among remaining parent SES categories, as an individual exposed to worse early-life conditions than their sibling and with parents with no more that secondary schooling is observed to suffer from a lower and statistically significant attained income. Within the most populated IMR span, represented by individuals experiencing conditions at birth not exceeding an IMR of 45‰, the situation suggested by the results is one which is strongly similar among children of primary as well as secondary educated parents. Among children born into a more elevated IMR context, differences in the early-life conditions to which children in a given family were exposed lead to increasingly different labor market outcomes among children of primary educated parents.

Differences in the predicted income is presented in Figure 5.5, again estimated according to typical early-life conditions for individuals in the sample belonging to each of the socioeconomic categories outlined. As suggested by the figure, the deviation from the family mean IMR varies to a non-negligible extent across the birth family's level of resources. Particularly accentuated among children of parents with no more than primary education, these siblings are characterized by larger shares with comparatively elevated deviations from the family mean. More specifically, 80 percent of siblings from families where the

parents possess secondary schooling or more have experienced a deviation from their family mean not exceeding +/- 2.3 IMR units. Among siblings with primary educated parents, the corresponding figure at the 10th and 90th percentile deviation from the family mean is almost twice as large, at +/- 4 IMR units.

Figure 5.5: Income effect from deviation from IMR family mean, by parents' highest education. Percent



Note: X-axis represent percentiles of IMR deviation from family mean. Actual deviations in parenthesis (primary/secondary/university).

Consistent with the indications from the previous section, the flatter curve suggested for children of parents with the most plentiful resources is replicated when explicitly looking at the effect from different early-life conditions. Compared to the typical child of university educated parents, a sibling born during a year characterized by an IMR representing the 70th percentile, experiences a predicted income being one percent lower. Such an average effect is not only rather negligible, but it is also statistically insignificant and therefore estimated with less than needed precision for any conclusions supporting its effect to be made.

Of more substantial importance are instead the differences in predicted income as a result of varying exposure to early-life conditions among siblings belonging to families where the parents possess no more than secondary schooling. The effects are again calculated *vis à vis* a typical individual belonging to the family type in question, suggesting between-sibling differences in the predicted outcome as increasingly sensitive to early-life conditions in

families possessing the least resources. An individual with primary educated parents and born into an IMR context represented by the 70th or the 90th percentile experiences a predicted income being roughly six and eleven percent lower than a sibling representing the family mean. The corresponding income penalty for the child of a secondary educated parent amounts to two and six percent, respectively. The increasing steepness of the predicted trajectories with decreasing parental resources provides little evidence supporting the hypothesis that families with fewer resources were able to ameliorate the detrimental effect of the most severely affected child by redirecting resources to that child.

5.7. Sensitivity analyses

The favored measurement of early-life conditions used in the family fixed effects part of the analysis is the unadjusted infant mortality rate, deemed appropriate due to the estimation relying on within-family variation in the parameters of interest. In order to more easily compare the results of the chapter with previous research using the IMR as a measurement of early-life conditions, Models 9 and 10 are estimated using family fixed effects, but gauging the individual's early-life conditions as in the cross-sectional analysis; as a threshold effect. Estimated as a model with a common early-life effect for everyone in the sample, the results suggest that an individual born during a year with an IMR variation exceeding the trend by five percent or more will experience a predicted income being 2.5 percent lower than the sibling born in a year characterized by a smaller positive or even a negative deviation from the trend. This result is naturally not directly comparable to the fixed effects results using the unadjusted IMR, but nevertheless supports its conclusions where the sibling born during the comparatively less favorable circumstances subsequently experiences worse labor market outcomes. Model 10 is extended to interact the early-life effect with the parents' educational level, again in order to inquire into whether the vulnerability to adverse early-life conditions varies depending on the amount of resources possessed by the parents. Again, results largely support those already encountered, particularly regarding the accentuated disadvantage experienced by individuals with parents with no more than primary education. The parameter estimate is only significant among siblings from such families, suggesting someone being born during adverse conditions as experiencing a 3.3 percent lower income than a sibling born into more favorable circumstances.

The sibling combinations included in the sample range from families with two to nine children, implying that the IMR context experienced by the first born child could differ considerably from the last born as a result of the period of time elapsed separating the births, despite occurring in the same country.

While 70 percent of the families, regardless of the number of siblings, cover a birth interval not exceeding 5 years as well as the individual's deviation from the family average IMR in more than 98 percent of the cases not exceeding 8 units in either direction, the potential influence of outlying observations cannot be discounted. In order to ascertain that the estimated effect of between sibling differences in exposure to disease load during infancy indeed is not driven by individuals in families with more substantial variation, two additional models were estimated, where the first is restricted to only include individuals whose conditions experienced during infancy fits within an IMR interval of eight units above and below the family average, as Model 11.

Reducing the sample by roughly 200 families, the effect from IMR maintains a consistent pattern as well as remaining statistically significant when estimated on the restricted sample. Compared to when estimated on the unrestricted sample, the predicted income effects only differ to a negligible extent. Again, the IMR effect is only significant among children of primary and secondary educated parents, and is associated with an increasing income penalty from being exposed to an IMR context characterized by a standard deviation higher IMR than the otherwise comparable sibling. Hence, it can be safely concluded that the estimated effect is not a result of families containing siblings born into very different IMR contexts.

A final sensitivity test consists of restricting the analysis to families consisting of no more than two children, as high and low-resource families may have had differing childbearing strategies, potentially influencing the effect from early-life conditions that is observed. It is for example possible that the greater effect from early-life conditions among siblings from low-resource families might be the result of their parents being more likely to opt for a strategy based on quantity rather than quality. Model 12 suggests this as not likely to be the case, as the effect remains also when estimating the model on roughly 3,000 families with two siblings, born within a time span less than or equal to seven years. Again, at the mean the results consistently suggest siblings within families with primary educated parents as most vulnerable to adverse conditions, with a predicted income penalty amounting to five percentage points for being born during a year with an IMR amounting to a one standard deviation positive difference. Thus, despite the available resources of a given birth family only being claimed by two children, the results remain consistent, indeed suggesting the least resourceful parents as on average being unable in offsetting an adverse health shock by redirecting resources to the adversely affected child.

5.8. Conclusions

There is a growing empirical literature emphasizing the lasting influence of health conditions experienced during early-life. On numerous contexts, empirical research has established a link between early-life conditions and later life health as well as socioeconomic status. Furthermore, all three parameters; early-life conditions, later life health and socioeconomic status, seem intimately related. Hence, a direct as well as indirect causal link between an individual's early-life conditions and subsequent labor market experience has been indicated as a plausible mechanism explaining differences in outcomes that cannot be explained by traditional models.

A major difficulty associated with such a link is naturally however to isolate the existence of a causal effect. Firstly, when examining adulthood outcomes, the time elapsed between cause and effect naturally makes any model vulnerable to the influence of a range of confounding factors. Furthermore, the results may be sensitive to issues of selection, where in particular individuals born under especially unfavorable circumstances may share a set of unobservable characteristics driving their effect. The contribution of this chapter relates to largely solving the second problem in particular by examining a sample of biological siblings and exploiting fixed effect modeling, canceling out shared unobserved characteristics. The method allows for viewing siblings' outcomes as an individual's counterfactual, due to individuals belonging to a given family to a considerable extent sharing unobserved characteristics, including genetic factors, ambition, values and norms.

A second contribution of the chapter is to examine a research problem which previously has not been examined in Sweden during the time period in question, using the aforementioned econometric modeling. Measuring early-life conditions using the infant mortality rate, another advantage of the findings pertain to the individual's exposure being exogenously determined and, therefore, exposing large segments of – if not the entire – population. The results consistently suggest within-family variation in exposure to disease load as exercising a significant influence on the predicted adulthood income. While typical differences between the early-life conditions experienced by individuals from the identical family typically are very small, the results nevertheless suggest an economically significant influence.

While the measurement of early-life conditions explicitly is designed to be exogenous and essentially permeate the entire population. Despite this, previous research has indicated varying degrees of vulnerability to health shocks across socioeconomic status levels. The modeling was therefore extended to examine to what extent the influence from exposure to adverse early-life conditions vary depending on the resources available to the parents. The results suggest the

influence of exposure to early-life conditions as associated with the greatest effect on the predicted adulthood income among children in families with the least resources. This suggests between-sibling differences within such families as leading to rather substantial differences in their later life labor market outcomes. The results also indicate the influence of such between-sibling differences in exposure to early-life conditions as decreasing with the parents' increasing socioeconomic status. Even more so, the influence estimated among siblings belonging to families with the most plentiful material and intellectual resources.

The existence of a socioeconomic gradient in the influence of early-life conditions strongly suggest that parents with a lot of resources appear able in redirecting resources among the siblings. As a result, the effect of the early-life conditions to which the less fortunate sibling was exposed may be at least partly offset by parental intervention. More specifically, better educated parents are more likely to possess knowledge regarding health care practices, nutrition and care. Despite the assumption that the exposure to variations in disease load affects the entire population, it is not impossible that differences in resources also potentially may affect a parent's opportunities of partially or completely shielding the child from being exposed. While impossible to observe which explanation is correct, both would arguably present the observed pattern of early-life influence on later life labor market outcomes.

This chapter concludes by confirming the existence of a link between early-life conditions and attained income in adulthood. This is done by examining a sample of natives and immigrants, suggesting the effect as consistent across contexts. Considering Sweden's history as a forerunner in health care practices, the results would suggest differences in early-life conditions between natives and immigrants as partially linked to different conditions experienced during the first year of life.

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Statistical Sources

Swedish Longitudinal Immigrant Database, Centre for Economic Demography, Lund University

Appendix D

Table D1: Estimates

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) FE	(7) FE	(8) FE	(9) FE	(10) FE	(11) FE	(12) FE
IMR deviation >= 5 %				-0.005					-0.0250*			
Parents with primary education:												
IMR deviation >= 5 %					-0.009					-0.0325*		
Parents with secondary education:												
IMR deviation >= 5 %					-0.007					-0.032		
Parents with university education:												
IMR deviation >= 5 %					0.016					0.021		
IMR at birth							-0.025***					
IMR at birth, squared							0.000***					
IMR at birth, cubed							-0.000**					
Parents with primary education:												
IMR at birth								-0.028***			-0.035***	-0.046***
IMR at birth, squared								0.000**			0.000*	0.001***
IMR at birth, cubed								-0.000**			0.000	-0.000**
Parents with secondary education:												
IMR at birth								-0.0283***			-0.038***	-0.033**
IMR at birth, squared								0.000**			0.001**	0.001**
IMR at birth, cubed								-0.000			-0.000*	-0.000**
Parents with university education:												
IMR at birth								-0.014			-0.025	-0.025
IMR at birth, squared								0.000			0.000	0.000
IMR at birth, cubed								0.000			0.000	0.000
Age at migration, continuous		-0.004***										
Age at migration, 0-2			ref	ref	ref	ref	ref	ref	ref	ref	ref	ref
Age at migration, 3-5			-0.037	-0.032	-0.032	-0.028	-0.003	-0.002	-0.025	-0.026	0.026	0.055
Age at migration, 6-8			0.014	0.014	0.014	0.024	0.060	0.060	0.026	0.026	0.086	0.087
Age at migration, 9-11			-0.057	-0.053	-0.053	-0.035	0.018	0.018	-0.034	-0.034	0.042	0.033
Age at migration, 12-14			-0.035	-0.030	-0.030	0.018	0.090	0.092	0.019	0.019	0.128*	0.124
Age at migration, 15-17			-0.061	-0.055	-0.055	-0.006	0.079	0.085	-0.007	-0.007	0.103	0.060
Age at migration, 18-20			-0.0716*	-0.061	-0.061	-0.024	0.073	0.078	-0.025	-0.025	0.063	0.035
Country of birth:												
Sweden	ref	ref	ref	ref	ref							
Sweden, second generation	-0.020**	-0.019**	-0.019**	-0.017*	-0.017*							
Chile	-0.177***	-0.112***	-0.124***	-0.125***	-0.125***							
Yugoslavia	-0.092***	-0.046	-0.055	-0.021	-0.021							
Denmark	-0.066***	-0.017	-0.025	-0.019	-0.019							
Finland	-0.078***	-0.031	-0.041	-0.010	-0.010							
Greece	-0.180***	-0.130***	-0.142***	-0.089*	-0.089*							
Italy	-0.149***	-0.101**	-0.109**	-0.076	-0.076							
Norway	-0.038	0.013	0.004	-0.007	-0.007							
Poland	-0.020	0.034	0.023	0.006	0.006							
Czechoslovakia	0.065	0.108**	0.103*	0.057	0.055							
Germany	-0.010	0.031	0.024	0.021	0.021							
USA	0.035	0.077	0.070	0.050	0.050							
Birth order:												
First born	0.027***	0.028***	0.028***	0.016**	0.016**	-0.013	-0.009	-0.010	-0.013	-0.013	-0.009	-0.015
Second born and above	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref	ref
Parents highest education:												
Primary education				ref	ref							
Secondary education				0.052***	0.052***							
University education				0.158***	0.157***							
Constant	12.32***	12.33***	12.33***	12.27***	12.27***							
Observations	11276	11276	11276	11276	11276	11276	11276	11276	11276	11276	10513	6230
R-squared / Within R-squared	0.222	0.222	0.223	0.241	0.241	0.22	0.223	0.224	0.221	0.221	0.226	0.221
Number of families						4697	4697	4697	4697	4697	4451	3115

*** p<0.01, ** p<0.05, * p<0.1

All models include controls for birth cohort, sex, municipal unemployment rate, metropolitan residence.

The models were estimated using the STATA xtreg (fe) command, with the family id indicated as the clustering variable.

Models 1 through 10 are estimated on pooled sample. Model 11 excludes individuals with IMR at birth > 8 units above or <-8 units below family mean. Model 12 restricts analysis to families with no more than two children.

Table D2: Full estimates, selected models

VARIABLES	FE Model 7	FE Model 8
bcoh_3239	-0.131	-0.122
bcoh_4044	-0.00624	-0.00272
bcoh_4549	-0.0115	-0.0103
bcoh_5054	-0.00833	-0.00763
bcoh_6064	0.0574***	0.0569***
bcoh_6569	0.107***	0.106***
sex	-0.322***	-0.322***
m_unemprate_3236	-0.0160***	-0.0162***
metro	0.0682***	0.0688***
parity_1	-0.00904	-0.0103
aam3_5	-0.00285	-0.00234
aam6_8	0.0597	0.0595
aam9_11	0.0177	0.0175
aam12_14	0.0896	0.0919
aam15_17	0.0786	0.0849
aam18_20	0.0725	0.0783
parpri_imr		-0.0280***
parpri_imr2		0.000307**
parpri_imr3		-1.33e-06**
parsec_imr		-0.0283***
parsec_imr2		0.000326**
parsec_imr3		-1.23e-06
paruni_imr		-0.0139
paruni_imr2		6.07e-05
paruni_imr3		2.66e-09
imr	-0.0253***	
imr2	0.000261***	
imr3	-9.98e-07**	
dev_p3		
Constant		
Observations	11276	11276
R-squared	0.223	0.224
Number of fam_id	4697	4697

*** p<0.01, ** p<0.05, * p<0.1

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