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*International Business School*

# Migration and average wages in Sweden

Immigration as a labour supply shock on the Swedish labour market from the year 2011 to 2018 across municipalities.

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## Abstract

With the recent influx of foreign-born individuals migrating to Sweden, this study aims to answer the question, “do high skilled foreign-born individuals relate positively to average wages in Sweden?”. We specifically observe high skilled foreign-born individuals and their contribution to the average wage across different municipalities in Sweden between the years 2011 and 2018. The method carried out in this study consisted of an empirical analysis where the significance of economic factors was interpreted in order to understand the variation in wages. The data was extracted from Statistics Sweden. The relationship of the share of highly educated foreign-born individuals has proved to be insignificant with respect to average wages in Sweden. Different theories are discussed in this paper in order to identify the key labour market outcomes due to the labour supply shock. Our findings disclose that differences in wages are present, meaning that natives and foreign-born individuals are complements in the short run.

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# 1 Introduction

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*The purpose of this part is to introduce the reader to what will be covered in the chapter. This is presented at the start of each chapter and is adapted to reflect the content of the chapter.*

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*“Migration is important because it shapes and re-shapes societies, making them more diverse and complex.”*

*King, 2012 (P.6).*

The outcomes of immigration on wages and employment among native workers is of a main arising concern in the public debate on immigration in many countries, including Sweden. In the year 2015, Sweden experienced a peak of 134,200 foreign-born individuals migrating (OECD, 2016). An important topic is how the immigration flow impacts both the economy and society, where the most focus regarding policies for immigrants has been through an economic perspective. Increasing pressure has been put on the Swedish labour market in the last decade with the employment gap between native- and foreign-born individuals being the largest among European countries (OECD, 2015). This thesis aims to answer the question of whether immigration is positively related to the average wage level in Swedish municipalities whilst taking into account the contribution of both highly educated foreign-born individuals in Sweden.

According to Statistic Sweden, this year (2020), the population is forecasted to increase to 10.4 million. The increase in population is due to migration and fertility. However, immigration is the leading result of the increased population in Sweden over the past 15 years (Löfgren, 2017). Immigration has shaped the rate of growth of the Swedish population, where the recent immigration flow has been from countries in the Middle East (Hammarsted and Shukur, 2007). There has been increasing concern by the native population that foreign-born individuals are competing for the native workers jobs, decreasing wages on the labour market or even replacement of native workers by immigrants leading to unemployment (Brücker et al., 2012).

Conferring to Hartog (2000), there have been debated changes in order to ensure immigrants can easily enter the labour market. A possibility is by lowering the entry wage for foreign-born individuals in order to prevent a higher unemployment rate which leads to higher burdens on public finances (Hartog, 2000). Borjas (2013) states that the lowering of entry wages for immigrants leads to native-born workers being substituted by immigrants. Thus, leading to unemployment due to the higher costs of hiring native-born workers. Borjas (2013) does not

see that lowering the entry wage in order to prevent unemployment among foreign-born individuals as an effective solution as it leads to unemployment among the native-born workers. In regard to the literature, by examining whether individuals who migrate to Sweden can affect the native workers' wages in the labour market, a prediction can be made on how those changes can affect the overall labour market within a country.

### **1.1 Background**

Migration flows could be due to several factors such as war, natural disasters, labour shortage, and others. Most of the countries face a disproportional distribution of economic activity, more specifically, geographical disparities that were caused by the Second World War (Barro and Sala-i- Martin, 1995; Brulhart, 1998), which led to the redistribution of economic power in Europe. The following era has served prosperity to multiple countries contrary to other nations experiencing a regional divergence (Amiti, 1999), job opportunities, investments, and infrastructure. After the Second World War, the Swedish population contained 1% of foreign-born individuals, since then, the share of foreign-born individuals relative to the native population increased rapidly. An increase in the share to 7% percent in the year 1970 and in 1995 to ten percent (Ekberg, 1998). According to Hammarsted and Shukur (2007), it is not only the amount that immigration changes by, but also the patterns and the different types of immigrants over the years.

A large share of foreign-born workers from Europe had settled in Sweden (Hammarsted; Shukur, 2007). The labour force consisted mainly of foreign workers with low education. There was competition present between other immigrants and native-born workers, meaning that the labour supply was high, and the wage was kept low. Swedish trade unions around the year 1960 realised that the Swedish wage level was kept down for low paid workers because of the great flow of immigrants. This led to a restriction in the immigration policy which decreased the labour force among immigrants. This change allowed immigrants that were born outside Europe to migrate to Sweden (Hammarsted and Shukur, 2007). According to Ekberg (1998), immigration increased rapidly during the 1990s where most immigrants had come from former Yugoslavia and the Middle East.

It is evident that the Swedish population has changed remarkably over the years with Sweden for centuries being a country for migration where it is apparent that the unemployment rate is low among foreign-born individuals (Ekberg, 1998). Native born workers seem to have more opportunities available in regard to employment in comparison to foreign-born individuals (i.b.i.d). As mentioned, prior, this could be due to the fact that immigrants from different backgrounds at a larger share in recent years mostly from the Middle East have migrated to

Sweden, making it harder for the transformation of their human capital on the Swedish labour markets requirements. This means that in vast cases, high skilled foreign-born individuals are unable to apply their ability to their maximum in the labour market in Sweden meaning that they could be seen as an equivalent to a lower skilled native worker (Hammarsted and Shukur, 2007).

It is clear that the benefits of immigration have been disregarded to where immigrants can complement native workers, increasing the overall welfare (Friedberg; Hunt, 1995). This alone is an interesting matter to conduct this study; however, the outcomes of the labour markets of immigrants are considered an important aspect that contributes to economic performance to which policymakers assess in order to reach a decision (Sameeksha Desai; Johan Eklund; Pardis Nabavi, 2016).

## **1.2 Purpose**

A topic that has been overlooked in past literature is if the flow of foreign-born individuals that have migrated to Sweden between the years 2011 and 2018, is positively related to the average wages across different municipalities.

The purpose of our paper is to examine whether immigration is significantly related to the average wages, whilst taking into account the flow of high-educated foreign-born individuals and comparing different municipalities in Sweden. If the latter statement is accepted, we will observe how each factor is related to the average wage level. Wages reflect human capital endowments, which is composed of labour market experience and education as well as taking into account gender, age, and family background. The importance of human capital is demonstrated by how an individual can contribute to the economy through education in terms of wages (Becker, 1964; Mincer, 1958). Hence, this paper contributes to the new field of immigration economics by examining the statistical significance of immigration that explains any variation in the average wage level in Sweden.

## **1.3 Research question**

The basic question of regional economics is whether migration is perceived as part of economic growth success and as a solution to problems regarding demographic changes and social integration (Geddes & Niemann, 2015) in Sweden. Therefore, an empirical analysis will be conducted to identify whether there is a positive or negative relationship between average wages and immigration. In this favour, the research question of interest is below:

### *1. Do high-skilled foreign-born relate positively to average wages in the Swedish labour market?*

By the use of previous theories in combination with the use of quantitative research methodology, we are able to analyse whether immigration is significant to the average wage level, hence, forecasting the future based on which plausible policies can be formulated.

#### **1.4 Limitations**

The main limitation of this study is the access to micro-data. Meaning that if we could obtain data for wages of all individuals in the municipalities, an analysis on an individual level would have been made. Another limitation is the time period. Most of the data we had access to was only available from the year 2011 to 2018. Therefore, the outcome of the study might not show a relationship between average wages and foreign-born since it takes time for immigrants to integrate into the new country. This could be due to the language barrier, so there is a time lag from when immigrants reside in Sweden to when they enter the labour market. However, this may lead to the model in this study explaining the share of immigrants who have integrated and received a job, to which will be reflected by in the variation of average wages. Another limitation, with only eight years of data available, the outcome might be less reliable.

#### **1.5 Outline**

This paper will be as follows. The theoretical framework is presented in section 2. The third section will present our data and methodology. The fourth section will present the results and findings. The empirical results are discussed in the fifth section. The sixth section concludes the paper with suggestions for future research.

## 2 Literature Review

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*This sector will present the theoretical background in order to understand the purpose and outcomes of this paper. First, previous research within economic factors is introduced for a deeper understanding of some factors that can affect wages followed by a more comprehensive exploration in research related to the main factor of this study, immigration.*

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### 2.1 Supply, Demand and Labour Market Equilibrium

The labour market has always been prone to uncertainty through different shocks. Immigration is one of these shocks that has affected the labour supply and demand, resulting in a shift of the labour market equilibrium. Borjas (2013) has explained how wages are affected by the flow of migration. Immigration leads to an increase in the labour force, which is referred to as the labour supply shock; this shifts the labour supply curve further to the right. According to Borjas (2013), if the foreign labour force is assumed as a substitute for natives, this means that they possess equivalent skills, hence, more competition for the same job, leading to a reduction of wages. In order to integrate into the labour market, foreign labour force will settle for lower wages. From a firm's perspective, employers will prefer to substitute native workers with immigrants, hence, maximising their profits. This scenario would hold in the short-run; however, in the long-run, the labour market equilibrium will be reached through efficient allocation of labour supply and market demand for them. This is an example of Adam Smith's Invisible hand's theory only if the competition is allowed in the labour market.

Borjas (2013) talks about the case where the foreign-born are complements to natives, meaning that immigrants can possess lower education in comparison to a share of native workers. Therefore, foreign-born will fill the gap of labour-intensive jobs, leaving the native workers to occupy jobs requiring higher levels of education and skills. By assuming that foreign individuals and natives are complements, they will not compete for the same job. In this case, an increase in immigration will shift the demand for labour to the right, resulting in an increase in wages for natives due to higher productivity and efficient allocation in the labour market.

### 2.2 Minimum wage

The basic migration theory is applied to markets with minimum wage being present (Chassamboulli and Palivos, 2013). They stated that an increase in immigration leads to a change in the wage levels for the lower-skilled natives that can be substituted by immigrants. The effect is dependent on the presence of the minimum wage in the country, how the minimum wage is determined, and the bargaining position of the workers. An influx of immigrants lowers the average wages since foreign-born workers are prepared to accept lower wages, leading to an increase in job entries allowing the native workers to be placed in a better



bargaining position. The assumption that all immigrants are unskilled are said to be perfect substitutes. Therefore, immigration increases, *ceteris paribus*, decreases the marginal product, which in this case, lowers the wage for unskilled foreign-born workers and raises the native workers' wages (Chassamboulli and Palivos, 2013).

### 2.3 Human Capital Theory

Human capital is defined as the intangible resources and intellectual capital that individuals possess as a result of the accumulation of education, knowledge, previous work experiences, and on-the-job training. The human capital theory can trace its roots to the year 1960 when Theodore Schultz defined that human capital consists of “*knowledge, skills and abilities of the people employed in an organisation*” Schultz (1961, p140). Over many years, the definition of human capital has been criticised and modified by Becker (1993), Bontis et al. (1999), Frank and Bernanke (2007), and Acemoglu and Autor (2009). For the purpose of this thesis, we will focus on the most recent definition by Thomas et al. (2013, p3) “*the people, their performance and their potential in the organisation*”.

The human capital approach provides assistance to policymakers assessing the relationship between education, economic, and social benefits, leading to a more effective policy ensuring the desired economic growth is achieved. However, the human capital theory has received criticism when neglecting factors such as culture and social capital that should be taken into consideration when assessing the relationship between education and higher wages.

### 2.4 Mincer's wage equation

In the field of labour economics, Jacob Mincer (1974) has modelled the human capital earning function in order to investigate both nature and causes of inequalities in incomes on a micro-level. The Mincer equation stems from the early method of the Human Capital model. Expanding to be able to understand earnings differentials amid different cohorts. Defined by Mincer, the model implies that the decisions in regard to schooling are based on the value of future earnings (i.b.i.d).

A complete wage equation model would include the following human capital variables:

$$\log(wages_i) = \beta_0 + \beta_1 educ_i + \beta_2 exp_i + \beta_3 exp_i^2 + \dots + u_i$$

where the term  $U_i$  contains factors affecting an individual's wage.

The equation has embodied years of education, and of potential experience. In addition to that, Mincer's empirical work has shown that the earnings of an individual were growing as a

concave function of age, which is known as the “age-earning profile”. In previous research, Mincer (1958) mentioned that the curve for high-educated workers was steeper compared to low-educated ones. Age was considered another variable representing the accumulated work experience and the education level of workers, which is reflected in a higher level of income. The Mincer equation has established the causal effect of education and experience on the income, hence, revealing the causes and nature of income inequality between individuals. (Jones, 2005; Lehman, 1953 and Simonton, 1999) the described age-productivity curve as an inverted U-shaped curve where the productivity peaks between the age of 20 to 40.

The Mincer equation (1974) stated that there is a positive relationship between the education of an individual and their later earnings. However, it is not that simple. Jacob Mincer (1974) indicates that this could be understood as the outcome of a productivity-enhancing influence of schooling. In agreement with the Human Capital Theory, which explains that the productivity of an individual is directly affected by education, where the wage is reflected by the productivity of the worker (Rospigliosi, 2014).

Mincer’s model makes the assumption that investments in human capital affect earnings positively through an increase in productivity (Mincer, 1974). It is important to note that there is some degree of opportunity cost through the consumption of time. The variable experience allows for the observation of reality that even after finishing their education, individuals tend to invest in human capital. Mincer states that this occurs at a declining rate over the years (i.b.i.d). Therefore, the Experience squared variable is added in order to take into account for nonlinearity.

A critic of the Mincer model is that the correlation is affected by the training or educational investments that are pursued by individuals after completing their education (Mincer, 1974) - mentioning that these investments are not spread evenly over the population with these investments is an important factor that is played when determining wage level (i.b.i.d). With the weakening of the correlation between educational investments and education, the variable ‘experience’ squared is a reason to why it is included in the equation.

## **2.5 Immigration impact on the labour market**

Altonji and Card (1991) and Card (1990) examined the effect of immigration on low skilled native-born workers. The effect of different skill levels whilst observing the impact of immigrants across different countries has been studied by Brücker et al. (2014). The effect of immigration differs across countries, depending on the labour market institutions. These institutions such as minimum wage and collective bargaining can affect how the average wage

level responds to a labour supply shock, such as immigration (Brücker et al., 2014). When analyzing the labour outcome, country differences are disregarded in this paper since only one country is being investigated, Sweden.

A study conducted that focused on the immigration impact on the labour market was Card (1990). The outcome for natives on the labour market after an increase in the immigration flow was estimated. The flow, in this case, was a large share of Cubans that had immigrated to the United States. With comparisons being made in an affected and unaffected state, he implied that the immigration flow had actually had no impact on the wage level for the lower-skilled native workers in the impacted state.

Another study later emerged by Kugler and Yuksel (2008) where they estimated the effect of wages on native-born and immigrants that had resided prior to an unexpected immigrant flow to America. Their result was that there was an increase in natives' wages in comparison to the recent flow of foreign-born workers. These two studies focus on the immigration flow consisting of mostly workers with a lower education but still both provide different results. The reason for this could be that the study conducted by Kugler and Yuksel (2008), observed the impact of the immigrant workers that had been legalized to work in the U.S in contrast to Card (1990).

The estimation of labour market effect of immigration was also conducted by Brücker et al., (2012). A distinction can be made between Brücker (2012) and both Card (1990) and Kugler and Yuksel (2008). Brücker acquired micro-data in order to be able to analyse the effects of wages on natives through their different skill sets; education, experience, and origin. Three countries were analysed; Denmark, Germany and the United Kingdom due to the differences in the labour markets. The difference across these three countries consists of the minimum wage, the bargaining opportunities, and the unemployment benefits. With different characteristics in the labour market, each country will react in a different way when a labour supply shock such as immigration is applied. Brücker (2012) assumed there was imperfect competition, which is contrary to a large share of previous studies that were conducted. In order to observe how immigration impacts wages in different skill levels, measurement of the elasticity of the wage-setting curve, and the elasticity of substitution between labour- and capital-intensive workers was measured. Brücker's findings were that the effect on unemployment was bigger in both Germany and Denmark. The U.K's wage level change was more flexible, meaning that in the U.K., the wages respond more when a labour supply shock is applied, thus, changing the labour market.

It is difficult to apply U.S studies of the labour market to the Swedish labour market since different policies and regulations are apparent. Bratsberg et al. (2014) estimated the effect on native wages when a labour supply shock was introduced, in this case, immigration in Norway. Differentiating from other studies, the immigrants were classified in groups of origin. They measured the immigrants share where any wage adjustment will identify the slope of the labour demand curve when an increase in labour supply was acknowledged. The different skill groups were measured in four different levels of education and eight levels of experience. The study exhibited that native-born workers' wages decreased after an inflow of immigrants.

Contradicting the results of the Bratsberg (2014), with a study conducted on the labour market in Denmark was Foged and Peri (2014). The purpose of this study was to approximate whether an increase of low-educated foreign-born workers impacted native workers' wages. The study measured the data over time by focusing on the impact of non-European individuals. An observation was made to capture the effect of immigrants moving within different municipalities and regions. The results were that an increase in the labour supply through the flow of lower educated non-European immigrants lead to a reallocation of low educated natives to greater job positions, where wage levels either increased or there was no effect.

Since the main focus of this paper is to analyse the labour market in Sweden, it is important to observe what previous empirical studies in the chosen country indicate. Lundborg (2014) also observes the share of immigrants' impact on the natives' wage level. Taking into account the different labour market institutions, host country and wage bargaining. Lundborg (2014) makes the assumption for a market where prospective employees and the firm negotiate the wage. In this case, the market is not assumed to be of perfect competition which contradicts the basic immigration theory (Borjas, 1994), where perfect competition is assumed. The result demonstrates that an increase in the share of immigrants with respect to natives, lowers the wage levels but only in the short-run and only if the foreign-lower individual has a low reservation wage in comparison to the native-born worker. Meaning if the foreign-born individual had a lower wage rate where they would be willing to accept a job than the native, then the wage level will decrease temporarily. After time, the wage level will return to its original point.

As Lundborg (2014), Corrales and Vega (2014) also examine the Swedish labour market but focus on the share of immigrants that possess a higher level of education. They estimate the impact of immigration by taking the log of relative average monthly wages in a group of individuals with the same age. Dividing into different levels of education and work experience, they estimated the elasticity of the relative wages in the different cohort groups when a labour

supply shock was applied, in this case, immigration. The result was that there was a negative effect on the native-born wages when an influx of foreign-born individuals migrated to Sweden.

## **2.6 Regional disparities**

Agglomeration economies and spatial sorting of workers are factors that reshape the wage level between different regions within one single country. The recent study done by Combes et al. (2008) and Mion and Naticchioni (2009) has explained how high-skilled labour undertake self-selection and relocate themselves in metropolitan cities. The reason behind it is to take advantage of not only the availability of job opportunities, but also of the abundance of the positive knowledge spill-over that will contribute to their unobserved skills (e.g., communication skills or any other skills that will build up their performance). Glaeser (1999) and Rauch (1993) mentioned that workers in big cities are incentivized to accumulate human capital faster due to the knowledge spill-over, which will be reflected in higher wages. Due to the industries being clustered in metropolitan cities, and the tendency of higher-skilled labour of self-selecting themselves, the spatial wage disparities have appeared. According to Malmberg (1998), industries tend to cluster in order to profit from both internal and external economies of scale, which will contribute to higher production efficiency, hence, compensating for the high land/rent prices and wage costs. The reasons behind regional disparities are due to the uneven and nonhomogeneous distribution of factors of production, hence, endowing resources differently across regions. Education level, demographic structure as well as migration flows provoke regional disparities, and all the three factors can result in “circular causation” (Malmberg, 1994; Myrdal, 1956 and Westlund, 2004), that can be explained as the manufacturing production being concentrated close to the market or where the high demand on those products is present.

It is crucial to mention the matching externality, which was first brought to light by Helsley and Strange (1990), where an increase in the number of agents matching increases the quality of each match. Due to monopsony power, wages differ from the marginal product of the workers (Duranton; Puga, 2003). Where firms compete for the workers, and in this case, are required to pay higher wages when an increase in the number of competitors is present. When a matching externality is present, a worker is able to locate an employer that is more of a match to their skills (i.b.i.d). Duranton and Puga (2003) stated that this occurs only when the workforce is growing, and the number of firms are increasing. The matching model has been adapted to many different situations (Helsley; Strange, 1990). If there is strong complementarity present between high-skilled workers, it is to the individuals’ advantage to

pay the costs of living in the city where there is a match with other high-skilled workers (Spence, 1973).

## **2.7 The integration of immigrants and labour market barriers**

Integration is another concept linked to migration, defined as:

*“The process by which migrants become accepted into society, both as individuals and as groups....[Integration] refers to a two-way process of adaptation by migrants and host societies...[and implies] consideration of the rights and obligations of migrants and host societies, of access to different kinds of services and the labour market, and of identification and respect for a core set of values that bind migrants and host communities in a common purpose” (IOM, 2011).*

When discussing migration and skill transferability, it is important to mention that foreign skills cannot be perfectly transferable. Bevelander (2000) and Chiswick et al. (2005) indicated those skills such as imperfect information about the labour market, excelling at the language of the host country, occupational licences and certification and task-specific skills. Therefore, the acquisition of country-specific skills with respect to the duration of residence in the host country is a fundamental part of the economic integration (see reviews in Lalonde and Topel, 1997; Powers and Seltzer, 1998; Zhou, 1997).

Zorlu (2013) has shed light on another aspect in the process of integration, where he showed that educated immigrants mostly enter the labour market through jobs requiring lower skills as a result of a low transferability of skills. This study was made in the Netherlands, and it has also shown that in the long run, those skills are being developed on an individual level, which improves their position. However, this improvement will experience some difficulties due to barriers and inequalities in several situations. Bevelander and Pendakur (2012) have also mentioned that immigrants are exposed to barriers when entering the labour market. These challenges can be expressed as language barriers, unestablished social capital, and insufficient work experience in the host country. According to Åslund; Forslund and Liljeberg (2017), it can take up to 15 years for immigrants to integrate.

Referring to Swedish Council for Higher Education (2015), 40% of the foreign qualification, at the upper-secondary level, post-secondary vocational education and higher education, were accepted and evaluated in a way that makes it equivalent to the Swedish educational qualification. On the counterpart, 60% of the foreign qualification were rejected unless the

applicants undertake complementary courses. Therefore, the 60% of highly educated<sup>1</sup> were not able to obtain a job that matches their skills and knowledge. Lemaître (2007) deemed this phenomenon as a waste of human capital.

Other studies such as Joona et al. (2014), Katz and Österberg (2013) and Dahlstedt (2011) have found that overeducation is relatively high among immigrants in Sweden; however, Joona et al. (2014) found that returns to overeducated immigrants are considerably low. This could be due to several reasons such as discrimination which is also considered as one of the barriers that hinder labour from entering the labour market. Others have found ethnicity, background and race as factors from which comes the devaluation of immigrants with high education (Bursell, 2007; Danielsson, 2008; Lemaître, 2007 and OECD, 2014). In this case, Carlsson and Rooth (2007) have provided some evidence on discrimination that occurs in the Swedish labour market; candidates with Swedish names, for instance, were given more consideration than candidates with non-Swedish names when applying for jobs.

Borjas (1999) and Brucker et al. (2002) have investigated an essential factor that relatively attracts immigrants. Welfare programs i.e., social benefits or unemployment benefits have proven to magnetise low-skilled immigrants, whilst high-skilled immigrants would prefer to establish themselves in countries where social spending is low, hence, lowering the tax burden on income.

<sup>1</sup> post-secondary education with 3 years or more foreigners

### 3 Methodology

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*The purpose of this section is to introduce the hypothesis to later move on to the empirical model, the method and data used in this study. The third part in this section will explain the chosen dependent and independent variables in order to gain a deeper understanding to why this specific method is being used.*

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#### 3.1 Hypothesis

The main hypothesis of this study is that there is not a significant relationship between the share of highly educated foreign-born individuals and the average wage. This means that an increase in the share of immigrants will lead to an increase in the average wages. Previous literature suggests that the control variable, age might have a positive relationship with average wages since the older you get, the more experience you gain. However, this might not be the case, since average age of the labour force is used instead of individuals' age. Referring to the table 4.1, the maximum value obtained for average age is 49.8 and the minimum value is 36.3, hence, expecting a negative sign for the variable average age as shown in table 3.1. On the contrary, unemployment should have a negative relationship, since the higher the unemployment, the lower the wages, therefore, should have a negative sign as shown in table 3.1.

*$H_0$ : The share of highly educated foreign-born does not lead to an increase on the average wage*

*$H_1$ : The share of highly educated foreign-born leads to an increase on the average wage*

If the null hypothesis holds, this would mean that immigrants and natives are substitutes since the competition for high-skilled positions is relatively high, hence leading to a decrease in the average wage. If the null hypothesis is rejected, this means that foreign-born and natives are complements for each other. In other words, high-skilled natives occupy capital intensive jobs, whereas low skilled foreign-born specifies in labour-intensive jobs.



Table 3.1 Expected sign of independent variables

Explanatory Variable	Expected Sign
<i>Share of foreign-born</i>	+
<i>Highly educated foreign-born</i>	+
<i>Population density</i>	+
<i>Average age</i>	-
<i>Share of unemployed</i>	-

We will use panel data which consists of repeated cross-section observations in our study since they give a data set that allows for more variability, less collinearity amid variables and more efficiency. By using panel data, it allows us to study the relationship between immigrants and average wages when the changes in the share of immigrants for high-skilled labour is included over time and across municipalities. Since we have obtained the data of these variables in different municipalities of the same country, we do not need to look at whether there are different laws or regulations present across municipalities.

### 3.2 Econometric model

We estimate the relationship between the migration and average wages in Sweden over several years and across municipalities using the following econometric model.

$$1. \text{Log(Wage)}_{jt} = \beta_1 + \beta_2 \text{Log(SFB)}_{jt} + \varepsilon_t, \text{ where:}$$

- $j$  = municipality
- $t$  = time period,  $t$  year, 2011 – 2018.
- $\beta_1$  = Intercept
- $\text{SOI}$  = Share of immigrants
- $\varepsilon$  = error term

Model (1) estimates how the share of foreign-born individuals correlates to percentage change in average wages within municipalities and over years. The regression presented above allows for observation to whether the coefficient of share of immigrants  $\beta_2$  has a positive or negative relationship with average wages. If the parameter is resulted to be positive, then native wages increase as the share of immigrants increase hence, having a positive relationship with the dependent variable, average wages.

We have chosen to observe whether immigrants with high education level have a positive relationship with average wages across different municipalities. It is important to keep in mind

that an assumption can be made that immigration can have different relationship with the average wage level for highly educated individuals in comparison to natives with a fairly low education. The variable highly educated foreign-born population is added into the previous equation. We now have:

$$2. \text{Log}(Wage)_{jt} = \beta_1 + \beta_2 \text{Log}(SFB)_{jt} + \beta_3 \text{Log}(HighEdu_{FB})_{jt} + \varepsilon_t$$

Again, through the sign of the parameter we can observe whether there is a relationship between average wages and the percentage of highly educated foreign-born individuals.

In the favour of detecting the agglomeration effect, the population density will be the variable added into the equation in order to account for where individuals cluster. Where there is high agglomeration, there is greater economic development which could state that there is a relationship between agglomeration and wages, hence, the share of population density variable is added into the previous equation, to where we have:

$$3. \text{Log}(Wage)_{jt} = \beta_1 + \beta_2 \text{Log}(SFB)_{jt} + \beta_3 \text{Log}(HighEdu_{FB})_{jt} + \beta_4 \text{Log}(PopDensity)_{jt} + \varepsilon_t$$

The Human Capital Theory states that a positive correlation between age and earnings is identified. Older people are less willing to invest in human capital since they might have invested before to which they are now receiving the outcomes from the accumulation of human capital. This could indicate that there could be a relationship between average wage and age, there, we choose average age to be one of our control variables. We add another control variable that being unemployment, with the macroeconomic theory suggesting that unemployment is negatively related to wages. Unemployment rate reflects the situation of the labour market for each year. With these two variables added to the previous equation (3), we now have the full equation:

$$4. \text{Log}(Wage)_{jt} = \beta_1 + \beta_2 \text{Log}(SFB)_{jt} + \beta_3 \text{Log}(HighEdu_{FB})_{jt} + \beta_4 \text{Log}(PopDensity)_{jt} + \beta_5 \text{Log}(Av.Age)_{jt} + \beta_6 \text{Log}(Unemp)_{jt} + \varepsilon_t$$

When using control variables, the parameters for both average age and unemployment rate will be able to show whether the result we had obtained from the equation prior to adding the control variables is either over or underestimated. If the parameters for both control variables are shown to be positive, then the result obtained previously is underestimated meaning that the relationship on the dependent variable is smaller than the actual relationship since age and

unemployment may affect these outcome variables when not taken into consideration. If the parameter is negative, then the previous result is overestimated.

### 3.3 Data

The data that we use in order to be able to study our research question is obtained from Statistic Sweden (2020). The variables that are covered in the study will help to shed light on the migration and wages, we split the labour force into native and foreign-born individuals. We extract the data covering information on annual average wage, the highly educated foreign-born individuals, average age for both natives and foreign-born individuals and unemployment levels for natives and foreign-born in 290 municipalities from the year 2011 to 2018. With 290 municipalities taken into account in a time period of 8 years, we obtain 2320 observations. The study will be based on a municipality level which allows for regional variation, hence, a deeper analysis on migration and wages without neglecting externalities<sup>1</sup> that may arise in metropolitan cities in comparison to non-metropolitan. It is important to note that the labour force will be heterogenous meaning that we will be observing it as a whole rather than observing a specific sector or industry.

#### **Dependent Variable (average wages):**

Our dependant variable is the annual *average wages* in Sweden earned in different municipalities. We are unable to use individual wages since access to micro-data is restricted, however, Antelius and Björklund (2000) state that similar findings can be obtained by using average annual earnings or hourly wages. The data is gathered from Statistics Sweden (2020) and presents the Swedish population that had an income from the years 2011 to 2018 on a municipality level. Average wage is defined as the annually taxable income which the employer has to payroll tax for, in Swedish Crowns (Statistikdatabasen, 2019). The total number of observations are 2320.

<sup>1</sup> Externality refers to the cost and benefit that a third party receives but have no control over. Negative externality can be pollution, and positive externality can be the benefits from government investments.

Table 3.2 Municipalities with highest and lowest average wage.

Municipality	Average Wage*
Årjäng	213,900
Malmö	230,300
Helsingborg	273,500
Jönköping	278,900
Stockholm	320,600
Danderyd	647,800

\*Annual average wages in SEK

Source: Statistics Sweden 2020

## Independent variables:

### Share of Foreign-born

The independent variable *share of foreign-born* (SFB) is a vital variable that is considered an exogenous shock to the regression that is conducted in the following section. Immigrants are defined as individuals that come from a foreign background (Statistikdatabasen, 2020).

### Highly educated foreign-born

Level of education measures the different level of education (OECD, 2020) in the 290 municipalities with the variable being distributed into three categories; Low education, medium education and high education. Foreign-born individuals with the *highest level of education* (HighEdu\_FB) from at least 3 years of education post-secondary school are grouped into high level education. Education is an important variable since we want to be able to investigate whether there is a significant relationship between wages and the highly educated population. The number of observations that will be used in this study consists of 2320.

### Population density

*Population density* (PopDensity) is the measure of the number of residents relative to the size of the area. In this paper, the population density reflects the share of population living within a municipality, which will be mirroring the agglomeration contribution to the average wages through positive and negative externalities discussed in the theoretical framework.

### Average Age

*Age* represented by the variable (Av.Age) in the regression, is measured as the average age in the total municipal populations.

## Share of Unemployed

*Share of unemployed* is the share of individuals that are unemployed per municipality which have been recorded in percentage in the statistics, where unemployment is defined as the labour force out of the labour market that are actively searching for jobs recently (OECD, 2020).

*Table 3.3 Definition of variables used*

<b>Variable</b>	<b>Definition</b>
Average wage (Wage)	Annual average wage in Sweden extracted on municipality level in SEK.
Share of foreign-born (SOI)	Number of foreign-born age between 25-64 years extracted on municipality level/Number of residents per municipality.
Highly educated FB (HighEdu)	Percentage of foreign-born possessing high educational attainment represented by post-secondary education (3 years or more) extracted on municipality level (%).
Population density (PopDensity)	Size of the population relative to the area of the municipalities per sq. km.
Average Age (Age)	Average age of labour force per municipality.
Share of unemployed (Unemp)	Percentage of unemployment per municipality (%).

## 4 Empirical results

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*This section presents the econometric method, correlation analysis and descriptive statistics of both the dependent and independent variables that are used in order to retrieve the empirical results to allow for an analysis and conclusion. Problems that may arise with panel data are taken into consideration and tested for, such as multicollinearity.*

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### 4.1 Econometric Method

The impact of highly educated immigrants on average wages is examined over 290 Swedish municipalities during a time interval of 8 years (2011 – 2018), through a regression analysis with the use of the program, Eviews. After having plotted the data, a linear relationship between the dependent and independent variables is observed, hence, the ordinary least square is the suitable model for this study. On the other hand, the data seems not to have a trend, to which a log transformation of all the variables is required in order to be able to regress the variables. In the interest of observing the significance of each independent variable on the average wages, the regression will be achieved through the addition of the explanatory variables on several stages.

Using panel data can have some challenging problems such as multicollinearity which would result in inefficient and biased coefficients. In order to see whether there is multicollinearity present, variance inflation factors are applied where an VIF of 1 indicates complete absence of collinearity and a value that exceeds 5 or 10 indicates a problematic amount of collinearity. First of all, a log transformation was performed in order to make highly skewed distributions less skewed. This can be valuable both for making patterns in the data more interpretable and for helping to meet the assumptions of inferential statistics. The residuals are normally distributed (Appendix 9.2).

### 4.2 Descriptive Statistics

It is clear that wages across the 290 municipalities are not evenly distributed. These differences can also be observed by the variations in the independent variables. Table 4.1 presents the descriptive statistics for both dependent and independent variables.

*Table 4.1 Descriptive statistics*

	<b>Mean</b>	<b>Max</b>	<b>Min</b>	<b>SD</b>
Annual average wages	293 954	647 800	213 900	42 294
Share of foreign-born	0.081	0.304	0.023	0.042
Highly educated FB	0.212	0.510	0.078	0.065
Population density	147.32	5818.6	0.2	526.8
Average age	43.26	49.8	36.3	2.613
Share of unemployed	9.63	21.6	3.5	2.938

*N=2320*

*Own calculation of the data for variables for different municipalities in Sweden year 2011 to 2018*

*Source: Statistics Sweden 2020*

### **4.3 Correlation Analysis**

There are various factors that affect wages and some if not, many can affect the dependant variable through the independent variables. This poses a risk of multicollinearity existing between independent variables. Table 4.3 illustrates the correlation between the dependant and independent variables. All wage correlations are significant at a 1% level (Table 4.2). The correlation between wages and unemployment is -0.630, which is the highest out of all correlations with the dependent variable. The second highest correlation with the dependent variable, wages is the share of foreign-born individuals with high education (0.576).

*Table 4.2. Average wage correlations*

Variable	Wages
Share of foreign-born	0.168**
Highly educated FB	0.576**
Population density	0.482**
Average age	-0.451**
Share of unemployed	-0.630**

*\*\*Significance level at 1%*

*\*Significance level at 5%*

Table 4.3 Correlation analysis for different variables included

	Wages	Share of foreign-born	Highly educated FB	Population density	Average age	Share of unemployed
<b>Wages</b>	1	0.168	0.576	0.482	-0.451	-0.630
<b>Share of foreign-born</b>	0.168	1	0.098	0.532	-0.501	0.257
<b>Highly educated FB</b>	0.576	0.098	1	0.381	-0.403	-0.589
<b>Population density</b>	0.482	0.532	0.381	1	-0.714	-0.289
<b>Average age</b>	-0.451	-0.501	-0.403	-0.714	1	0.363
<b>Share of unemployed</b>	-0.630	0.257	-0.589	-0.289	0.363	1

*N=2320*

*Source: Statistics Sweden 2020*

There is correlation present between several of the independent variables, where the highest correlation is between the population density and average age at a value of -0.714. This could imply that older people tend to live in more rural areas. The second highest correlation is -0.589 between the highly educated foreign-born and share of unemployed. Hence, we can conclude that there is correlation present among the independent variables however, not critical. In order to conclude whether there is a significant relationship between the independent variables and the dependent variable, a regression analysis will be conducted

#### 4.4 Findings

In order to see to what degree the independent variables are related to the municipal variations in the average wage, pooled OLS regressions are used. All the regressions conducted are significant at a 1% level when looking at the F-statistics. Based on previous literature review, an assumption is made that foreign-born individuals possess a lower education-level than Swedish individuals. In this case, this means that they are substitutes to low skilled native-born workers and at the same time complements to high skilled natives since the competition between them is low.

The first regression examines the average wages including the independent variable *share of immigrants*. Table 4.4 shows a positive value of the share of foreign-born individuals at a 1% percent significance level. This means that when the share of immigrants increases with one percent, then the average wages will increase by approximately 4.8%. The variable *share of immigrants* shows a VIF value of 1 meaning that there is no multicollinearity present. Therefore,



this does not affect the significance of the variable in the model. A low  $R^2$  value of 0.028 present could be explained since there is only one variable in the first regression model. Additional variables may be able to lead to an increase in the explanatory power in the model.

Table 4.4 Regression Analysis

Dependent variable: Log(Wages)								
Variables	Regression 1	VIF	Regression 2	VIF	Regression 3	VIF	Regression 4	VIF
Log(Share of foreign-born)	0.0477** (0.006)	1.00	0.064** (0.005)	1.01	0.023** (0.006)	1.635	0.095** (0.006)	2.297
Log(Highly educated FB)	-		0.272** (0.007)	1.01	0.222** (0.008)	1.373	0.129** (0.008)	1.741
Log(Population Density)	-		-		0.019** (0.002)	1.895	0.009** (0.002)	2.481
Log(Average Age)	-		-		-		-0.253** (0.005)	2.606
Log(Share of Unemployed)	-		-		-		-0.234** (0.008)	2.001
Constant	2.520** (0.007)		2.726** (0.008)		2.616** (0.012)		2.461** (0.072)	
R-squared	0.028		0.383		0.417		0.574	
Adj. R-squared	0.028		0.382		0.416		0.574	
N	2320		2320		2320		2320	

Standard errors within brackets

\*\*Significance level at 1%

Regression 2 includes the addition of the *highly educated foreign-born individuals* across the 290 municipalities. Both independent variables are significant at a 1% level, where the results from the second equation indicate a positive relationship between wages and highly educated immigrants. Average wages in Sweden will increase by 6.4% when the share of immigrants increase by 1%. Also, the wages will increase by approximately 27% when the share of highly educated foreign-born increases by 1%. But this coefficient value may not be accurate due to omitted variables, hence, leading to bias in the results of the second regression. The VIF (Variance inflation factor) values obtained are both 1.01 meaning that there is no impact on the significance of the variables. In comparison to the first regression, we can see that the  $R^2$  is higher at a value of 0.383, meaning that the independent variables that have been added explains more of the variance in the dependant variable.

The third regression takes into account the agglomeration effect by adding the *population density* as an independent variable. A 1% increase in the population density increases wages by 2.3%. The variables *share of immigrants*, *foreign high education* and *population density* show higher but still low VIF values with the variable *population density* obtaining the highest value of 1.895. Therefore, there is no multicollinearity present. The R-squared increases faintly meaning that even though

the density of population has not been highly significant to wages, there is still somewhat a relationship present between the two variables.

The final regression examines average wages in Sweden after adding all the independent variables to the equation. All the variables are significant at a 1% level. As presented in the table, the parameters are still positive. However, the coefficients decrease slightly for the independent variables except the share of immigrants. The parameter for the share of immigrants remains positive. When the share of highly educated immigrants increases by one percent, the wages increase by approximately 12.9%. The control variables *average age* of labour force and *share of unemployed* show to be negative; this allows us to conclude that the results that were previously obtained have been slightly overestimated. The VIF values are all under 3, with the highest value at 2.606 for the variable *average age*. We can conclude that in the final regression there is no multicollinearity present. The R-squared is now higher at a value of 0.574 meaning that the independent variables that have been included explain more of the variance in wages.

## 5 Discussion

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*This section presents an analysis of the results which enables us to observe whether they are in line with the theories that have been discussed in the theoretical framework.*

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Referring to the empirical results presented in the previous section, the null hypothesis states that the share of high educated immigrants does not lead to a change in average wages is rejected. An increase in the *share of immigrants* is shown to have a positive relationship with the *average wages*, hence, we can conclude that immigrants and natives are complements rather than substitutes and that they are not competing for the same job opportunities. These results are in line with the theory of Borjas (2013). Similar to the empirical study conducted by Kugler and Yuksel (2008), the effect on average wages after an increase in the share of immigrants is positive. Brücker et al. (2014) examined the effect on wages by observing foreign-born individuals at different skill levels in 3 different countries, concluding that immigrants were positively related to wages. Brücker et al. (2014) stated that this outcome could be due to the differences in institutions in the 3 countries. Labour market institutions, for instance, have a great impact on labour market legislations, minimum wages and work conditions. Unions in Sweden prevents employers from setting wages lower than the minimum wage, if the employee is subscribed as a member in the union. If this was not the case in Sweden, our empirical study would have shown different results. For an individual that has recently migrated to a country, immigrants might not be aware of the presence of such institutions and their contribution for the benefits of the employee.

An assumption is made that foreign-born individuals are low skilled. This might not be accurate since Joona et al. (2014), Katz and Österberg (2013) and Dahlstedt (2011) have found that *overeducation* among foreign-born in Sweden is relatively high, however, the returns to the accumulated capital are low according to Joona et al. (2014). Foreign-born individuals migrate to Sweden in order to attain higher levels of utility and could be willing to accept positions where they are over-skilled for. The reason behind it might be the wage for the low-skilled job being higher relative to a high-skilled job in country of origin. It is also difficult for foreign-born individuals to implement their human capital to the Swedish labour market which could make them a complement to a native. As foreign-born individuals commence their contribution into the labour market, they acquire the country-specific skills (Lalonde and Topel, 1997; Powers and Seltzer, 1998; Zhou, 1997). Bevelander (2000) and Chiswick et al. (2005) mentioned that foreign skills transferability might take time, the fact that explains that high-skilled foreign-born do not compete with natives on capital-intensive jobs in the short-run. This could be the reason

to why our results are not in line with the study conducted in Sweden by Lundborg (2014), where an influx of immigrants leads to a decrease in the average wages. In the long run, once immigrants have acquired the skills on demand in the labour market, the competition arises between natives and foreign, which will therefore induce an adjustment of wages due to the fact that they become substitutes. The higher the competition becomes, the higher the productivity among workers, thereafter, leading to higher wages.

With the increasing flow of migration to Sweden, there will be certain individuals affected slightly more than others. As a result of population density, individuals are perpetually clustering in metropolitan cities where higher wages are offered (i.e. Stockholm with average wages equal to 320,600 compared to Jönköping 278,900). The existence of pooled labour force in metropolitan cities results in a severe labour supply shock compared to smaller cities. According to Borjas (1996) internal migration is the result of an increase in immigration where foreign-born can impact the average wages. Referring to our results in the previous section, *population density* was positively related to the change in wages, hence, being in line with the study made by Combes et al. (2008) and Mion and Naticchioni (2009). The latter stated that high-educated people select themselves and move to metropolitan cities, where job opportunities are available as well as the knowledge spill-over that improves productivity and competition among workers.

The results can be over or under-estimated since we are observing *average wages*, we cannot look at specific labour market effects. The average wages represent a broader illustration of workers' earning which comprises different skill levels, however, our results could differ if wages would be extracted on a micro level, hence, resulting in more reliable results. Mincer (1974) mentioned that the "age-earning profile" can be illustrated as an inverted U-shaped curve. More specifically, workers between the *age* of 20 and 40 will accumulate capital (education, work experience), the fact that increases their earnings with respect to the age and capital. The *average age* has a negative relationship with average wages, this could be due to the appliance of average age in our study rather than individuals age. Mincer's wage equation embodies explanatory variables representing microdata on individual level. As mentioned earlier, one of the limitations that we faced was not having access to microdata, hence, possibly being the reason why our study is not in line with other studies such as Lundborg (2014). Another recent study conducted by Corrales and Vega (2014) has shown the opposite of our results, where a relative relationship has appeared on native wages when immigration is included. This study examined the Swedish labour market by using a different method compared to Lundborg (2014). The Mincer equation (1974) also showed a positive relationship between the *education* of individuals and their later earnings, to

which our results are in line with. Bratsberg et al. (2010) conducted a study where he investigated the impact of a labour supply shock in Norway and its outcome on the wage. He grouped immigrants under 4 different levels of education and 8 levels of experience. The conclusion was that the share of immigrants has decreased natives' wages. Our results weren't in line with this study, this could be an implication of the use of average variables instead of individual wage. Another reason is the method used by Bratsberg et al. (2010) when categorising individuals under different categories of education and experience, which would give more accurate and specific results.

Another aspect of the results from our analysis could be explained by Zorlu (2013) who stated that during the first years of residence, immigrants step into the labour market through labor-intensive job opportunities. This could be also linked to Bevelander (2000) and Chiswick et al. (2005) who stated that foreign skills have to fit labour market requirements of skills. In a recent study, Bevelander and Pendakur (2012) listed the barriers when entering the labour market such as language, limited social capital and insufficient work experience. These barriers might be eliminated if diligence on the individual level is made. Limitations might also occur when validating the foreign qualification and certificates, to which the rate of rejecting or complementing cases have been quite high in Sweden. Lemaître (2007) considered this phenomenon as waste of human capital. Other limitations on the labour market level were discussed by (Bursell, 2007; Danielsson, 2008; Lemaître, 2007 and OECD, 2014). They referred to factors related to ethnicity, country of origin, and race. For instance, the recruiting process has been studied by Carlsson and Rooth (2007) who found evidence on hidden discrimination where employers haven't been objective when recruiting candidates based on their qualifications rather than name and country of origin. In contrast, Sweden is considered a generous country when it comes to social benefits and unemployment benefits. The social welfare system in Sweden might provoke a higher *unemployment* among immigrants, hence, financial reliance on the state. However, this might not be the case for high skilled immigrants who prefer to settle in countries with low tax burden Borjas (1999) and Brucker et al. (2002) but our results have shown that unemployment have been negatively related to average wages.

## 6 Conclusion

The outcome of our empirical study has revealed that foreign born and natives are complements rather than substitutes since the share of highly educated immigrants has had a positive impact on the average wages in Sweden. This means that natives and foreign born do not compete for the same job opportunities despite the fact that education among immigrants is relatively high in Sweden.

*“Migration is important because it shapes and re-shapes societies, making them more diverse and complex.” -  
King, 2012 (P.6).*

This study was initiated by the text above, the result of the study conducted has proven to be what is known as an “iceberg illusion”. There is a lot more to this arising issue than meets the eye. The effort and policies implemented by the government for immigrants into the labour market have been effective to some extent. Integration has been encouraged in Sweden by providing an introductory course on community orientation, establishment program that allows individuals to receive funds whilst learning the language, as well as subsidizing the step-in jobs in order to accelerate the process of integration. In 2017, OECD published that the unemployment among foreign born individuals was at 16%, ranking Sweden as one of the highest unemployment rates compared to other OECD countries (OECD, 2017). This is the part of the iceberg that is not visible. By starting at the bottom of the iceberg, some of the issues recognized that pose a barrier towards integration of high-skilled immigrants are the rigorousness of recognition towards foreign qualifications and discrimination towards the entry into the labour market.

Since the study was conducted from the year 2011 to 2018, some of the high-skilled immigrants who migrated to Sweden in 2011 or 2012 might have integrated and received jobs, however, this hasn't been observed in our results since there was no relationship between the share of foreign born and the average wages in Sweden (i.e. rejecting null hypothesis). On the other hand, those who came in the later years have not had the possibility to fully integrate. The reason behind it is that the labour market entry is a time-consuming process where it can take up to 15 years for full integration (Åslund; Forslund and Liljeberg, 2017). If the impact of immigrants on average wages that were investigated in our study is affected through non-economic factors and if it is indeed the missing piece of the puzzle, this could be a future topic that should be further looked into, in order to allow the implementation of policies, hence, maximising the utility on an individual- and national-level. The question that remains is, how can *pareto efficiency equilibrium* be reached in the labour market, where wages reflect job-to-skill match?

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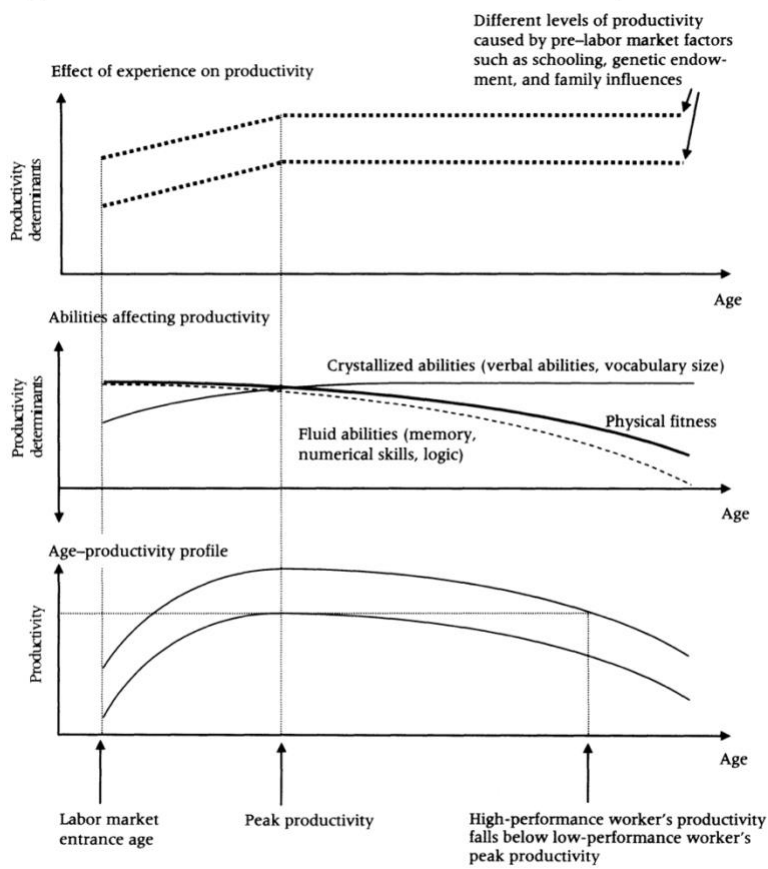
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## 8 Appendix

### Appendix 8.1 Stylized diagram of factors influencing age-productivity



### Appendix 8.2 Standardized residual distribution

