The effect of immigrant labour on wages and price levels in the construction industry in Finland

Matthew Wood

Department of Economics

Hanken School of Economics

Helsinki

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Author: Matthew Wood	**Date:** 29.7.2016

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Abstract: Immigration to Finland has increased dramatically, particularly from the former Soviet Union, but the effect of this phenomenon on labour market outcomes for Finnish natives has not previously been studied. Using a fixed-effects regression model to analyze longitudinal individual data on workers in the construction industry between 2004 and 2010, I determine the effect of an increase in the share of immigrants in a given occupation.

I find that wages in a given occupation decline by 0.7% when the proportion of immigrants increases by 10%, and also that decreased wage levels are passed on to consumers in the form of lower house prices. This suggests that the net effect of work-based immigration in Finland may be positive for the whole economy.

Keywords: Immigration, wages, price levels, Finland, construction, house prices

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1 INTRODUCTION

Finland has historically been a country characterized by emigration – in particular, the waves leaving for North America in the late 19th and early 20th centuries and the post-World War II exodus of Finns mainly to Sweden. Recently, however, immigration has been in focus, with great concern over the migrants coming to Finland and how they might affect native Finns. The problem is that little is known about the labour market effects of work-based immigration to Finland, leaving the public debate to be largely ideological in nature and the government without good data to support public policy. There is a widespread belief that immigration from abroad creates downward pressure on wages for employed natives, takes jobs from otherwise deserving Finns (the "lump of labour" fallacy), and otherwise makes things harder for those who are already living in Finland.

This topic is particularly important because of the redistributional nature of immigration – as is often the case, there are those who benefit, and those who suffer from the effects of immigrants entering the labour market. Standard economic theory suggests that, as a result of an increase in the supply of labour, the equilibrium wage will decrease, which is bad news for native workers in industries that are affected – meaning those where immigrants are substitutes for natives. This effect may, however, be balanced out if immigrants are in fact complementary to native workers; for example, if they take lower-paid positions and push natives into specialist or managerial roles. Additionally, there should be a benefit to consumers if a decrease in the wage level leads to a reduction in prices, but this is dependent on producers passing these savings on to their customers in a competitive market, which is not necessarily the case. The net effect of these forces is ambiguous, creating a need for more research on the subject.

The specific contribution of this study is to examine the labour market effect of immigration on the Finnish market, which has not yet been done using empirical data. Regardless of the outcome, this study adds to the limited domestic literature on the topic, and provides some additional information to policymakers who are currently faced with the crisis of how to deal with the large influx of refugees and asylum-seekers who have recently arrived in Finland from their countries of origin, mainly in the Middle East. If they are to be employed and integrated in Finland, it is important to have some idea of how this will affect the native population, and whether certain affected parties should potentially be protected or compensated.

My study focuses on the construction industry, which together with the service industry is the other main employer of immigrants in Finland. The 2004 EU enlargement, which opened the door to migrants from several Eastern European countries, serves as a natural experiment, due to the large increase in immigration that occurred as a result. I exploit the differing requirements for licenses in various trades as a source of exogenous variation in the share of immigrant employment, and use this to estimate the effect of foreign workers on wages for natives.

The use of individual longitudinal data sourced from Statistics Finland accounts for unobserved personal characteristics among those in the sample. Using similar methods, Bratsberg and Raaum (2012), in their study of the Norwegian construction industry, found that a 10% increase in immigration reduced wages in a given trade by 0.6%, and that wage and cost reductions were passed on to consumers. I expect to find similar results in my study, due to the use of very similar methods and the many common factors between Finland and Norway.

In my opinion, the level of public discourse on this subject is sorely lacking, and would benefit from additional data on how large-scale immigration affects the native population. Nearly 60% of Finns have negative feelings towards migration from outside the EU, and nearly 30% share that attitude towards migration from other EU member states (Eurobarometer 83). My chief aim is to determine whether or not the economic effects of migration justify this attitude, and to what degree.

1.1. Outline

This thesis is roughly divided into the following eight sections – this introduction, background, theory, data, methodology, results, price levels, and conclusions. In the appendices, I provide additional data for those who are particularly interested in seeing some of the background behind the research.

The background begins with a look at the history of migration to and from Finland, which is in both directions a relatively recent phenomenon. Following this history, I introduce some descriptive statistics on immigration in order to give a snapshot of the situation as it stands. Finally, I present the Finnish construction industry and explain the key characteristics of the subject of my research.

In the theoretical section, I cover the standard models before a brief introduction of the theoretical model that this paper is based upon. I close the section with a look at the literature from, in increasing levels of detail, a European, Nordic, and lastly Finnish perspective.

The section on data covers both the nature and origin of the data as well as the identification strategy used to reduce the original source down to something usable. This section also covers issues with the available data and how these issues might affect the end result.

The next section, methodology, presents the methods by which the data analysis will actually proceed. There is a short review of the available literature on measuring the effect of immigration and an explanation of why the selected approach is suited to the available data. I also introduce the empirical framework and how it will be used in practice.

The following two sections present the results of the analysis. In the first part, I cover the effect of immigration on wages for natives, the effects of native exit, and the breakdown of the effects by immigrant status and skill level. Thereafter, I look at how immigration affects consumer price levels in the construction industry through changes in unit labour costs. This section quantifies the real societal effect of the results found in the previous section and how this affects consumer surplus.

Finally, I summarize the results of my research and discuss the implications of these results in terms of both the existing literature and government policy. I then provide some thoughts on how further research on this and related topics could be conducted.

2 BACKGROUND

2.1. A brief history of migration to and from Finland

2.1.1. Emigration

Until the late 20th century, the only significant migration that Finland had ever seen was outward. More than 1 million Finns left the country over the last century, of which only approximately 20-40% returned (Heikkilä and Uschanov, 2004). These mass emigrations happened mainly in two large waves. The first wave left for North America beginning in the 1860s and continuing until 1923, when some controls on immigration were imposed in the United States. Approximately 400,000 departed for the United States and Canada, mainly from Ostrobothnia – typically (but not exclusively) for economic reasons. At the time, the Vaasa region had a surplus population, crop failures and famines were common, and conscription into the Russian armed forces was a risk; as a result, the long journey overseas was a relatively appealing option.

The second wave of migration was mainly comprised of Finns emigrating to Sweden after the Second World War – a group so large that up to two-thirds of inter-Nordic migrants since 1954 have been Finns moving to Sweden and back (Korkiasaari and Söderling, 2003). Between 1945 and 1999, 535,000 Finns emigrated to Sweden, mainly as a result of high unemployment in Finland and higher salaries in Sweden. The period of highest migration began in the mid-1960s and ended in the late 1980s, as the available job opportunities in Finland became more comparable to those in Sweden. Currently, most emigration to Sweden is for personal, rather than economic, reasons.

As a result of these two waves, Finland's population, at approximately 5.4 million, is significantly lower than it would otherwise have been, with the Genealogical Society of Finland estimating in 2004 that the population would today be close to 7 million.

2.1.2. Immigration: the former Soviet Union

In the 1990s, just as the wave of migration from Finland to Sweden was coming to an end, the first significant immigration in Finland's modern history was beginning. From a total of 13,000 in 1980, the number of foreign citizens living in Finland grew to nearly 90,000 in 1999, and stands at almost 220,000 in 2014. The reason for this increase is twofold: the collapse of the Soviet Union in the early 1990s, and Finland's status as a member of an expanding European Union.

In 1809, following its defeat in the Finnish War and as a result of the Treaty of Fredrikshamn, Sweden ceded the new Grand Duchy of Finland to the Russian Empire. While the most significant outcome of the treaty (Karonen, 2010) was that it brought lasting peace to the Nordic region, it also tied Finland closely to its eastern neighbour. Even following the Russian Revolution of 1917, Finland's subsequent independence, and the establishment of the Soviet Union in 1922, developments in Russia affected Finland greatly – most obviously in the Winter and Continuation wars (1939-1940, 1941-1944) and in the period of Finlandization that followed the wars. The collapse of the Soviet Union in 1991 also caused the first noteworthy immigration to Finland that was not a result of return migration.

Between 1989 and 1994, the number of foreign citizens living in Finland increased from just over 20,000 to over 60,000, increasing again to 90,000 by the year 2000, after remaining steadfastly between 10,000 and 20,000 in the decade leading up to 1990. Nearly all of the new arrivals came from the former Soviet Union, of which more than 10,000 were Ingrian Finns, descendants of Finns that had settled near what is now known as Saint Petersburg, and still living in the Soviet Union at the time of its collapse.

2.1.3. Immigration: the European Union

On January 1, 1995, as part of the enlargement that increased its size from 12 to 15 members, Finland, Austria and Sweden joined the European Union (Norway and Switzerland had also applied for membership, but withdrew their applications after national referenda rejected joining the EU). After submitting its application in March 1992, Finland had organized a national referendum in October 1994, with 56.9% voting in favour of joining the EU. As a result, Finland became a part of the European Single Market, and subject to Article 45 of the Treaty of the Functioning of the European Union (TFEU), which states that "Freedom of movement for workers shall be secured within the Union." (Official Journal of the European Union, 2012, p.47).

In practice, this meant that Finnish citizens were now able to move freely, live, and work in any other member state of the EU, and vice-versa. This was a freedom that many would come to take advantage of in the coming years, but most notably following the next enlargement of the EU in 2004, which added 10 member states: Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia.

As a condition of the 2004 accession of these 10 member states, Finland obtained (as a result of advocacy by the Central Organization of Finnish Trade Unions (SAK)) a "transition period" that "restricted Estonians' and other EU8 nationals' right to work in Finland between years 2004 and 2006" (Alho, 2015, p.27). However, by 2004, there were already 13,978 Estonians registered as living in Finland, and beginning in 2007 all Estonian nationals would be able to move freely to Finland.

After 2004, migration from Russia slowed down considerably, with nearly 25,000 arriving between 1990 and 2004 and only 6,000 after 2004. Instead, nearly all migrants were coming from Estonia, with the number of Estonians in Finland increasing from the nearly 14,000 in 2004 to over 48,000 in 2014. In a matter of a decade, the number of Estonians living in Finland had increased threefold (Statistics Finland, 2015).

Growth was also coming from the other new member states, if not in such large numbers as from Finland's neighbour to the south. In particular, immigrants were now arriving from Hungary, Latvia, Lithuania, and Poland in significant numbers. Additionally, following the 2007 expansion of the EU that added Romania and Bulgaria, the previously negligible number of immigrants from those nations began to increase. As a result of the collapse of the Soviet Union and the eastern expansions of the EU, Finland has now experienced immigration on a large scale for the first time, the long-term effects of which still remain to be seen.

2.1.4. Recent developments

As a final note, I would be remiss if I did not mention the significant number of refugees and asylum seekers that have recently arrived in Finland – over 32,000 in 2015 alone, nearly 10 times more than the amount that arrived in 2014, and of which 25,000 come from Iraq and Afghanistan (Finnish Immigration Service, 2016). While the effects of this flow of migration is not within the scope of this study, these are people that will need to be housed, educated, and employed, and that will no doubt pose challenges for the Finnish state. Further studies could examine the integration of previous refugees and asylum seekers and attempt to quantify the effect on native wages in given trades that have employed these people and their families.

2.2. Descriptive statistics on immigration

In this section, I examine the similarities and differences between the Nordic countries, with a specific emphasis on Finland. While the most important tables are presented here, the full data can be seen in Appendix 3.

2.2.1. In the Nordics (Denmark, Finland, Norway, Sweden)

The Nordic countries are an excellent comparison group for analyses of many kinds. Here you have four small countries (not counting Iceland) in Northern Europe with broad linguistic, cultural, and historical similarities, to say nothing of the Nordic welfare state that all four have adopted. As a result, comparisons between the four countries can highlight small, but important differences between them. A key example of this is in the percentage of foreign residents as a share of total population – as shown in Table 1. While Sweden is typically considered to be the "model citizen" (depending on your point of view) as a result of its liberal immigration policies, Norway has more immigrants as a share of the total population. Conversely, of the four Nordic countries, Finland has the lowest proportion of foreign citizens as a share of population.

Table 1 Foreign citizens in the Nordics

	Denmark	Norway	Sweden	Finland
Total population	5,627,235	5,109,056	9,747,355	5,471,753
Foreign citizens	397,300	483,177	739,435	219,675
% of total pop.	7.06%	9.46%	7.59%	4.01%
EU citizens	147,451	304,278	334,896	90,178
% of total foreign	37.11%	62.97%	45.29%	41.05%

Source: National statistics agencies, own calculations. Note: data for Denmark is for foreign citizens by country of origin rather than by country of citizenship

When it comes to the origin of these immigrants, Finland is once again an outlier in the Nordic sense. In Table 2, which breaks down immigrants by country of origin, it is clear that, while Polish citizens represent the single largest group of immigrants in Denmark, Norway, and Sweden, there are very few Polish citizens in Finland. It seems that Estonian immigrants take their place, with more than 13 times as many Estonians in Finland than there are Poles. Even Russian citizens outnumber them more than eight-to-one. At the same time, Finland is the only Nordic country in which Estonians are one of the top three countries of origin for immigrants, which is interesting considering Sweden's history as a colonial power in the Baltic region.

Table 2 Immigrant populations over 10,000, 2014

	Denmark	Norway	Sweden	Finland
1	**Poland**	**Poland**	**Poland**	Estonia
#	32,516	85,591	48,227	48,354
2	Romania	Lithuania	Romania	Russia
#	18,815	35,770	13,022	30,619
3	Lithuania	Russia	Lithuania	**(Poland)**
#	10,358	11,455	10,406	3,684

Source: National statistics agencies, own calculations. Note: data for Denmark is for foreign citizens by country of origin rather than by country of citizenship

Since 2004, there has been massive growth in immigrants from the new EU member states in all the Nordics, particularly in Norway, which, for example, has seen a nearly 40-fold increase in the number of resident Lithuanians and 30-fold growth in the number of Poles. Norway also has the highest percentage of foreign nationals living in the country, which makes sense due to its growing economy's need for foreign labour. 62% of these foreign nationals, however, are from within the European Union – the highest share in the Nordics, in spite of the fact that Norway is the only Nordic country that is not an EU member.

This data does not necessarily suggest that Norway has the most "foreigners"; Norway has stricter rules regarding citizenship than Denmark, Sweden, or Finland – requiring the forfeiture of one's first citizenship in the case of naturalization. There are fewer benefits to acquiring citizenship from the perspective of its mostly European immigrant population, who are already granted many of the same rights as Norwegian natives, particularly in the case of citizens of other Nordic countries. Sweden, though, has the most non-European immigrants as a percentage of all foreign nationals.

2.2.2. In Finland

In Finland, the population of Estonian citizens has increased from 0 in 1990 (a predictable result, since Estonia did not gain independence until August 1991) to 13,978 in 2004, when Estonia joined as a new EU member state, to 48,354 in 2014. The increase in percentage terms is 250% in the 10 years since 2004, compared to a 24% increase in the Russian population in the same period of time.

The growth in immigration from all new (2004 and later) EU member states over the past 10 years is greater than 150% for all nationalities excluding Croatia, which joined only in 2013. The next-highest growth, following Estonians, is in Poles, Romanians, and Bulgarians, but this number is still tiny in comparison to the inflow from Estonia over the past decade.

2.2.3. Why Estonians choose Finland

Estonians are, by a wide margin, the largest single migrant group living in Finland today. While the other Nordic countries have large numbers of Polish citizens living and working there, Finland has very few Poles, and in their place are the Estonian immigrants. Somewhere between 15,000 and 20,000 Estonians were employed in temporary cross-border work in the Helsinki region alone in 2011, along with around 18,000 employed in longer-term projects (Laakso et. al., 2013). According to Laakso (2013, p.51), the most common industries in which they tend to be employed are: “retail trade, hotels and restaurants, cleaning services, construction, transport, information services, storage services, health services, social services, education, mail services and agriculture.”

The question, then, is why do Estonians choose to live and work in Finland? A look at the statistical differences between the two countries helps explain why it might seem quite attractive to make the short trip north to work in Finland.

Table 3 Estonia and Finland: a comparison

	Estonia	Finland
Population	1,313,271	5,471,753
GDP (billion)	€ 20.5	€ 207
Growth rate	1.1%	0.5%
Average monthly wage	€ 1,065	€ 2,946
Unemployment rate	6.2%	9.4%

Source: National statistics agencies, all data 2015

Estonia is about one-quarter of Finland's size in terms of population; Finland has a larger market, but with Saint Petersburg next door – a city of over 5.2 million people, to say nothing of the rest of the country – it is a less obvious selection. Similarly, since the economic crisis of 2008, the growth rate in Finland has suffered. Finland's unemployment rate is also significantly higher than Estonia's, though Estonia's low rate is likely a result of work-based emigration from the country.

However, when you look at the average monthly wage, things start to make sense. With an average salary of nearly three times that in Estonia, working in Finland could be very attractive. Nauwelaers et.al. (2013, p.13) find that this cost differential "creates a flow of investments…notably through sub-contracting practices from Finnish companies in Estonia and cross-border direct investment."

Beyond higher wages, Finland is simply very close to Estonia. The distance between Helsinki and Tallinn is around 80km – on a clear day, you can see from one country to the other with the naked eye. There are several companies running fast ferry connections throughout the day, and it is possible to get between Helsinki and Tallinn in approximately an hour and half. The accepted definition of a functional labour market region involves an area within a two-hour driving time, which puts the Helsinki-Tallinn area on the edge of that definition (Nauwelaers et.al., 2013). Additionally, due to the large Estonian diaspora living in the Helsinki region, the attractiveness of the region as a destination for migration has only increased over time.

Finally, and perhaps most importantly, the languages spoken in the two countries are, if not perfectly alike, at least relatively similar. The Finnish and Estonian languages are more similar to each other than any other extant language, and although the level of mutual intelligibility varies, many Estonians can speak some level of Finnish. These factors all combine to make Finland a very attractive destination for Estonians looking to make a move.

2.3. An overview of the construction industry in Finland

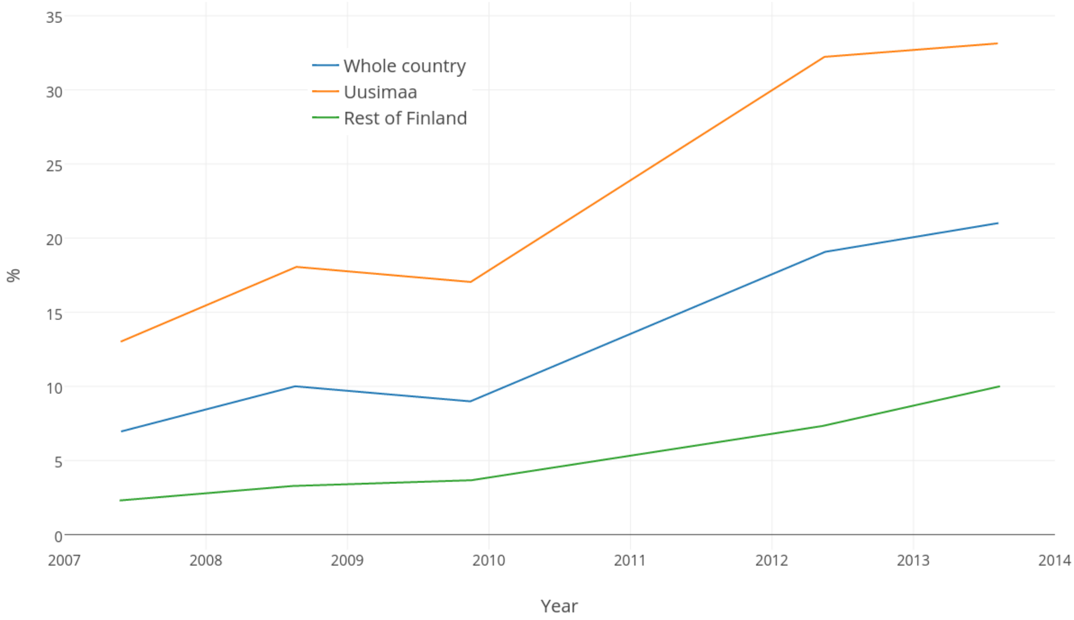
The Confederation of Finnish Construction Industries (RT, FI: Rakennusteollisuus) estimated that, in 2011, there were 100,000 workers on construction sites in Finland, and 250,000 employed in the industry overall. Of the industry's approximately €30 billion in net revenue, 46.4% came from residential construction, 39.8% came from non-residential construction, and 5.1% came from civil engineering works (Marketline, 2016).

The major players in the Finnish construction industry are a mix of Finnish and Swedish companies. The largest by turnover are YIT, Lemminkäinen, and SRV, all three of which are Finnish publicly listed corporations (Largest Companies, 2016). Following these Finnish firms are the Finnish subsidiaries of three large Swedish construction firms: Skanska, NCC, and Peab.

2.3.1. Foreign workers in the industry

It will come as no surprise to anyone who has been living in Finland for any length of time that a significant proportion of the construction workers in Finland, at least those present on the average construction site, are of foreign origin. As estimated by RT, and shown in Figure 1, the share of foreign workers in the construction industry grew from approximately 10% in 2008 to 21% in 2013. In the Uusimaa region (which includes Helsinki), the share of foreign workers in the industry is estimated to be over 30%.

Figure 1 The share of foreign workers in the Finnish construction industry



Source: The Finnish Construction Industry (Rakennusteollisuus RT)

The growth has levelled off, however, and seems to have been affected by the introduction of personal tax numbers for all workers on construction sites in 2012 and 2013. Following the implementation of this new policy, which was designed to combat the so-called "grey economy," around 53,000 foreign workers applied for the personal tax number (YLE, 2013). This appears to support RT's estimate that about one-fifth of the 250,000 construction workers in Finland are of foreign origin. Estimates of the breakdown by nationality are conflicting, but the Finnish Construction Trade Union estimated in 2014 that, of the foreign construction workers in Finland, around 80% are Estonian (YLE, 2014).

The final consideration here is the employees of subcontractors based in Estonia who are not registered as residents of Finland. It is not clear how many of these individuals are included in the above figures, since they are difficult to track, but I assume that there are some who are not included. This would bias the estimate of the share of foreign workers down, which would bias the estimate of the effect of increases in the share up – in other words, making the effect appear greater.

2.3.2. The effect of the "grey economy"

The term grey economy (known also as the informal economy) refers to the part of the economy that is not included in official statistics; it is not taxed, nor is it reflected in the GDP of Finland, for example. In the construction industry in particular, this refers to contractors who work off the books, or "under the table." How much of a problem is this in the Finnish context?

The Finnish Construction Trade Union estimates that 10% of the labour force and 3.5% of the turnover in the construction industry is made up of undeclared workers – a figure that adds up to about 15,000 people and €700 million in turnover (Kaseva, 2007). This makes the grey economy a serious problem, and among other things, risks eroding the tax base in Finland (Hirvonen, 2012).

Since 2000, there have been several reforms with the aim of reducing the damage caused by these undeclared activities. The most prominent policy, mentioned briefly above, was the introduction of personal tax numbers for workers in the construction industry, which led to a significant increase in the number of officially registered workers. According to the Occupational Health and Safety Act, every person on a construction site must wear a visible identification badge which shows clearly the tax number of the individual. In addition, since 2013, every work site has to maintain a "pass list" of all persons working on the site, their tax number, and the organization that is paying their wages, and this pass list must be available for at least six years after the end of the project (RT, 2013).

2.4. The role of employers' federations and labour unions

2.4.1. Representative bodies in Finland

As is typically the case in Finland's centralization bargaining system, the construction industry is characterized by two bodies, one representing each side in the classic struggle between labour and capital: a federation of most employers in the sector, and a trade union representing most of those that are employed in the sector.

The main body speaking for employers in the construction industry is the previously-mentioned Confederation of Finnish Construction Industries (RT). RT is made up of more than 2,600 companies employing approximately 55,000 people, and representing around €10 billion in annual turnover (RT, 2016). Given the estimated total market size of around €30 billion, the companies represented there appear to be responsible for about one-third of the annual sales of the industry.

According to RT's (limited) English-language website, it aims "to firm up the cooperation of industrial players so as to promote good construction and to strengthen the supervision of the interests and importance of the construction industry both in Finland and in the strongly internationally-oriented business environment." RT is a member of the Confederation of Finnish Industries (EK, FI: Elinkeinöelamän keskusliitto), which acts in its members' interests at the national level.

On the employees' side, RT's counterpart is the Finnish Construction Trade Union (RL, FI: Rakennusliitto). The union has around 87,000 members, a number which has decreased from over 91,000 in 1994 but is still up significantly from a low of 80,000 in 2004. Rakennusliitto describes itself as "(defending) the rights of employees and negotiates nationally binding collective agreements. These agreements establish enforceable minimum standards of pay and other conditions of employment that must be respected in the construction industry" (Rakennusliitto, 2016).

Rakennusliitto is represented at the national level by SAK, the Confederation of Finnish Trade Unions. It should be noted that the white-collar employees in many construction workers are chiefly represented by their own professional unions; for example, the Union of Finnish Business School Graduates (Suomen Ekonomit – Finlands Ekonomer), Academic Engineers and Architects in Finland (TEK), or the Finnish Association of Architects (SAFA), all of which are represented at the national level by Akava, the central union for professionals and managers in Finland.

2.4.2. Unions and collective bargaining in the Nordics

The most commonly-used measure of the influence of trade unions in a given country is union density, which refers to the proportion of paid workers who are union members. However, as per Hayter and Stoevska (2011), "union density only measures the extent of unionisation and tells us very little about the influence or bargaining power of unions." This is most clearly shown by the example of France, where only around 7% of the workforce belongs to a union (OECD.Stat, 2016), but nearly 100% of the population is covered by a collective agreement. This is in strong contrast to the situation in the Nordics, where both density and coverage rates are high, as shown in Table 4.

Table 4 Trade Unions in the Nordics and Estonia

	Density	Coverage	Year
Denmark	72.6%	92.0%	2008
Norway	**53.0%**	**74.0%**	2006
Sweden	85.1%	91.0%*	2007
Finland	69.5%	98.0%	2006
Estonia	7.6%	11.3%	2007

Source: Hayter and Stoevska, 2011, except * (ILO, 2009). Note: data for Denmark is for foreign citizens by country of origin rather than by country of citizenship

In addition to showing how similar the Nordic countries are relative to Estonia, this table shows the differences between Norway and the other three Nordic countries. The rate of both density and, most importantly, coverage, shows that the situation of workers in Norway is somewhat different from its neighbours. This is especially relevant given that the paper upon which this study is based (Bratsberg and Raaum, 2012) is a study of the Norwegian construction industry.

2.4.3. Unions and foreign workers

The relationship between trade unions and foreign workers is an interesting one – unions, especially those mainly representing blue-collar workers, tend to be opposed to migration in general as a result of the perception, correct or not, that migration exerts downward pressure on wages for existing members. However, at the same time, immigrants are a pool of potential members just like any other labourers.

In Sweden, there is a clear inverse relationship between the strength of a union's institutional position and its relative interest in organizing migrant as a result of a lack of pressure to innovate (Bengtsson, 2013). Since union density is even higher and the institutional position stronger in Finland than in Sweden, the Finnish unions' lack of interest in recruiting foreign workers starts to make sense.

The Finnish Construction Trade Union (RL) estimates that it has between 2,000 and 3,000 foreign members, of a total of approximately 87,000 – which, even at the high of that estimate, suggests that no more than 6% of all foreign workers in the industry are represented in the union, in spite of the fact that they make up around 20% of total employment in the sector.

In Finland, blue-collar trade unions like SAK have resisted the liberalization of migration since at least the 1970s, when they opposed the import of foreign labour to address labour shortages, and as late as 2004, when they lobbied for a transition period that would restrict new EU members' citizens from coming to Finland. In both cases, they were successful (Alho, 2015).

Interestingly, while SAK (of which RL is a member) opposes immigration on the grounds of existing high unemployment and questionable working conditions, Akava (which represents white-collar workers) is more open to bringing in workers from outside the EU – perhaps because these workers tend to be complements to, rather than substitutes for, their existing members (Alho, 2015).

3 THEORETICAL FOUNDATIONS

3.1. Standard model and general findings

The standard model for the analysis of the effect of immigration on the wages of natives suggests that, in general, the labour demand curve is downward-sloping. As a result, an increase in the supply of labour (for example, through work-based migration) should cause a decrease in wages for natives, which is a very intuitive result for anyone who has taken a course in principles of economics. However, the evidence we have from existing literature is somewhat more ambiguous, with significant differences in opinion between economists. These differences depend on the relative complementarity or substitutability of immigrants and natives (Borjas, 2008).

Borjas (2003) found that the labour demand curve is downward-sloping, finding a 3-4% decrease in wages alongside a 10% increase in the number of foreigners in a given field. He concluded that “the evidence consistently suggests that immigration has indeed harmed the employment opportunities of competing native workers.” (p.3) However, this could be the result of skill-biased technological change (SBTC) rather than any direct effect from the immigrant workers.

Alternatively, Card (2001) determined that immigration reduced native wages very little or not at all, a finding supported by Friedberg and Hunt (1995) and Friedberg (2001) who concluded that natives were not negatively affected by immigration. Instead, they found that immigrants tend to push natives to higher-wage or managerial positions, pointing to complementarity between natives and immigrants as a potential explanation, although they noted that the results could also be affected by SBTC (Friedberg, 2001).

Borjas (2008, p.5) responded that: “Overall, the evidence of labor-market complementarities between comparably skilled immigrants and natives is fragile. In general, a carefully designed empirical exercise that matches the theoretical concepts from factor demand theory with observable measures of prices and supplies fails to reject the hypothesis that comparably skilled immigrants and native workers are perfect substitutes.”

In the European Union, Angrist and Kugler (2003) found that barriers to entry increase the negative effects of immigration on natives, while restrictive institutions do not insulate natives from immigration as would be expected or hoped. However, this was seemingly contradicted by Menyhert (2012), who showed that the relationship shown by

Angrist and Kugler existed in the 1980s, but disappeared by the 1990s. They find no evidence of the effect of immigration on employment rates for natives. Even among leading economists in the field, the debate continues unresolved.

3.2. Theoretical basis for this paper

My theoretical framework is, as has become the norm when measuring the labour market effects of immigration (Okkerse, 2008), based upon a CES production function, in this case as borrowed from Bratsberg and Raaum (2012):

$$Q_t = \left(\sum_{j=1}^{J} \lambda_{jt} L_{jt}^{\rho} \right)^{\frac{1}{\rho}}, \tag{1}$$

where Q_t represents production, λ_{jt} is productivity, and L_{jt}^{ρ} is labour input, which is made up of native and immigrant labour as follows:

$$L_{jt} = \left[N_{jt}^{\pi} + \varphi_{jt} M_{jt}^{\pi} \right]^{1/\pi} \tag{2}$$

In these two equations, ρ and π represent the degree of substitution between labour types, and φ_{jt} is the relative productivity of immigrant labour.

In simpler terms, this says that the total economic product is equal to the sum of each unit of labour, multiplied by its productivity, or how efficient it is at producing a given output. The subscripts j and t indicate a specific type of job and point in time, respectively. Labour is made up of two types of workers: natives (*N*), and immigrants (*M*), which may have different levels of productivity.

The final part of this equation is the degree of substitution between the two types of labour – in other words, how easily can an immigrant be substituted for a native worker, or vice-versa? This last question is of particular interest to my work, as it will to some extent determine the overall effect of work-based immigration on native workers, depending on the relative effects of substitution (bad for natives) and complementarity (good for natives). Overall, this theoretical section should merely provide background on the assumptions made by this paper, and Chapter Four, which covers the empirical approach, will develop these themes further.

3.3. Literature review: the effect of immigration in the Nordics, and Finland

In order to gain some perspective, it is useful to investigate the work that has already been done in this field – specifically, in the other Nordic countries and in Finland. There has been little research into the effect of immigrants on wages for natives, but there has been plenty in terms of their overall performance in the labour market and their effect on the welfare states in the Nordics. This brief review should help to provide context for the work that follows.

3.3.1. The Nordics

Turning now to the Nordic countries, Storesletten (2003) found that the government of Sweden loses money on each new immigrant – approximately $20,000 – but this is entirely dependent on the age profile. As one might expect, immigrants in their first years in the labour market are much more beneficial to the economy than those who arrive later in life, with fewer working years ahead of them and more limited opportunities to become fully fluent in the native language. Ekberg (1999), however, finds "strong evidence that during the post war period up to about 1980 the native Swedish population obtained additional incomes through the public sector because of the immigrants."

In Norway, Hayfron (1998) used cross-sections from 1980 and 1990 censuses to find that the labour market performance, in particular earnings, depended highly on the differing "quality" of waves of immigrants over time. Longva and Raaum (2003), in a revision of Hayfron, found that the earnings assimilation of immigrants was weaker than his data suggested, after using country of origin as the determination, rather than citizenship. They also found, as Hayfron suggested, that the earnings of immigrants from OECD countries are similar to those of natives, while those from non-OECD countries start out quite far behind, but gradually improve over time.

Liebig (2007) studied the Danish market and found that immigrants have been doing much worse relative to natives for at least the previous 20 years. They determined that all immigrant workers, including the highly-educated and those coming from OECD (wealthy) countries, performed poorly in terms of labour market outcomes such as employment rates and representation. In addition, they found that these effects persist for second-generation immigrants, even controlling for characteristics such as educational attainment.

Turning to Norway, Bratsberg and Røed (2015) examined the effects of immigration on the health of the welfare state as a whole, rather than individual outcomes. They determined that, in the short run, the welfare state benefits from the presence of work-based immigrants through an increase in the supply of labour. Interestingly, Bratsberg, Raaum, and Røed (2016) also studied the labour market performance of immigrant workers in Norway and found that they are more than twice as likely as natives to lose their jobs, and additionally, that they suffer much more in terms of lost wages and employment potential.

Finally, Bratsberg and Raaum studied the Norwegian construction industry in 2012, finding a significant and negative correlation between the proportion of immigrants in a given trade and the development of wages in that trade, and that the visible effect is lessened due to both native exit and reduced native entry. However, they also looked at the effect of reduced wage growth via house prices, and determined that construction firms did pass on cost savings to consumers – an interesting result from an overall welfare point of view.

3.3.2. Finland

Sarvimäki (2011) finds similar results in Finland to what Longva and Raaum did in Norway, in that immigrants tend to earn less than natives upon arrival, and non-OECD immigrants do much worse than those from OECD countries. Additionally, he found that male immigrants from developed countries are the only ones who ever catch up to natives in terms of earnings, which appears to be largely a result of differences in employment.

Bartram (2007) explores the reasoning behind the relative lack of foreign workers in Finland, and finds that, due to the highly-regulated domestic labour market, there are fewer low-level jobs available – the ones typically filled by workers coming from abroad. Additionally, the relative strength of the labour unions in Finland makes it harder for companies to advocate for government policy that would be more liberal towards allowing in foreign workers. This finding is supported by SAK's aforementioned success in securing a temporary "adjustment period" before workers from new EU member states were allowed to enter the Finnish labour market.

4 EMPIRICS AND METHODOLOGY

4.1. Measuring the labour market effects of immigration

As per Okkerse (2008), there are a variety of different approaches that have been used to determine the effect of immigration on labour market outcomes for native workers. She divides the existing research into two categories: simulation-based analyses, which use existing models to simulate the effects of immigration, and econometric analyses, which use data to estimate the effects of immigration. This study is based upon an econometric analysis, which is further subdivided by Okkerse into area analysis, production theory approach, aggregate time-series analysis, and natural experiments.

The type of econometric analysis that is used most frequently is known as area analysis, which exploits concentrations of migrants in particular areas in order to determine the effect of migration on regional labour markets. With high-quality panel data being available, I could have used this approach, but there are two major problems with area analysis.

The first is an endogeneity problem, in which immigrants select their destination based on the local situation. This is highly likely. Of course, immigrants would rather move to an area with high wages and low unemployment if they have good access to information.

The second issue concerns natives moving away from areas with high concentration of immigrants to those with lower concentrations, diffusing the effect of immigration and giving the (mistaken) impression that immigration has had no effect. As Borjas (2003, p.3) finds, “This framework has been troublesome because it ignores the strong currents that tend to equalize economic conditions across cities and regions.”

As a result, this study combines aspects of area analysis with the use of a natural experiment –the increase in immigration to Finland associated with the 2004 expansion of the EU. My method exploits the variation in the share of immigrants per occupation to determine the overall effect of large-scale migration on the Finnish economy, similar to Friedberg’s 2001 study of the Israeli labour market, meaning that the “area” I analyse will in fact be a segment of the Finnish labour market rather than a geographical area.

4.2. Empirical framework

My study follows the example set by Bratsberg and Raaum in their 2012 paper, and uses the following empirical model for the natural logarithm of the wage of a given native worker i, doing job j, in year t:

$$lnW_{ijt} = \theta f(P_{jt}) + \beta' X_{it} + \gamma_j + \tau_t + u_i + \varepsilon_{ijt}\ , \qquad (3)$$

where P_{jt} is (as before) the immigrant employment share, X_{it} the vector of explanatory variables such as gender, age, and education, γ_j the group fixed effect, τ_t the time fixed effect, u_i is individual error, and ε_{ijt} is the error term which includes other unobserved factors. The subscripts i, j, and t serve to identify the individual, type of job, and year, respectively. I will explain the fixed effects in particular in the next section.

Now, what does this equation actually mean? Returning to equations (1) and (2) from the theory section in Chapter Three, which focused on production as a result of labour input and productivity, we now need to introduce wages. In a competitive market, the wage for a given employee is equal to the marginal product of his or her work. Equation (3) attempts to determine how much the value of the marginal product of work is affected by an increase in the supply of labour, which depends on how well immigrants can substitute for natives. The proportion of immigrants in a given type of job is used as the test for how wages move over time, and the other terms in the equation attempt to account for other factors that help determine a given person's wages. These factors can either be observable or unobservable. For example, wages in the Helsinki region are higher than those in the countryside, so we control for the region of residence. Age, gender, and level of education all have an effect on a given worker's wages, so it is crucial to make sure that we account for this variation. These are all examples of observable factors, and they are represented in the equation above by X_{it}.

Some things that determine wages (wage determinants), however, are more difficult to observe, and it is for this reason that the use of quality panel data and individual fixed effects become so helpful to getting good data. These topics are covered in more detail in the following section.

My dependent variable is log wages, and to obtain this value I divide total earned income by the number of working days and take the natural logarithm of the result. Using the previously determined regression form, which includes individual fixed effects, I regress log wages against the vector (X_{it}) of the following explanatory variables in order to account for endogeneity: age at the end of the year, education, and region according to the 2012 internal division. This is the basis for the results of my regression analysis, but first, some background on the model itself.

4.3. Panel data and the fixed-effects regression model

Panel data is a dataset in which observations are taken of the same entities (in this case of my data, humans living in Finland) at various points in time (Lipps and Kuhn, 2012). It allows the researcher to control for the unobserved individual characteristics that were mentioned in the previous section, which is particularly valuable when performing a regression analysis, in which all endogeneity must be accounted for in order to assume a causal relationship. The large number of data points increases the degrees of freedom, reducing covariance between variables and controlling for both unobserved and omitted variables (Hurlin, 2010). The main appeal of panel data is in its potential for greater accuracy and a setup that can be likened to experimental design.

Perhaps the most important aspect of the model I have chosen to use for this study is the use of fixed effects. Fixed effects are simply the things that, in theory, do not vary over time – for example, intelligence, gender, or one's parents' level of education. A fixed-effects regression model, like the one I use here, assumes that these unobserved or omitted variables are correlated with the other variables in the model, and controls for them accordingly, assuming that those omitted variables are time-invariant as well.

The other alternative when using panel data would be a random effects model, which assumes no such correlation. I do not expect that to be so, but in any case, a Hausman test can be performed once the panel data is set in order to confirm the appropriateness of the model. The Hausman test checks to see if the individual error (u_i) is correlated with the regressors (key and control variables), and from the result it is possible to determine which of the two models suits the data best.

Fixed effects models are used when the variable(s) of interest are those which vary over time. Since the key variables here are wages and the immigrant share, both of which vary over time, this condition is easily satisfied.

4.4. Measuring the welfare effects of immigration

The next topic I address is how immigration affects overall welfare. One obvious measure is the effect on wages for natives, which is the major subject of this paper, but it is certainly not the only way of determining the effect on a country's citizens. For example, if wages for natives are lowered due to an increase in the supply of labour, do these lowered wages lead to an expansion in demand for labour, which could increase overall employment? Dynamic effects like these are difficult to estimate, and as a result the overall effect of immigration is ambiguous.

Another possible measure, and one which I try to estimate, is the development in the price of houses during a given period of time. If one again assumes that immigration lowers wages in the construction sector, are these decreased wages passed on to consumers in the form of lower prices for houses? If so, there could be a significant and positive effect on all consumers of housing (not just home buyers) throughout the country, as rents should move together with house prices in one direction or the other. I will return to this topic in Chapter Seven, where I attempt to estimate the effect of a change in wages on prices for houses in Finland.

4.5. Confounding factors

There are factors which might affect the results I find in Chapters Six and Seven after performing the regressions described in this chapter. I will briefly discuss them here.

First, the issue of legal but non-resident workers and the use of foreign subcontractors. As mentioned in Chapter Two, there are workers that work on Finnish construction sites who are not registered as residents of Finland or who work for subcontractors and are otherwise not counted. These individuals, while working legally in Finland, do not appear in the official statistics, and will not be included in my estimations, which causes undercounting of foreign workers.

Next, the "grey economy" and illegal workers. I find that legal immigration, particularly from Estonia, has increased significantly since Estonia joined the European Union and their workers were permitted freedom of movement within the EU. However, who is to say that illegal immigration has not increased at the same rate, or even more quickly? There are no border controls within the Schengen Area (to which Finland and Estonia both belong), so it is very difficult to track the movements of people within this area. As a result, illegal workers are no doubt in the country, working for unknown (but likely low) wages.

In both of these cases, the estimates of the effect of foreign workers in the industry on wages would be biased upwards as a result of undercounting of foreign workers. The question that needs to be answered here is: if actual immigrant employment is 10% higher than observed in the data, how much will my estimates exaggerate the effects under consideration? Fortunately, there is a way of avoiding this issue: rather than just taking the coefficient of my regressions (θ), I report the elasticity of wages with respect to the proportion of immigrants, which accounts for this undercounting of foreign workers.

5 DATA AND EMPIRICAL IDENTIFICATION

5.1. Data source

My main empirical source is the Finnish Longitudinal Employer-Employee Data, or FLEED, which has been created by Statistics Finland (FI: Tilastokeskus/SV: Statistikcentralen) for research use. It is a 1/3 random sample of persons aged 15-70 living in Finland (except Åland) between 1988 and 2013 and includes about 1.2 million persons in the data, tracking those persons during the years in which they are alive, residing in Finland, and within the age range of the survey.

This key word in the title of this data is “longitudinal,” which indicates that this is panel data. This means that it tracks the same individuals over a long period of time, which enables the use of the model described in Chapter Four.

In addition to basic demographic information such as age, gender, and nationality, the FLEED contains all sorts of interesting information, from size and type of house and whether the person owns a car, to whether they received student financial aid and/or maternity allowance. More relevant to this work, however, is the detailed information on education, employment, and income that the data contains. This allowed me to track individual persons’ outcomes over time without needing to try and combine multiple data sets, if that were even possible.

5.2. Identification strategy and dataset construction

To obtain the data that is relevant to this study, I first identified those individuals who had worked in the construction industry at some point during the survey. I identified these individuals by the standard industry classifications (SIC – FI: TOL) of their employer at the end of the year. This already posed a problem, as these classifications were updated four times between 1988 and 2013, but in the end I was left with 25 individual datasets, one for each year, with all those individuals who had been employed in the construction industry at some point. I then combined these into one dataset, with a total number of 1153954 observations of 187469 individuals.

It was also necessary to assign a randomly-generated identification number (ID) to every distinct individual in the data. The FLEED data is largely stored in string (or text) format, rather than as a number, and this also applies to the encoded IDs that are used to protect the personal identification numbers of the individuals in the data. These IDs are a mix of letters and numbers, and the statistical software that I used for the analysis, STATA 14, is unable to use a string value as an identifier for a fixed-effects regression. As a result, I needed to generate a new numeric ID for each unique individual before going any further.

Next, I needed to determine the proportion of immigrant labour by trade, which is my main independent variable. The difference between trades with significant barriers to entry (such as physical scientists and engineers), and those without these barriers to entry (tradespeople and drivers) can be shown by using the 2-digit level occupational code to determine an individual's specific trade even within the construction industry. Since these trades with stricter entry requirements are more difficult for immigrants to gain entry to (as a result of language and localization issues), they are characterized by a lower proportion of immigrant labour (P_{jt}).

However, another problem quickly presented itself: detailed data on specific job tasks was only kept during the years 2004 to 2010. As a result, I was left with 7 years of data and 343,545 observations of 91,882 individuals. This did narrow the scope somewhat, but still left me with plenty of data to work with, and in fact, I have access to more data than Bratsberg and Raaum did in their original work.

In order to establish the annual proportion of immigrant labour by trade, I used the variable indicating citizenship to find those workers who were not Finnish citizens. The result was an immigrant employment share specific to each activity, defined by

$$P_{jt} = \frac{M_{jt}}{M_{jt}+N_{jt}} \ , \tag{4}$$

where M_{jt} represents the immigrant employment level and N_{jt} the native employment level in a given trade, with j representing the occupational classification and t the year. Appendix 2 shows the number of individuals and immigrant share for each occupation in 2004 and 2010, the first and last years of the data, respectively.

Once I had determined the immigrant employment share for each occupation in each year, I combined the 7 datasets together, dropped the variables that were not needed for my research, and reorganized the data in a manner that was pleasant to work with and had English-language variable names and explanations.

After completing my work on what I consider to be the full sample, I moved to create three additional datasets in order to help interpret the results of my analysis. The first dataset I created was a balanced panel, which drops all those individuals who do not appear in the dataset in all 7 years of the sample. In practical terms, this means that every individual with fewer than 7 observations is removed from the data. The use of a balanced panel helps to determine the effects of attrition – those individuals that leave the data for various reasons.

Next, I dropped all those individuals who appear in the data for the first time after 2006, creating a smaller dataset that is referred to as "drop entrants" in the rest of the paper. This dataset can be used to control for the effect of new entrants to the industry during the course of the study.

I also created a dataset called "drop leavers," in which all those individuals who appear in the data in the first years of the study but leave before 2007 are removed from the sample. Performing the same regressions on this smaller sample helps to control for the effect of native exit.

Finally, I created a fifth dataset that is exclusively made up of those who left the industry before 2007 – the observations that were dropped from the "drop leavers" sample. The intention here was to obtain descriptive statistics on the profile of those workers who decided to leave the industry, and no regressions will be performed on this (quite small) dataset.

5.3. My contribution to the existing data

While the FLEED database is an excellent source of data and a comprehensive one, the personal information it contains about one-third of the Finnish labour force makes it difficult to gain access. In the first place, the database may only be accessed on the premises of Statistics Finland in Kalasatama, Helsinki, or via a highly-controlled remote access system, and then only by employees or those individuals, like myself, who are working on a research contract. As a result, little of this data is commonly available.

In addition, the data exists in raw form only, and in order to make it usable for purposes similar to my study, significant work is required in terms of dataset construction. The result of this work, in my case, is a comprehensive set of all those individuals in the data who worked in the construction industry between 2004 and 2010. These datasets include information on job type, monthly and annual wages, months of work, age, education level, sex, and the proportion of immigrant labour in their specific field.

This alone would be a highly interesting resource for anyone with an interest in the industry, and I consider it in a way to be a positive externality that has been created; in terms of my study, it is to some extent a means to an end, but it does help add valuable context for the reader. Sadly, all these datasets will, as per my agreement with Statistics Finland, be deleted following the end of my research contract. I will go into more detail on what the data actually contains in the following section.

5.4. Data and descriptive statistics

In the end, I was left with five datasets, only four of which were intended to be used in the regression analysis: the full sample, a balanced panel, a reduced sample which left out those who entered the dataset after 2006, a reduced sample which left out those who left the dataset before 2007, and a smaller fifth sample which included only those who left the dataset before 2007. These five datasets are the bases for my regression analysis, and are featured in Table 5.

Table 5 Descriptive statistics: what do the data look like?

	Full sample	Balanced panel	Drop entrants	Drop leavers	Leavers only
	(1)	(2)	(3)	(4)	(5)
Monthly wage	€ 2,821 (€ 1,979)	€ 2,954 (€ 1,712)	€ 2,841 (€ 1,960)	€ 2,831 (€1,882)	€ 2,682 (€ 2,921)
Annual wage	€ 30,135 (€ 16,003)	€ 34,296 (€16,413)	€ 30,853 (€ 15,902)	€ 30,701 (€15,999)	€ 23,193 (€ 14,340)
Age	41.43 (12.17)	43.67 (10.27)	42.46 (11.7)	41.4 (12.02)	41.81 (13.8)
Working months	11.07 (2.22)	11.77 (1.05)	11.24 (2.01)	11.18 (2.08)	9.87 (3.24)
Foreign workers	2.24%	1.03%	1.54%	2.23%	2.25%
Observations	343,545	135,877	290,933	317,655	25,890
Individuals	91,882	15,380	47,205	55,990	

Notes: Standard errors in parentheses. Monthly wage, annual wage, age, and working months are population means. "Foreign workers" shows the population share of non-natives.

Using Table 4, it is possible to compare the full sample (in column 1) with the various other reduced datasets. The balanced panel, for example, representing those individuals who were in the data for all 7 years, has the highest mean wage, the highest average annual working time, the highest average age, and the lowest proportion of foreign workers. This reflects the positive selection inherent in a dataset made up of those who have spent a longer time in the industry and have chosen to remain there. It should also be noted that very few individuals were in the data for all seven years, which indicates the low barriers to entry and exit that characterize the industry.

Conversely, the dataset “leavers only” is the opposite in many ways – it has the lowest mean wage, the lowest average annual working time, and the highest proportion of foreign workers, which represents the selection bias of a group that has chosen to leave the industry entirely. Reasons for leaving can include low pay, better opportunities elsewhere, native exit following the entry of immigrants, and retirement, the last of which may partially explain why the average age in this group is slightly higher than it is in the full sample. The drop leavers sample is also likely to demonstrate positive adverse selection, in that those remaining after any rounds of layoffs may tend to be more skilled than those who left the sample. While Finnish labour law and collective agreements make it quite difficult to fire employees for these reasons, it is likely that employers do find a way over time to keep the workers they determine to be more productive.

The “drop leavers” and “drop entrants” samples are quite similar in nature, with only two noteworthy differences between the two. The first is the difference in average age, which is significantly lower in the “drop leavers” dataset. This can be explained by the observation that those entering the industry for the first time tend to be younger, and those leaving the industry tend to be older workers retiring or going on disability. The second difference is in each dataset’s share of foreign workers – the proportion is much higher in the “drop entrants” sample, which quite predictably is lower when entrants to the industry are excluded. When compared to the full sample, these two datasets demonstrate that labour market conditions appear to be slightly better when native entrance and exit is excluded.

6 RESULTS AND ANALYSIS

The data were accessed in Spring 2016 at Statistics Finland's research laboratory in Kalasatama, Helsinki, and the confidential nature of the data necessitates that no unit-level observations leave the premises. The results have been screened by Statistics Finland's Researcher Services department in order to ensure compliance with the relevant policies on data protection. All the regressions were performed using Stata 14, using the remote access system available on the same premises.

After performing my initial regressions, I performed a Hausman test in order to indicate which of the two results I should consider more reliable. The Hausman test confirms that the model which included individual fixed effects is the one which corresponds to the available data best. As a result, the coefficient from column (2) is the best estimator of the effect of immigrant share on native wages. Additionally, I performed a Breusch-Pagan test to check for heteroscedasticity, and determined that, based on the regressions I had run, the variability in wages is equal across all values of my independent variables.

6.1. Effect of immigration on the native wage

The results from the estimation of my empirical model are presented in Table 5. The natural logarithm of the monthly wage of each individual worker is the dependent variable, and the key independent variable is the immigration employment share P_{jt}, the coefficient of which is θ. All the results are significant at the $p<0.001$ level.

Without taking individual fixed effects into account, the results in column (1) show a significant and negative effect on wages from an increase in the immigrant employment share, with an estimated coefficient of -1.001. This finding was quite surprising, as I expected to find little to no effect on wages before accounting for time-invariant individual characteristics.

When these individual fixed effects are included, in column (2), the coefficient decreases, to -0.748, with a standard error of 0.107. Once again, there is a significant and negative effect on wages resulting from an increase in the immigrant employment share, although this effect appears to be somewhat lower than predicted in (1).

Table 6 The effect of immigration on wages for natives

Immigrant share and the native log wage

Dependent variable	lnW_{ijt}	lnW_{ijt}	lnW_{ijt}	lnW_{ijt}	lnW_{ijt}	lnW_{ijt}
	(1)	(2)	(3)	(4)	(5)	(6)
Immigrant share (P_{jt})	-1.001*** (0.089)	-0.748*** (0.107)	-0.898*** (0.146)	-1.120*** (0.156)	-0.900*** (0.121)	-0.762*** (0.108)
Individual fixed effects	No	Yes	No	Yes	Yes	Yes
Observations	255,838	255,838	105,970	105,970	217,081	238,924
Individuals	66,828	67,270	15,380	15,380	47,367	56,287
R^2	0.066	0.055	0.060	0.071	0.058	0.056
Sample	Full sample		Balanced panel		Drop entrants	Drop leavers

Notes: Standard errors in parentheses. *** = significant at the p<0.001 level. The regressions control for age, age², education, region, year of observation, and job code. Estimates of R^2 for regressions with individual fixed effects are using the within estimator.

The result shown in (2) is very similar to Bratsberg and Raaum (2012), who found that the equivalent coefficient in Norway was -0.72. This figure is broadly in line with the existing literature, for example Borjas (2003) who found a comparable value of -0.572. While this could mean that the wage effects of immigration in the Finnish construction sector may be slightly higher in Finland than in Norway, the Norwegian coefficient is well within the reported standard error. Either way, the results are, as expected, quite similar.

Turning to the regressions performed on the balanced panel, in particular in column (4), which accounts of individual fixed effects, the reported coefficient of -1.120 (with a standard error of 0.156) is significantly higher than the result from the full sample. This quite significant difference suggests that the negative effects on to those employees who have been in the industry all seven years is somewhat greater than that done to those who were not.

The difference between the two results could be due to adverse selection within the balanced panel. For example, those within this dataset could be those with fewer options for other employment, since they have remained in the same occupation for the entire seven-year period. The individuals in this group are on average the best-paid, the oldest, and those who work the most regularly. It stands to reason that this may make these employees less likely to seek other employment, and as a result they may be more likely to accept lower increases in salary when compared to workers who are younger and/or more mobile.

6.2. Selective participation: entry and exit

Table 5 also shows the effects of immigration on two more limited datasets: "drop entrants," which does not include those individuals who entered the data for the first time after 2006, and a third dataset, "drop leavers," which does not include those individuals who were present in 2004 but left the dataset before 2007. Performing regressions on these reduced datasets allows me to account for the effect of native entry and exit over the seven-year period of my study.

Column (5) shows the effect of immigration on the group that does not include those individuals who entered the industry during the course of the study. The reported coefficient here is -0.900, with a standard error of 0.121. Based on this result, it would seem that early entrants to the industry had a stronger effect on industry wages than those who entered later on.

As shown in column (6), the resulting coefficient for the "drop leavers" sample is -0.762 with a standard error of 0.108. This figure is nearly identical to the result from the full sample. I would have expected the coefficient to be significantly smaller than (2), given the fact that those with lower salaries should be more likely to leave the industry. However, that that does not appear to be the case here.

Both results are broadly similar to those from the full sample, which suggests to me that the labour mobility of natives has not greatly affected the development in wages in this industry, or that the substitution effect of natives exiting the industry following the entry of new immigrants, in particular, is being counteracted by some other unknown force – perhaps the complementary effects that can only be seen over a longer time period.

6.3. Native wage elasticity

To determine how much wages for natives change as a result of an increase in immigration, I will calculate the elasticity of wages relative to the proportion of immigrants. I evaluate the full sample at the mean value of P_{jt}, which is 3.3%, using the following equation for wage elasticity:

$$\frac{\partial lnw_{ijt}}{\partial m_{ijt}} = \frac{\theta}{(1 + m_{ijt})^2}, \tag{5}$$

where m_{ijt} is the percentage increase in the proportion of immigrants by trade. As per Bratsberg and Raaum (2012), this indicator is preferable to two more frequently used measures of elasticity which use the immigrant employment share or relative immigrant employment, as it is not affected by the undercounting of immigrants.

The resulting elasticity of wages with respect to immigration is -0.07. In other words, if the share of immigrants increases by 10%, wages for native workers in the industry will decrease by 0.7%. This result is very similar to the value of -0.06 that was found by both Borjas (2003) and by Bratsberg and Raaum, and is consistent with studies conducted using different methods and in various countries.

6.4. General findings

Based upon the results of the six regressions I performed on these four datasets, there appears to be a clear negative relationship between the share of immigrant workers and wages for natives. These results seem to hold regardless of whether or not individual fixed effects are taken into account, and for all variations of the available data.

In particular, the wage elasticity relative to the proportion of immigrants seems to indicate that immigrant workers are substitutes for similarly-skilled natives, although perhaps not perfect ones. The degree of substitution is unclear, but at the very least it does seem likely that it is perfectly feasible to replace Finnish workers in the construction industry with foreign workers.

A possible reason for the two groups not being perfect substitutes is the possibility that foreign workers are less productive than domestic workers. As an example, when interacting with clients in particular, language issues may be an issue. If both parties involved believe that the other party's level of understanding is higher than it is, costly mistakes may be made. This is presumably less likely to happen with native speakers of Finnish or Swedish.

The results appear to be largely due to the increased supply of labour caused by immigration to Finland. The proportion of workers in Finland that are covered by collective agreements is significantly higher than the rate of union membership. At the same time, though, unions may find their resources and bargaining power reduced if the new entrants to the industry do not join as members. As discussed in Chapter Two, the Finnish Construction Trade Union (RL), has seen a decrease in its membership in recent years, which may be in part due to migrant workers in the industry choosing to remain outside the union. If this is the case, the reduced market power of the union may result in lowered wages for all parties, which could partially explain the results here.

7 IMMIGRATION AND PRICES

In the previous section, I concluded that immigration does appear to have a significant and negative effect on wages for natives when they enter the construction industry. However, to leave the analysis there would be to tell only a part of the story – wages for natives in the industry may be affected in the short term, but what about the dynamic effects of lowered wages?

If wages do in fact decrease, are these cost savings passed on to consumers, or simply absorbed as profits for the companies in the industry? In a competitive market, reduced input costs should result in a decrease in prices, and the reduction in input costs has already been demonstrated. To address this question, I begin with a presentation of the means with which I can answer it.

7.1. Background and existing literature

Bratsberg and Raaum (2012) use Statistics Norway's Building Costs Index to look at the relative development in costs by trade over time – for example, how costs have increased over the past several years for services like painting and carpentry (performed by trades with higher proportions of immigrants) compared to the costs of services like plumbing and electrical work (using trades with lower proportions of immigrants). The data permitted them to match 7 of the 16 trades in their study of wages to the price of different services within the industry. This approach worked well for the authors, and they determined that "over time, the prices of services with no increase in immigrant labour have risen at a rate of 50–100% above that observed for services that intensified their use of immigrant labour." (pp.1200-1201)

Unfortunately, this approach is not feasible with the data that is available in Finland. At the micro-level (with the FLEED), job data is not available at the same level of detail, making it impossible to determine the change in wages for such easily-defined services. Secondly, at the macro level (regarding house prices), the building costs index does not break costs down into these services either. It quickly became clear that I would need to figure out a different way of answering the question.

In terms of the existing literature, Lach (2007) studied the arrival of migrants in Israel from the Soviet Union in 1990, and looked at the effects on price levels following their arrival. He found that the increase in the proportion of foreigners in the market decreased prices overall as a result of higher price elasticity and lower search costs. Cortes (2008), studied the effect of lower-skilled immigrants on prices for immigrant-intensive services in the U.S., and found that a 10 per cent increase in the share of immigrants in a given occupation resulted in a 2 per cent decrease in the price of the service provided.

7.2. Empirics and methodology

My approach is to exploit the fact that there are great differences in the proportion of foreign workers between different regions of the country. As noted in the discussion of the construction industry in Chapter Two, most of the foreign labourers in the industry have moved to the Helsinki region, and as a result, their effect on wages should be largely confined to that region. Therefore, I decided to use a differences-in-differences estimation strategy.

The differences-in-differences model gives the average effect of a given treatment on those that are treated. In this case, the treatment is migration, and the treated, rather than individuals, are the regions of Finland. The control group are the other 18 regions of Finland in which little to no increases were seen in the proportion of immigrants in the construction industry, and the treatment group is the Uusimaa region, in which nearly all of the migration has been concentrated.

The estimation in differences-in-differences can suffer from the issue of other events other than the treatment affecting the dependent variable. As a result, I will control for regional-level differences using GDP and output data in order to reduce the effect of this unobserved variation.

The main assumptions of this model are as follows. First, that the regions would have followed parallel trends if the treatment had not occurred. I assume that this is the case, if only after I control for the relative change in GDP over the period in question, being aware of no other significant shock to the industry that would have affected the Uusimaa region and not the rest of the country at the time that it did. The other assumption is that the timing of the treatment is as good as random, which I do accept, as Finland was already a member of the European Union, and the entry of the new member states occurred at a specific time that was set well in advance.

The empirical equation used here is as follows:

$$\beta = [E(lnP_2|R = 1) - E(lnP_1|R = 1)] - [E(lnP_2|R = 0) - E(lnP_1|R = 0)] \quad (6)$$

where β is the effect of the treatment, E indicates the expected value, lnP_t is the log house price at time t, and R is the region (1 referring to Uusimaa, and 0 referring to the rest of Finland).

In this case, the equation depends on the assumption that if an increase in migration had not occurred in the Uusimaa region, the resulting house prices in the region would have followed the same trend as house prices in the rest of the country.

7.3. Confounding factors

There are drawbacks, however, to this approach. It is not the ideal approach, but limitations on the scope of this paper necessitate a less-than-ideal method. I will summarize the main drawbacks here, but the main point is that I can only prove correlation, not causation.

First, the development in house prices may be affected by other factors. It is unclear in which way estimates could be biased, depending on what unobserved variables are causing a change in house prices.

As an example, the demand for housing is greater in the capital region than anywhere else in the country, as that is where most of the jobs and services are located. As a result of this, comparisons between the capital region and other regions may be misleading, and estimates of the effects of immigration on house prices in this region would be biased downwards.

Another issue that is specific to the capital region is the spillover effect of lowered wages in the capital region. If wages decrease in Helsinki due to an increase in the availability of foreign labour, it is possible that this may lower wages in the rest of Finland due to the free movement of labour within the country. This would also bias the estimates downwards.

Finally, the data itself is not what I would have hoped for, even for this limited approach. The best possible data would have been micro-level data on all newly-constructed homes in the country, allowing me to take older homes out of the equation. As it stands, I have to rely on the assumption that lower building costs for new homes will pass through to lower sale prices for older home as well, and that new and existing homes are relatively close substitutes for one another.

7.4. Data

This approach required the use of three main sources of data, which needed to be cobbled together into one dataset: the FLEED, Statistics Finland's Regional Accounts database, and the National Land Survey of Finland's (FI: Maanmittauslaitos SV: Lantmäteriverket) official purchase price register. First, from the FLEED, I used a similar approach to that which I used to determine the share of foreign workers by type of job, except this time breaking the sample down by the share of foreign workers by region and year, using the 2002 regional division. Next, I used the Regional Accounts database to determine the output, GDP, average population, and number of employees by region and year. Finally, using the purchase price register, I found the mean and median prices of single-family detached homes by region and year.

Once I had the data, I combined all of these into a single dataset, with which I could proceed with my analysis. I then took the natural logarithm of the mean and median house prices in order to normalize the distribution of the residuals.

7.5. Results

I run six regressions here: three using the log median house price (lnP_{med}), and three using the log mean house price (lnP_{avg}). Regressions (1) and (4) are run with no additional controls, while (2) and (5) use GDP as a control variable, and (3) and (6) use output.

The regressions without additional controls find a negative relationship between treatment and house prices, but in both cases, the relationship is statistically insignificant, with p-values around 0.50. However, once control variables are introduced to account for differences within the regions, the relationship that is established is strongly negative and highly statistically significant ($p<0.001$). The resulting coefficient for these four regressions is quite consistently near -0.2, with little variance between them and standard errors around the 0.05 mark. The full results are found in Table 7.

Table 7 The effect of immigration on house prices

Immigrant share and the native log wage

Dependent variable	lnP_{med}	lnP_{med}	lnP_{med}	lnP_{avg}	lnP_{avg}	lnP_{avg}
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment effect (β)	-0.037 (0.051)	-0.211*** (0.054)	-0.204*** (0.058)	-0.034 (0.052)	-0.218*** (0.047)	-0.209*** (0.050)
Control var.	None	GDP	Output	None	GDP	Output
Observations	133					
Regions	19					
R^2	0.453	0.533	0.524	0.513	0.603	0.592

Based upon these figures, it is clear that there appears to be a significant and negative effect of increased immigrant labour on the price for houses in Finland, discounting the regressions in (1) and (4), which fail to account for the difference in GDP and output growth between the capital region and the other regions of Finland.

This supports the theory-based argument that, in a competitive market, prices will decrease in response to a decrease in input costs – in this case, the cost of labour, the decrease in which was shown in the previous section. The effect of the treatment appears to be a large decline in house prices in the capital region relative to where they would otherwise be absent the increase in labour migration.

8 SUMMARY AND CONCLUSIONS

8.1. Summary

As a result of the opening of borders to the new European Union member states in 2004, there was a significant increase in the supply of labour to existing member states. In the rest of the Nordics, this was mainly Polish workers; in Finland, this was mainly Estonians. Many of them entered the construction industry, and this increase in the supply of labour caused a decline in industry wages. My study finds that a 10% increase in immigration in a given trade should cause a 0.7% decrease in wages for that trade.

This decrease in wages, while a difficult thing for those native workers already in the industry, did have other effects. As a result of this wage effect, the cost of building decreased for firms in the construction industry, and in a competitive market, this should cause prices to decrease as well. This does seem to be the case here, and as a result, the price of housing in the capital region is lower than what it would otherwise be if the migration had not taken place.

This suggests that the net effect of work-based migration, without looking into the effects on public finance (in the form of tax receipts) or expenditure (in the form of benefits) is a positive one, assuming that the benefit of lower house prices for all capital region residents outweighs the negative effect of lowered wages for those within the construction industry.

8.2. Implications

The implications of these findings are quite significant, in that they show for the first time in Finland that wages for natives are eroded by the entry of foreign workers, if by a relatively small amount. However, the implications go well beyond that, as the societal effects of reduced prices for all consumers need to be considered in the discussion as well.

The finding that the entry of foreign workers reduces wages for natives does support the conclusion that these workers are substitutes for natives, but it does not exclude the possibility that they are complements as well. The effects of complementarity can often be detected only over a longer time horizon than we have access to, and in fact, the effects may already be apparent would I have access to more recent data. Immigration is still quite a new phenomenon for Finland. And, after all, the existing domestic literature is somewhat limited.

Expanding public access to information of the sort in the study would ideally contribute to a more nuanced discussion about immigration, although I am personally quite skeptical about facts winning out over feelings, especially in a field where there is so much nuance to understand. If this information can be communicated well by the right person, perhaps it could get someone to soften their stance on immigration in either direction, and to see it as more of an ambiguous force rather than strictly good or bad.

In terms of implications for public policy, the demonstrated effects of immigration on native workers could justify support for displaced workers in affected industries. More precisely, if workers do leave the industry as a result of an influx of foreign workers in their industry, subsidies or retraining could be a good way of compensating them for this.

As an example from a different industry, Uber (an American company that provides an infrastructure for transportation services) is currently competing with officially-licensed taxis on both service quality and, crucially, price. This is largely driven by the fact that drivers tend to be of foreign origin and that they are contractors rather than full-time employees. If the increase in foreign workers can be shown to decrease wages in the industry, this could influence the decisions made by policymakers.

Unions should perhaps take a more active role attracting migrants if they wish to maintain their role in society as the representatives of working people in the tripartite collective bargaining system which is currently under threat. Their efforts so far have been relatively tentative at best, and if they were to do a good job reaching out to those new to the country, they could protect their existing members against the erosion of wages due to immigration.

Another topical issue is the “availability concern” (FI: saatavuusharkinta SV: uppehållstillstånd för arbetstagare) system used by the Finnish government when it comes to the issuance of work permits for non-EU/EEA citizens. In theory, this system means that a residence permit will not be granted if an unemployed native worker could do the job that the immigrant is applying for.

This requirement was publicly debated in the lead-up to the 2015 Finnish parliamentary elections: should it be changed, retained as is, or scrapped entirely? The government that took office following the elections included a line in their official programme that said that the system would be maintained, but this was by all accounts a political decision. It is my opinion that the findings of this paper give justification for the removal of this requirement, in the case that support for displaced native workers is introduced – which should increase total national welfare. However, if support would not be introduced, the effect on native workers could potentially justify the maintenance of the availability concern.

Finally, with the large inward migration of refugees and asylum seekers fleeing conflict in the Middle East, this can perhaps shed some light on how adding a large amount of foreign labour might affect the workforce if it happens all at once – though at the rate refuge and asylum claims are being processed, it may happen over quite a long period of time. In any case, if policymakers are considering the effects of immigration on native workers, they at least have somewhat more information than they did before.

8.3. Direction for future research

My study largely focuses on the short-term effects of immigration, which mainly captures the substitution effects of immigration. If, in fact, Finnish workers in the construction industry are pushed into higher-wage or higher-skill jobs (for example, as construction site foremen or safety supervisors) this will only be seen given a sufficiently long time horizon. As a result, future research could attempt to break down the long-run effects into substitution and complementarity, and determine which of these forces is stronger in the Finnish construction industry and/or in Finland.

Another direction would be to take a more rigorous approach to the question of the effects of immigration on house prices and on total consumer welfare – even to the point of trying to calculate the net change in national welfare that results from an increase in immigration. For the house prices example, an instrumental variables approach with a very good instrument would allow one to establish a causal relationship between immigration, wages, and prices for houses, rather than the relationship of correlation I have demonstrated here.

The same study could be repeated in the service industry to see if the results for the construction industry can be generalized. For example, the effect of increased immigrant labour in the restaurant or cleaning businesses could be examined [in particular, on the price level, similar to Cortes (2008) in the United States] and if similar results were found here, the robustness of the findings from the construction industry could be confirmed.

SVENSK SAMMANFATTNING

Introduktion

Finland har sett mycket mer utvandring än invandring under sin historia. För första gången i modern tid har Finland nu sett även invandring, men det finns lite information om effekterna av detta på den infödda befolkningen. Det anses ofta att invandrare tar jobb från lokalbefolkningen och sänker lönenivån, men detta är i stort baserat på fördomar i stället för fakta.

Ämnet är viktigt eftersom invandring tycks påverka olika grupper på olika sätt, beroende på om invandrarna fungerar som komplement eller substitut för lokalbefolkningen. Det är troligt att båda effekterna existerar, men frågan är vilken effekt är starkare och vilken nettoeffekten är. Ämnet är också aktuellt eftersom många flyktingar och asylsökande har kommit till Finland, vilket säkert kommer att ha inverkan på lokalbefolkningen.

Den här studien är den första som studerar, baserat på empirisk data av hög kvalitet, effekterna av invandring på lönenivån i den finska arbetsmarknaden,. Jag studerar byggindustrin, en industri som genom EU utvidgningen 2004 sett en kraftig ökning av utländsk arbetskraft, då länder som Estland kom att höra till samma arbetsmarknad som Finland. Jag använder individuell longitudinal data för att göra en regressionsanalys av effekterna av en ökning i andelen utlänningarna i en bransch på lönenivån i denna bransch, och hur detta påverkar fastighetsmarknadens prisnivå. Jag förväntar mig liknande resultat som motsvarande studier i andra länder.

Bakgrund

Mer än en miljon finländare lämnade landet under det sista århundradet, av vilka mellan 20% och 40% återvände (Heikkilä och Uschanov, 2004). Den första stora vågen av utvandring var till Nordamerika vid skiftet av 1800- och 1900-talet, och den andra till Sverige efter andra världskriget. Orsaken till utvandringen var oftast ekonomisk.

Antalet utlänningar som bor i Finland ökade från bara 13 000 i 1980 till nästan 220 000 i 2014. Detta är huvudsakligen på grund av Sovjetunionens sammanfall och Finlands EU-medlemskap. Medan de första invandrarna kom framför allt från Ryssland, har majoriteten sedan 2004 kommit från Estland. Idag bor nästan 48 000 ester i Finland. Esterna kommer till Finland på grund av likheterna mellan språken och kulturerna, men också på grund av geografisk närhet och de stora ekonomiska skillnaderna. Tallinn ligger bara 80km från Helsingfors, och medellönen är nästan tre gånger högre i Finland än i Estland.

Nästan 20% (53 000) av arbetarna i byggnadsbranschen i Finland är utlänningar. Siffran är nästan 30% i Nyland. Detta inkludera bara de som arbetar officiellt, men det är estimerat att 10% av arbetet i industrin inte deklareras. Det är troligt att den här "gråa ekonomin" skapar prispress på lokalbefolkningens löner inom industrin, men reglerande reformer har minskat detta.

Fackföreningarna har en stark institutionell position i Finland. Nästan 70% av arbetstagarna är medlemmar av en fackförening och 98% omfattas av ett kollektivavtal. För att skydda sina medlemmars intressen tenderar fackföreningarna att motsätta sig invandring (Alho, 2015), och mindre än 6% av de utländska arbetarna är medlemmar av en fackförening.

Teori och litteratur

Standardmodellen visar att efterfrågekurvan för arbetskraft är neråtlutande. Med andra ord, om utbudet för arbetskraft ökar, kommer lönenivån att sjunka. Litteraturen är mer tvetydig, med resultat både för och emot denna teori. Enligt Borjas (2003) sjunker lönenivån med 3-4% efter en ökning på 10% i andelen utlänningar i en bransch, medan Card (2001) påstår att invandring har liten till ingen effekt på löner på grund av att utlänningar är komplement till lokalbefolkningen. Detta understödes också av Friedberg och Hunt (1995) och Friedberg (2001). Borjas (2008) svarar att det finns för lite bevis av komplementaritet och håller fast vid att lokalbefolkningen och invandringar är substitut och inte komplement. Opinionen bland forskare är fortfarande delad.

Min studie bygger på en CES produktionsfunktion där avkastning beror på arbetsinsats och produktivitet, och där arbetsinsats består av lokal arbetskraft och invandrare. Det viktigaste i funktionen är graden av substitution mellan typer av arbetskraft, med andra ord hur lätt en lokal arbetare kan substitueras med en invandrare. Detta kommer att avgöra effekter på lokalbefolkningen; desto bättre substitut invandrare är för lokal arbetskraft, desto sämre är invandring för lokalbefolkningen.

I artikeln som inspirerade min studie, identifierar Bratsberg och Raaum (2012) en signifikant och negativ korrelation mellan andelen av invandrare i en bransch och löneutvecklingen i samma bransch. Deras studie visar också att effekten är minskad på grund av både ökat utträde och minskad inträde av lokal arbetskraft. Emellertid visade studien även att den lägre lönenivån resulterade i lägre bostadspriser, vilket betyder att byggnadsföretag förde vidare inbesparningar till konsumenterna.

Empirisk metodik

Enligt Okkerse (2008) finns det några olika metoder för att avgöra vilka effekter invandring har på lokala arbetstagare. Den här studien är baserad på en ekonometrisk analys som kombinerar areaanalys med naturligt experiment. Det naturliga experimentet är EU:s 2004 östutvidgning, eftersom den åstadkom en stor ökning i invandring. Min studie följer Bratsberg och Raaums (2012) exempel, och använder en fast effekt (EN: fixed effects) regressionsmodell för att utnyttja skillnaderna mellan andelarna utlänningar i olika branscher. På detta sätt kan man fastställa effekten av storskalig invandring på den finska ekonomi och lönenivån för lokalbefolkningen.

Ekvation 3 (sida 22) visar regressionsmodellen. Jag använder paneldata på grund av dess potential för exakthet och för att de fasta effekterna förklarar tidsinvarianta individuella egenskaper, till exempel intelligens eller kön, som är oobserverade.

Jag mäter effekterna av invandring på konsumenternas välfärd genom att studera effekten på lönenivån för lokalbefolkningen inom byggnadsindustrin, men också på bostadsprisnivån, konsumentprodukten av byggnadsindustrin. Förväxlingsfaktorer inkluderar närvaro av arbetare som är bosatta utomlands och illegala arbetare. Detta kommer att snedvrida mina estimat av effekterna uppåt, på grund av undervärdering av antalet utländska arbetare. Jag kommer att beakta detta genom att rapportera elasticiteten av löner istället för bara koefficienten.

Data och empirisk identifiering

Min huvudsakliga empiriska källa är Finnish Longitudinal Employer-Employee Data (FLEED), skapat för forskare av Statistikcentralen. Detta är ett 1/3 slumpmässigt stickprov av personer mellan 15 och 70 år, bosatta i Finland (exklusive Åland) mellan åren 1988 och 2013. Datan inkluderar ungefär 1,2 miljon personer.

För att skapa mitt dataset identifierade jag de personer som hade jobbat i byggnadsindustrin under tiden för undersökningen. Jag tilldelade ett identifikationsnummer till varje person, och fastställde antalet invandrare i varje bransch. Mitt slutliga dataset innehöll information från år 2004 till 2010, med 343 545 observationer av 91 882 individer. Jag skapade också tre ytterligare dataset: en balanserad panel som inkluderade bara individer som ingick i datan varje år, ett ”drop entrants set” som utelämnade alla som kommit in till datan efter 2006, och ett ”drop leavers set” som utelämnade alla som exkluderats från datan före 2007. Ett femte dataset innehöll bara de sistnämnda ”leavers.”

Den deskriptiva statistiken för de fem datasetten är visade i tabell 5 (sida 30). Av dessa fem har den balanserade panelen den högsta medellönen, årliga arbetstiden och åldern, samt den lägsta andelen utländska arbetare, vilket visar effekterna av positivt urval. ”Leavers only” datasettet, med det högsta antalet utländska arbetare och låga värden för de andra måtten, visar urvalsfel i det motsatta hållet. ”Drop leavers” och ”drop entrants” dataset liknar varandra, och tyder på att förhållandena på arbetsmarknaden är bättre när man exkluderar in- och utträde av lokalbefolkningen.

Resultat

Jag fick tillgång till datan på Statistikcentralens forskningslaboratorium i Fiskehamnen i Helsingfors under våren 2016. Resultaten från estimatet av min empiriska modell är presenterade i tabell 5 (sida 33).

Kolumn 2 visar en signifikant och negativ effekt på lönenivån i en bransch, som resultat av ökning i andelen utländska arbetare i densamma branschen. Koefficienten är -0,748 med standardfel 0,107. Det är mycket liknande till Bratsberg och Raaum (2012), vars motsvarande resultat var en koefficient på -0,72. Det är också jämförbart med Borjas (2003) koefficient på -0,572. Detta understöder min hypotes om att resultaten i Finland skulle vara liknande till tidigare forskning.

Den balanserade panelen (kolumn 4) har en högre koefficient på -1,120, som förmodligen beror på demografiskt urvalsfel. Baserat på analys av ”drop entrants” och ”drop leavers” datasetten, verkar det som om in- och utträde av lokalbefolkningen inte har en betydande påverkan på lönenivån i industrin, eller att någon annan oobserverad effekt (till exempel komplementaritet) påverkar resultaten.

För löneelasticiteten med respekt till andelen utlänningar per bransch är koefficienten -0,07. Med andra ord, om andelen utlänningar i en bransch ökar med 10%, borde lönenivån för lokal arbetskraft i denna bransch minska med 0,7%. Det stämmer överens med koefficient på -0,06 som Bratsberg och Raaum (2012) och Borjas (2003) rapporterat om. Detta understöder idén om att utländska arbetare är ett substitut, om inte ett perfekt substitut, för lokal arbetskraft.

Invandring och priser

För att avgöra nettoeffekten av invandring på konsumenter i Finland, studerar jag utvecklingen av bostadspriser per region mellan 2004 och 2010.

Jag kan inte använda mig av Bratsberg och Raaums (2012) metod, eftersom den nödvändiga datan inte finns att tillgå i Finland. Istället använder jag mig av en så kallad ”differences-in-differences” identifieringsstrategi, som baserar sig på att nästan alla utländska arbetare i Finland är bosatta i Nyland. Genom den här metoden kan jag isolera den del av utvecklingen i bostadspriser som beror på invandrare anställda inom byggnadsindustrin. Jag använder mig av data från FLEED igen, kombinerat med data från Statistikcentralens regionalräkenskaper och Lantmäteriverkets köpeskillingsregister över fastigheter. För att kontrollera för skillnader mellan regioner, inkluderar regressionsanalyserna BNP eller produktion som kontrollvariabler.

Resultaten tyder på ett signifikant och starkt negativt samband (koefficienterna rör sig kring -0,2) mellan invandring och bostadspriser. Detta understöder standardmodellen, som säger att priser i en konkurrenskraftig marknad borde minska till följd av en minskning i insatskostnader. Insatskostnaderna i det här fallet är löner i byggnadsindustrin. Minskade löner verkar ha lett till lägre bostadspriser i de regioner som har sett mer invandring.

Slutledning

Som ett resultat av EU:s östutvidgning år 2004 och öppningen av arbetsmarknaden till medborgare av de nya medlemsstaterna, har arbetskraftsutbudet i Finland ökat markant. Detta ökade arbetskraftsutbud har påverkat negativt lönenivån för lokalbefolkningen i byggnadsindustrin, vilket i sin tur har lett till lägre bostadspriser. Därmed verkar nettokonsumentsvälfärdseffekten av invandring vara positiv, men de negativa effekterna på enskilda individer kan vara signifikanta.

Min studie understöder hypotesen att utländska arbetare är goda substitut för lokal arbetskraft, men man kan inte exkludera möjligheten att de också är komplement. Effekterna av komplementaritet kan observeras bara under en lång tidsperiod, och invandring är fortfarande ett relativt nytt fenomen i Finland. I vilket falla som helst, har finska beslutsfattare i och med denna studie mer information än tidigare i detta ämne.

Framtida forskning kunde studera effekterna av invandring på lokalbefolkningen och omfattningen av komplementaritet genom en mer långsiktigt metodik. Dessutom skulle det vara viktigt att adressera frågan om hur bostadspriser skiftar i förhållande till växlingar i insatskostnader med en mer rigorös forskningsstrategi än den som används här. Slutligen skulle en studie av en annan bransch (till exempel tjänstesektorn) hjälpa för att generaliserar resultaten av den här studien.

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APPENDIX 1 RESULTS OF STATA REGRESSIONS

1.1. Full sample, description

```
      id:  1, 2, ..., 91882                                 n =      91882
    year:  2004, 2005, ..., 2010                            T =          7
           Delta(year) = 1 unit
           Span(year)  = 7 periods
           (id*year uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%     max
                         1       1       1         3         6       7       7

     Freq.  Percent    Cum. |  Pattern
 ---------------------------+---------
     19411    21.13   21.13 |  1111111
      5922     6.45   27.57 |  ......1
      5091     5.54   33.11 |  1......
      3368     3.67   36.78 |  ...1111
      3065     3.34   40.11 |  11.....
      2898     3.15   43.27 |  ...1...
      2860     3.11   46.38 |  .111111
      2847     3.10   49.48 |  .....11
      2829     3.08   52.56 |  ....111
     43591    47.44  100.00 | (other patterns)
 ---------------------------+---------
     91882   100.00         |  XXXXXXX
```

1.2. Full sample, no individual fixed effects (1)

```
. regress lwage p age age2 educ region

      Source |       SS           df       MS      Number of obs   =   255,838
-------------+----------------------------------   F(5, 255832)    =   3599.62
       Model |  5774.80074         5  1154.96015   Prob > F        =    0.0000
    Residual |  82085.2912   255,832  .320856231   R-squared       =    0.0657
-------------+----------------------------------   Adj R-squared   =    0.0657
       Total |   87860.092   255,837  .343422148   Root MSE        =    .56644

------------------------------------------------------------------------------
       lwage |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           p |  -1.000678   .0894009   -11.19   0.000    -1.175901   -.8254548
         age |   .0373485   .0006777    55.11   0.000     .0360202    .0386769
        age2 |  -.0003861   8.30e-06   -46.53   0.000    -.0004023   -.0003698
        educ |   .0008808    .000011    80.34   0.000     .0008594    .0009023
      region |  -.0034525   .0001875   -18.42   0.000    -.0038199    -.003085
       _cons |   6.694735   .0139755   479.04   0.000     6.667343    6.722126
------------------------------------------------------------------------------
```

1.3. Full sample, with individual fixed effects (2)

```
. xtreg lwage p age age2 educ region, fe

Fixed-effects (within) regression               Number of obs     =    255,838
Group variable: id                              Number of groups  =     67,270

R-sq:                                           Obs per group:
     within  = 0.0545                                         min =          1
     between = 0.0704                                         avg =        3.8
     overall = 0.0379                                         max =          7

                                                F(5,188563)       =    2174.08
corr(u_i, Xb)  = -0.6790                        Prob > F          =     0.0000

------------------------------------------------------------------------------
       lwage |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           p |  -.7482564   .1073156    -6.97   0.000    -.9585925   -.5379204
         age |   .0955677   .0017952    53.23   0.000     .0920491    .0990864
        age2 |  -.0006261   .0000204   -30.76   0.000     -.000666   -.0005862
        educ |    .000784   .0000413    18.98   0.000     .0007031     .000865
      region |  -.0054281   .0009568    -5.67   0.000    -.0073033   -.0035529
       _cons |   4.802867   .0405166   118.54   0.000     4.723455    4.882278
-------------+----------------------------------------------------------------
     sigma_u |  .70794402
     sigma_e |  .36791821
         rho |  .78734723   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(67269, 188563) = 6.21               Prob > F = 0.0000
```

1.4. Full sample, Hausman text

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
           p |   -.6290986      1.90597       -2.535069        .0705799
         age |    .0427666     .0113499        .0314167        .0005027
        educ |    .0009356     .0010093       -.0000737        .0000373
      region |   -.0058666    -.0027073       -.0031593        .0009042
------------------------------------------------------------------------------
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =     4950.77
                Prob>chi2 =      0.0000
```

1.4. Balanced panel, no individual fixed effects (3)

```
. regress lwage p age age2 educ region

      Source |       SS           df       MS      Number of obs   =   105,970
-------------+----------------------------------   F(5, 105964)    =   1344.94
       Model |  2002.00849         5  400.401698   Prob > F        =    0.0000
    Residual |  31546.5421   105,964  .297709997   R-squared       =    0.0597
-------------+----------------------------------   Adj R-squared   =    0.0596
       Total |  33548.5506   105,969  .316588348   Root MSE        =    .54563

------------------------------------------------------------------------------
       lwage |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           p |   -.898491   .1457668    -6.16   0.000    -1.184192   -.6127901
         age |    .023896   .0013028    18.34   0.000     .0213425    .0264495
        age2 |  -.0002472   .0000154   -16.07   0.000    -.0002774   -.0002171
        educ |   .0010418   .0000168    61.98   0.000     .0010089    .0010747
      region |  -.0055263   .0002839   -19.46   0.000    -.0060828   -.0049698
       _cons |   6.981858     .02766   252.42   0.000     6.927645    7.036072
------------------------------------------------------------------------------
```

1.5. Balanced panel, with individual fixed effects (4)

```
. xtreg lwage p age age2 educ region, fe

Fixed-effects (within) regression               Number of obs     =    105,970
Group variable: id                              Number of groups  =     15,380

R-sq:                                           Obs per group:
     within  = 0.0706                                         min =          1
     between = 0.0167                                         avg =        6.9
     overall = 0.0187                                         max =          7

                                                F(5,90585)        =    1375.42
corr(u_i, Xb)  = -0.6705                        Prob > F          =     0.0000

------------------------------------------------------------------------------
       lwage |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           p |  -1.119704     .15643    -7.16   0.000    -1.426305   -.8131027
         age |   .0912192   .0024426    37.34   0.000     .0864316    .0960068
        age2 |  -.0005419   .0000272   -19.95   0.000    -.0005951   -.0004886
        educ |   .0009509   .0000883    10.77   0.000     .0007778     .001124
      region |   -.006248   .0016165    -3.87   0.000    -.0094163   -.0030797
       _cons |   4.711759   .0634173    74.30   0.000     4.587462    4.836056
-------------+----------------------------------------------------------------
     sigma_u |  .63326838
     sigma_e |  .34605906
         rho |  .77004578   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(15379, 90585) = 11.24               Prob > F = 0.0000
```

1.6. Drop entrants (5)

```
. xtreg lwage p age age2 educ region, fe

Fixed-effects (within) regression               Number of obs     =    217,081
Group variable: id                              Number of groups  =     47,367

R-sq:                                           Obs per group:
     within  = 0.0577                                         min =          1
     between = 0.0472                                         avg =        4.6
     overall = 0.0272                                         max =          7

                                                F(5,169709)       =    2078.10
corr(u_i, Xb)  = -0.6819                        Prob > F          =     0.0000

------------------------------------------------------------------------------
       lwage |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           p |   -.900043   .1211755    -7.43   0.000    -1.137544   -.6625416
         age |   .0949536   .0018652    50.91   0.000     .0912978    .0986094
        age2 |   -.000608    .000021   -28.97   0.000    -.0006491   -.0005668
        educ |   .0008136   .0000473    17.19   0.000     .0007208    .0009063
      region |  -.0064268   .0010234    -6.28   0.000    -.0084327   -.0044208
       _cons |   4.758138   .0432432   110.03   0.000     4.673382    4.842894
-------------+----------------------------------------------------------------
     sigma_u |  .69637177
     sigma_e |   .3688404
         rho |   .7809206   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(47366, 169709) = 7.27               Prob > F = 0.0000
```

1.7. Drop leavers (6)

```
. xtreg lwage p age age2 educ region, fe

Fixed-effects (within) regression               Number of obs     =    238,924
Group variable: id                              Number of groups  =     56,287

R-sq:                                           Obs per group:
     within  = 0.0564                                         min =          1
     between = 0.0688                                         avg =        4.2
     overall = 0.0360                                         max =          7

                                                F(5,182632)       =    2184.75
corr(u_i, Xb)  = -0.6915                        Prob > F          =     0.0000

------------------------------------------------------------------------------
       lwage |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           p |  -.7620144   .1078188    -7.07   0.000    -.9733368    -.550692
         age |   .0956462   .0017972    53.22   0.000     .0921238    .0991687
        age2 |  -.0006253   .0000204   -30.69   0.000    -.0006652   -.0005853
        educ |   .0007884   .0000415    18.98   0.000      .000707    .0008698
      region |  -.0054839   .0009682    -5.66   0.000    -.0073816   -.0035863
       _cons |   4.805464   .0405992   118.36   0.000      4.72589    4.885037
-------------+----------------------------------------------------------------
     sigma_u |  .68979964
     sigma_e |  .36663856
         rho |  .77972239   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(56286, 182632) = 6.54               Prob > F = 0.0000
```

1.8. Median house price, no controls (1)

```
. reg lmed time##treated, r

Linear regression                               Number of obs =      133
                                                F(  3,    129) =   256.63
                                                Prob > F      =   0.0000
                                                R-squared     =   0.4528
                                                Root MSE      =   .18245
```

lmed	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
1.time	.168652	.0345147	4.89	0.000	.1003638	.2369401
1.treated	.6528846	.0429262	15.21	0.000	.5679541	.737815
time#treated						
1 1	-.0370655	.0514539	-0.72	0.473	-.1388683	.0647373
_cons	11.65541	.0278903	417.90	0.000	11.60023	11.71059

1.9. Median house price, GDP control (2)

```
. reg lmed gdp time##treated, r

Linear regression                               Number of obs =      133
                                                F(  4,    128) =   303.82
                                                Prob > F      =   0.0000
                                                R-squared     =   0.5334
                                                Root MSE      =   .16913
```

lmed	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
gdp	.0000175	3.73e-06	4.68	0.000	.0000101	.0000249
1.time	.1576182	.0320836	4.91	0.000	.0941353	.2211012
1.treated	-.3063308	.1983863	-1.54	0.125	-.698872	.0862105
time#treated						
1 1	-.210959	.054089	-3.90	0.000	-.3179832	-.1039347
_cons	11.55398	.0389048	296.98	0.000	11.477	11.63096

1.10. Median house price, output control (3)

```
. reg lmed output time##treated, r

Linear regression                               Number of obs =      133
                                                F(  4,    128) =   268.72
                                                Prob > F      =   0.0000
                                                R-squared     =   0.5243
                                                Root MSE      =   .17078
```

lmed	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
output	8.75e-06	2.04e-06	4.29	0.000	4.72e-06	.0000128
1.time	.1556745	.032401	4.80	0.000	.0915635	.2197854
1.treated	-.2598455	.206875	-1.26	0.211	-.669183	.149492
time#treated						
1 1	-.2036844	.0583321	-3.49	0.001	-.3191045	-.0882643
_cons	11.56043	.0389227	297.01	0.000	11.48341	11.63744

1.11. Mean house price, no controls (4)

```
. reg lavg time##treated, r

Linear regression                               Number of obs =      133
                                                F(  3,    129) =   296.85
                                                Prob > F      =   0.0000
                                                R-squared     =   0.5125
                                                Root MSE      =   .17148
```

lavg	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
1.time	.1761563	.0322234	5.47	0.000	.1124015	.2399111
1.treated	.6915101	.0434684	15.91	0.000	.6055069	.7775134
time#treated						
1 1	-.0340346	.0518782	-0.66	0.513	-.1366768	.0686077
_cons	11.71135	.0256277	456.98	0.000	11.66064	11.76205

1.12. Mean house price, GDP control (5)

```
. reg lavg gdp time##treated, r

Linear regression                               Number of obs =     133
                                                F(  4,    128) =  456.75
                                                Prob > F      =  0.0000
                                                R-squared     =  0.6025
                                                Root MSE      =  .15545
```

lavg	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
gdp	.0000184	3.39e-06	5.43	0.000	.0000117	.0000251
1.time	.1645457	.0293613	5.60	0.000	.1064493	.222642
1.treated	-.3178553	.1810374	-1.76	0.082	-.6760687	.0403581
time#treated						
1 1	-.2170196	.0468418	-4.63	0.000	-.3097041	-.1243352
_cons	11.60461	.0342373	338.95	0.000	11.53686	11.67235

1.13. Mean house price, output control (6)

```
. reg lavg output time##treated, r

Linear regression                               Number of obs =     133
                                                F(  4,    128) =  450.82
                                                Prob > F      =  0.0000
                                                R-squared     =  0.5920
                                                Root MSE      =  .15747
```

lavg	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
output	9.20e-06	1.86e-06	4.96	0.000	5.52e-06	.0000129
1.time	.1625201	.0297885	5.46	0.000	.1035784	.2214618
1.treated	-.2675446	.1895977	-1.41	0.161	-.6426961	.1076069
time#treated						
1 1	-.2091101	.0503432	-4.15	0.000	-.3087226	-.1094975
_cons	11.61154	.0342231	339.29	0.000	11.54383	11.67926

APPENDIX 2 BREAKDOWN OF IMMIGRANT SHARE BY OCCUPATION

2.1. Immigrant share, 2004

2004		Nationality			
Code	Description (Classification of Occupations 2001)	FI	Other	Total	Prop.
11	Legislators and senior officials	8	0	8	0.00%
12	Corporate managers	714	<3		
13	Managers of small enterprises	179	<3		
21	Physical, mathematical and engineering science professionals	1914	10	1924	0.52%
22	Life science and health professionals	11	<3		
23	Teaching professionals	104	<3		
24	Other professionals	352	<3		
31	Physical and engineering science associate professionals	3416	18	3434	0.53%
32	Life science and health associate professionals	35	0	35	0.00%
34	Other associate professionals	762	3	765	0.39%
41	Office clerks	1068	6	1074	0.56%
42	Customer service clerks	40	<3		
51	Personal and protective services workers	317	4	321	1.26%
52	Models, salespersons, and demonstrators	266	<3		
61	Skilled agricultural and fishery workers	303	4	307	1.32%
71	Extraction and building trades workers	23508	485	23993	2.06%
72	Metal, machinery, and related trades workers	3507	27	3534	0.77%
73	Precision, handicraft, craft printing, and related trades workers	29	0	29	0.00%
74	Other crafts and related trades workers	202	9	211	4.46%
81	Stationary plant and related operators	270	3	273	1.11%
82	Machine operators and assemblers	342	6	348	1.75%
83	Drivers and related water traffic operators	3386	25	3411	0.74%
91	Sales and services elementary occupations	589	9	598	1.53%
92	Agricultural, fishery, and related labourers	26	0	26	0.00%
93	Labourers in manufacturing and construction	2957	29	2986	0.98%
XX	Not classified	284	7	291	2.46%
Total		44589	655	45244	1.47%

2.2. Immigrant share, 2010, and change 2004-2010

2010	Nationality				
Code	FI	Other	Total	Prop.	Change
11	82	0	82	0.00%	N/A
12	181	3	184	1.66%	11.834
13	1783	24	1807	1.35%	2.4094
21	2406	19	2425	0.79%	1.5115
22	9	0	9	0.00%	0
23	11	0	11	0.00%	0
24	374	4	378	1.07%	1.8824
31	3417	31	3448	0.91%	1.7217
32	8	<3			N/A
34	20	<3			12.7
41	994	15	1009	1.51%	2.6861
42	22	<3			1.8182
51	219	5	224	2.28%	1.8094
52	126	0	126	0.00%	0
61	122	6	128	4.92%	3.7254
71	23507	1171	24678	4.98%	2.4145
72	1136	38	1174	3.35%	4.3449
73	12	0	12	0.00%	N/A
74	4690	56	4746	1.19%	0.268
81	295	19	314	6.44%	5.7966
82	39	<3			1.4615
83	5288	75	5363	1.42%	1.921
91	155	20	175	12.90%	8.4444
92	5	0	5	0.00%	N/A
93	1740	42	1782	2.41%	2.4612
XX	137	17	154	12.41%	5.0344
Total	46778	1549	48327	3.31%	2.2542

APPENDIX 3 DATA ON FOREIGNERS IN THE NORDICS

Destination	Denmark			Finland		
Origins	1990	2004	2014	1990	2004	2014
Bulgaria	118	491	7096	159	329	1727
Croatia	0	445	821	0	342	356
Czech Republic	0	297	1124	128	196	494
Estonia	0	540	1394	0	13978	48354
Hungary	284	491	3769	308	634	1879
Latvia	0	911	4696	0	392	1648
Lithuania	0	1691	10358	0	351	1315
Poland	4488	6059	32516	582	810	3684
Romania	578	1405	18815	83	580	2233
Slovakia	0	175	1879	0	90	378
Slovenia	0	72	341	0	17	113
Russian Federation	0	2945	5358	0	24626	30619
Data for Denmark is for foreign citizens by country of origin rather than by country of citizenship						
POPULATION, TOTAL	5135409	5397640	5627235	4998478	5236611	5471753
FOREIGN CITIZENS, TOTAL	150644	271211	397300	26255	108346	219675
% of total	2.93%	5.02%	7.06%	0.53%	2.07%	4.01%
EUROPE	85329	148120	238592	18106	72590	136728
% of foreign	56.64%	54.61%	60.05%	68.96%	67.00%	62.24%
OTHER EU(28) COUNTRIES	35912	61041	147451	12652	36607	90178
% of foreign	23.84%	22.51%	37.11%	48.19%	33.79%	41.05%

Destination	Norway			Sweden		
Origins	1990	2004	2014	1990	2004	2014
Bulgaria	214	567	4587	1103	810	5522
Croatia	0	1881	1102	0	3581	3571
Czech Republic	0	232	1579	0	581	1434
Estonia	0	473	4886	0	2155	4455
Hungary	224	336	2667	3155	2309	6297
Latvia	0	534	9435	0	1072	5184
Lithuania	0	892	35770	0	1451	10406
Poland	2874	2741	85591	15672	14664	48227
Romania	144	746	9950	5313	2360	13022
Slovakia	0	321	3639	0	7123	8116
Slovenia	0	20	272	0	505	1352
Russian Federation	0	6203	11455	0	520	763
Data for Denmark is for foreign citizens by country of origin rather than by country of citizenship						
POPULATION, TOTAL	4233116	4577457	5109056	8590630	9011392	9747355
FOREIGN CITIZENS, TOTAL	140312	204731	483177	483704	481141	739435
% of total	3.31%	4.47%	9.46%	5.63%	5.34%	7.59%
EUROPE	73252	119835	342348	321912	313920	384666
% of foreign	52.21%	58.53%	70.85%	66.55%	65.24%	52.02%
OTHER EU(28) COUNTRIES	60716	91853	304278	253214	255422	334896
% of foreign	43.27%	44.87%	62.97%	52.35%	53.09%	45.29%