Master Thesis

Immigration and Firm Performance: Evidence from Norway

An Examination of the Effect of Employed Immigrants on Firm Financial Performance

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Bergen, Spring 2019

This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible—through the approval of this thesis—for the theories and methods used, or results and conclusions drawn in this work.

Abstract

This thesis examines the empirical relationship between employed immigrants and firm financial performance in Norway during the period 2001-2008. More specifically, we estimate the effect of working immigrants on the firm performance measures of Return on Assets and Return on Equity. Using micro-level data on Norwegian firms and municipal-level shares of employed immigrants, we find that the effect of immigrants vary depending on the empirical method applied. We examine the data using OLS, fixed effects, and a shift-share instrumental variable approach. The shift-share instrument uses the national inflow of immigrants and the past settlement from each country of origin to predict the exogenous distribution of immigrants across Norwegian municipalities. The implementation of this instrument in our empirical analysis represents our effort to identify the causal effect of changes in the immigrant population on firm financial performance. Our primary conclusion is that we do not find evidence that employed immigrants have a negative effect on firm performance.

Acknowledgements

We would like to start by thanking Professor Astrid Kunze for her patience, wisdom, enthusiasm and guidance as our supervisor.

To Ben Fram, your insightful critiques are much appreciated.

Lastly, we want to thank our friends and family for their support during this period of study and exploration.

Contents

1 Introduction

Immigration has a long history of polarizing effects on political, social and economic outcomes. The consequences of immigration are hot-button topics in policy debate and media in both Europe and the United States, likely as a result of the rise in immigrants over the past decade. Prior to the presidential elections in 2016, then United States Presidential candidate Donald Trump made immigration a centerpiece of his campaign, proposing anti-immigration policies. The infamous slogan 'Build the Wall' and its eventual key role in motivating an electoral victory serves as an indicator that a consequential portion of the population shares the desire to restrict immigration into the US. The debate in Europe seems to be framed around the impact that asylum seekers have on the social and economic fabric of EU member states. Political strife in the Arab world (notably Syria 2011-2019) has provided numerous influxes of refugees, and these events have had an influence on political platforms and eventual policy decisions in Europe (Human Rights Watch, 2019). A notable reaction to the increased immigration is the rising of far-right political parties and closed border policy advocates, which have gained high levels of support in several European countries over the past decade.

Observers in Norway are experiencing a similar debate, where the prevalence of the welfare state takes the center stage. Immigration to Norway has increased sharply over the last several decades. As of 2018, immigrants and Norwegian-born to immigrant parents made up 17,3% of the Norwegian population (SSB, 2019b). The increasingly diverse society has changed the composition of the Norwegian community, but the increase in immigration has placed an additional burden on the welfare state. The long-term consequences of a high level of immigration was highlighted in the Brochmann report of 2017, which argues that an influx of people with low qualifications will put pressure on public finances (NOU2017:2, 2017). The economic reality of the state's ability to provide the same legal and practical opportunities for all residents of Norway, has resulted in initiatives that require limited and selective immigration policies (Cooper, 2015). In a chronicle in the Norwegian news outlet Dagbladet from February 2019, Representatives from the Norwegian Progress Party (Frp) claimed that, to sustain the current welfare model, the Norwegian government must reduce further reception of non-western immigrants (Wiborg & Helgheim, 2019). Despite these observations, economist Victor Norman argues that the welfare model cannot persist without immigration. Norman states that the aging population is what undermines the foundation of the welfare state and pressuring public finances, and that Norway needs immigrants to sustain the established welfare program (Arre, 2018).

Understanding the outcomes of immigration and the reasons behind the conflicting nature of the immigration debate is important to policy makers and legislators who are tasked

with managing various demands from their constituents. LaLonde & Topel (1991) frame the policy debate by stating: 'If the main costs of immigration are borne by less-skilled natives through reduced earnings and employment opportunities, the case for immigration controls and redistributive policies is strengthened. In contrast, if the labour market easily absorbs new immigrants without serious distributional effects, these policy options are less attractive' (LaLonde & Topel, 1991, p. 167). The continued search for a broader and deeper understanding of the effects of immigration are an important topic, and the goal of this paper is to contribute to the growing literature on the effects of immigration. This thesis aims to investigate whether immigrants have an impact on the financial performance of firms. We will use data on all Norwegian firms for the years 2001-2008 containing comprehensive accounting information, which enables us to construct firm-level performance measures. The data does not detail the number of employed immigrants in each firm, and we have therefore merged the firm data with information on the employed immigrant share in each Norwegian municipality. We assume that the regional shares of employed immigrants are highly correlated with firm-level immigrant shares, which enables us to examine the effects of immigration in Norway on firm level.

We aim to answer the following question:

What is the effect of employed immigrants on firm financial performance?

The effect of employed immigrants on firm financial performance in the recipient country can be explained through a stylized example where the economy consists only of two types of labour, doctors and custodians.[1] We assume that doctors and custodians have different skills, and therefore act as perfect compliments. An increase of labour supply due to immigration in a given labour market, without consideration for other factors, will equate to a decrease in wages in jobs where immigrants and natives compete. A considerable increase in custodians through new immigrants will put downwards pressure on wages of all custodians in the recipient country. As firms take advantage of a cheaper workforce, immigration can further be expected to reduce production costs, and thereby generate substantial economic benefits for firms. The increased supply of custodians could also benefit firms through complementarities. Custodians would complement doctors, which would increase the doctors' productivity and subsequently raise the value of their services. A more productive workforce may in turn be beneficial for firm performance.

Within the prominent economic literature on the effects of immigration, we see a consistent thread where researchers try to address the endogeneity of immigrants' location choices. Immigrants oftentimes do not randomly choose to settle in certain communities within the host country, but rather are influenced by some local conditions. The many factors

[1] The theory is described in detail in Chapter 3.

that go into a person's decision to immigrate to a certain locale are often difficult to measure or unobservable. Some of these could be social network, wage potential, services or local labour market conditions. For instance, improvements in unobserved local labour market conditions attracts immigrants and increases firm performance, which would bias the estimates of the effect of employed immigrants upwards. Changes in firm performance across locales could also have a direct effect on immigrants' location choices. By solving these problems, researchers can place more confidence in the resulting estimates, and policymakers can place more emphasis on the results when proposing and enacting future law changes.

One of the main efforts from economists to overcome this bias is seeking natural experiments where the pull factors are neutralized. Natural experiments occur when there is little immigration in one year, followed by a sharp increase the subsequent year due to an exogenous push effect like change in policy, humanitarian crisis or war in the source country. However, the scarcity of natural experiments has driven researchers to find other ways to address the endogeneity issues. One solution, which has been a common theme in previous literature, is the 'shift-share' IV approach. The method was first introduced by Altonji & Card (1991), and implemented in notable immigration studies (e.g. Mitaritonna, Orefice, & Peri, 2017; Card, 2009). The shift-share instrument exploits the notion that immigrants tend to locate close to earlier enclaves of immigrants from the same country of origin. The method uses spatial variation to determine how the national inflow of immigrants is represented in a local region. Simply put, the instrument uses the past settlement and the national inflow of immigrants from each country of origin to predict the exogenous distribution of immigrants across regions.

Our study will utilize pooled OLS and fixed effects regression to provide estimates of the effect of employed immigrants on the firm outcome measures of Return on Assets and Return on Equity. We use median quantile regression to control for the influence of potential outliers in the OLS regression model. Moreover, we add control variables regarding firm characteristics to estimate a more precise effect of immigration and to capture more variation in firm performance. As we will discuss in detail, the shift-share instrument has been effective in addressing the endogeneity problem in other studies, and we will replicate that effort by drawing inspiration from the research conducted by Mitaritonna et al. (2017) and replicating the shift-share instrument defined by Card (2009).

Our main interest in researching this topic is adding to the growing body of literature on immigration, and contributing to further evidence in how immigration affects host country communities. Through our research, we have found considerable studies performed

on various outcomes of immigration, but to our knowledge the specific question of how immigration affects firm performance in Norway has not been addressed through published empirical research. By using the shift-share instrument, this thesis will contribute to the methodological progress in the body of literature on immigration in Norway. Our aim is to complete the first study of this kind in Norway and inspire future research to expand and pursue more detailed understanding of the effects of immigration.

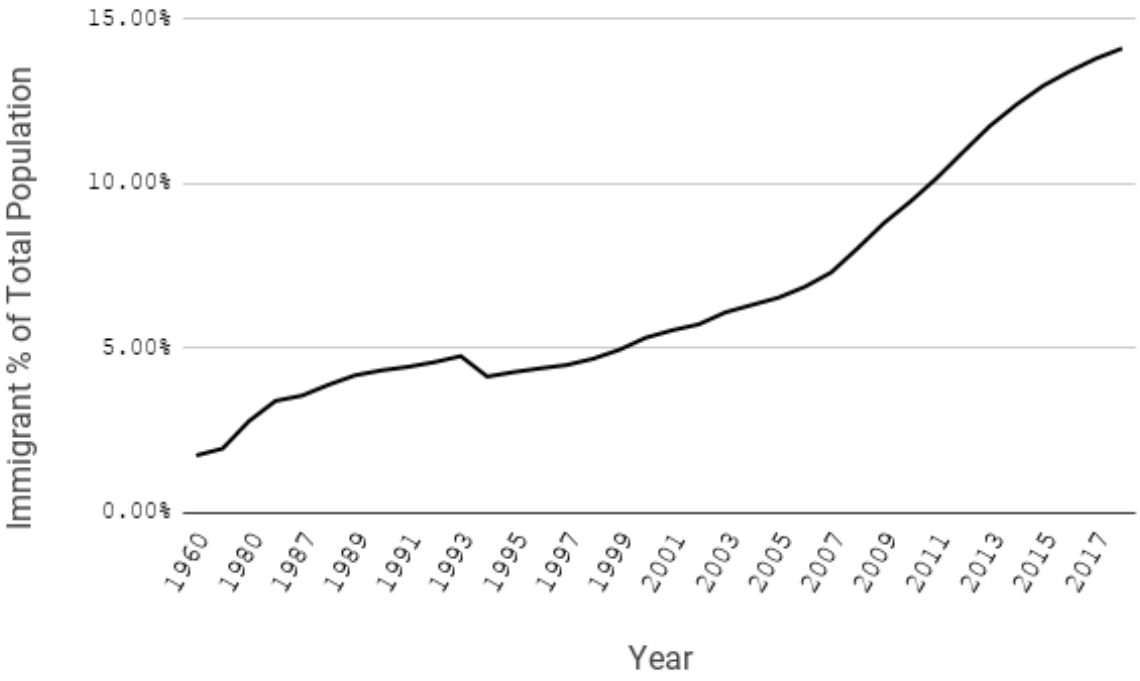
The remainder of the thesis continues as follows. In Chapter 2 we provide a summary background of immigration in Norway. We continue in Chapter 3 by outlining a simple economic model forming the bases of our empirical predictions. In Chapter 4 we provide a review of the previous literature. Chapter 5 provides a detailed description of the data sample selection and collection methods, including the identification of the variables of interest. Chapter 6 details the empirical strategies implemented in our research. The results of our empirical analysis are presented in Chapter 7. We discuss our findings in Chapter 8, together with limitations and suggestions for future research. Lastly, we conclude in Chapter 9.

2 Background

2.1 Immigration in Norway

International relocation is by no means a new phenomena in Norway's history, but has changed markedly in a relatively short time both in terms of scope and diversity. Foreign-born residents made up 1,3% of the Norwegian population in 1970, compared to 12,2% at the end of 2010 (NOU 2011:7, 2011, p. 12).

Figure 1: Norway: Development in Immigrant Share, 1960-2018 (SSB)

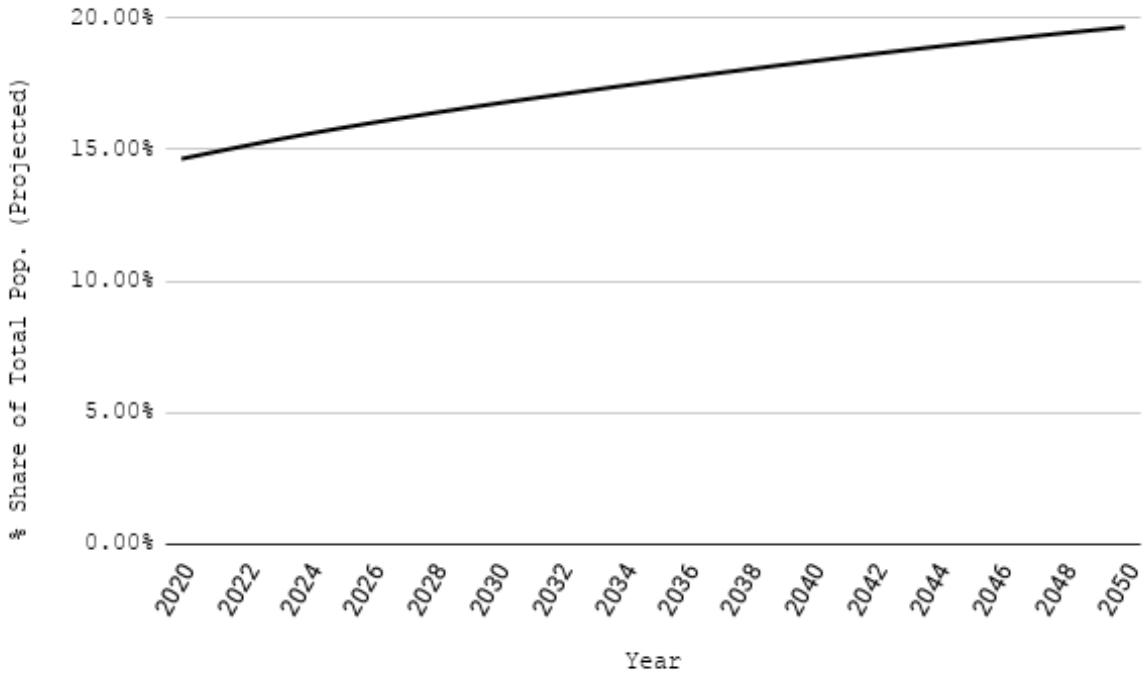


Note: Immigrant Population recorded on 10 year intervals prior to 1970

Figure 1 shows an increasing trend in the share of immigrants from 1960 to 2018.[2] Population projections conducted by Statistics Norway (SSB) shows a continued increasing trend (Figure 2), with a predicted immigrant share of approximately 20% by the end of 2050 (SSB, 2018). A deeper and broader understanding of the possible consequences of increased immigration is therefore highly relevant, both for present and future policy suggestions.

[2]Statistics Norway (SSB) defines immigrants as persons living in Norway born abroad by two foreign parents and four foreign grandparents (Dzamarija, 2014, p. 4).

Figure 2: Norway: Projected Immigrant Share, 2020-2050 (SSB)



Note: SSB describes several projection alternatives. This graph shows the 'Main Alternative' which combines projections of medium fertility, medium life expectancy, medium domestic migration and medium immigration.

Before 1970 the majority of immigrants came from Western Europe and other Nordic countries. The establishment of the pan-Nordic labour market in 1954 allowed free movement across the borders, which subsequently led to an increase in the number of immigrants from other Nordic states (Brochmann & Kjeldstadli, 2014, pp. 210-214).[3] The arrival of non-western immigrants to Norway in the late 1960s marked the start of the modern immigration, which initiated the transformation of a relatively homogeneous society to a multicultural and diverse population. Immigrants from Yugoslavia, Pakistan, Morocco and Turkey came to Norway predominantly as migrant workers (Brochmann & Kjeldstadli, 2014, pp. 210-218). The new immigrants raised a general concern about the impact of immigration on the Norwegian labour market. An immigration ban was therefore enforced in 1975, which was justified by the need to facilitate improvements in integration and welfare policy for the immigrants already residing in the country (NOU 2011:7, 2011,

[3]The Nordic agreement on a common labour market between the Norwegian, Danish, Swedish and Finnish governments released their citizens from the obligation to hold a passport or other travel documents when traveling in-between these countries. Citizens from these countries are also exempted from holding residence permits during stays in other Nordic countries than their home country ("Protokoll om fritagelse for statsborgere i Norge, Danmark, Finland og Sverige fra å inneha pass og oppholdstillatelse under opphold i annet nordisk land enn hjemlandet," 1954).

p. 68). It was in effect a regulation on labour migration, which principally prevented low-educated individuals from developing countries to immigrate. A dispensation from the law was given to family reunifications, refugees, asylum seekers and demanded labour migration. The ban, however, did not lead to a decline in the number of immigrants, but changed the immigration composition. Labour immigrants were substituted by an increasing number of family immigrants and refugees (Brochmann & Kjeldstadli, 2014, p. 242). Immigration remained relatively stable between 1971 to the mid 1980s, with a net immigration of approximately 5000 a year. However, from the mid 1980s, the average level of immigration increased and more acutely reflected economic cycles and international migration flows (Vassenden, 2012).

A large number of refugees came to Norway in the 1980s and 1990s, primarily from countries like Chile, Vietnam, Iran, Sri-Lanka and the Balkans (NOU 2011:7, 2011, pp. 68-69). The need for workers in the agricultural sector in the 1990s also allowed for immigration of seasonal workers, especially from Poland and Lithuania (Østby, 2017). The European Economic Area (EEA) agreement of 1994, which ensures that Norway takes part in the European Union (EU) Single Market, did not consequently affect this immigration pattern. The EU enlargement in 2004, however, marked a turning point, both in terms of immigration pattern and scope (NOU2017:2, 2017). Twelve new member states, nine of them part of the former Eastern Block, joined the EU between 2004 and 2007 (European Union, 2019).[4] The enlargement of 2004 led to a sharp increase in labour immigration, especially from Poland and Lithuania (SSB, 2019a). When the barrier to mobility was removed, labour migration once again became the most prominent reason for immigration to Norway, accounting for approximately 67% of the immigration from 2004 to 2006 (Østby, 2017).

3 Theory

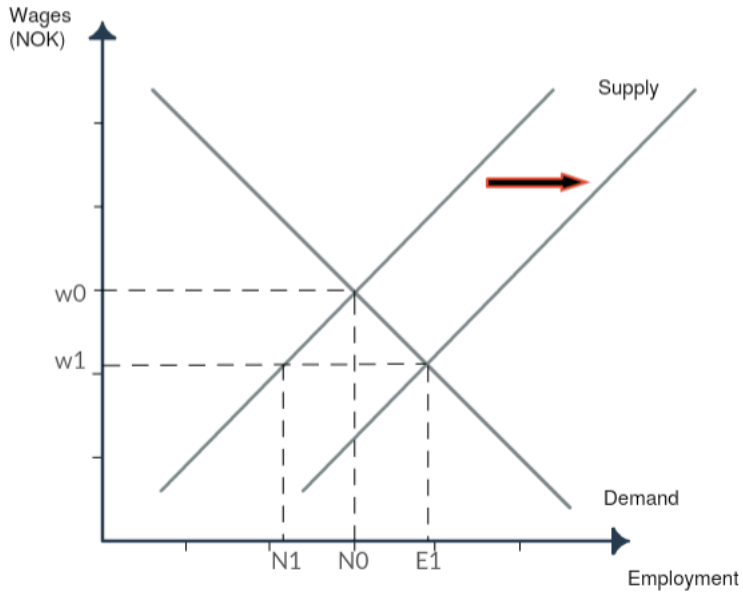
The goal of our study is to analyze how immigrants affect firm performance. Thus, in this chapter we present a simple economic theory to illustrate the potential channels through which this relationship could be observed. The theories presented will, together with the associated literature, form the basis of our empirical hypothesis.

[4]Czech Republic, Cyprus, Estonia, Latvia, Lithuania, Poland, Hungary, Malta, Slovenia, Slovakia joined in May of 2004, with Bulgaria and Romania joining in 2007.

3.1 Immigrants and Natives as Perfect Substitutes

If immigrants and natives are perfect substitutes, their contributions to the workforce are interchangeable. This implies that both immigrants and natives are competing in the same labour market. An increase in labour supply due to immigration will shift the supply curve outward, as illustrated in Figure 3. As a result, total employment will increase from $N0$ to $E1$, and wages will fall from $w0$ to $w1$ (Borjas, 2016, p. 165). A reduction in equilibrium wages would reduce labour costs, and subsequently lead to higher firm performance.

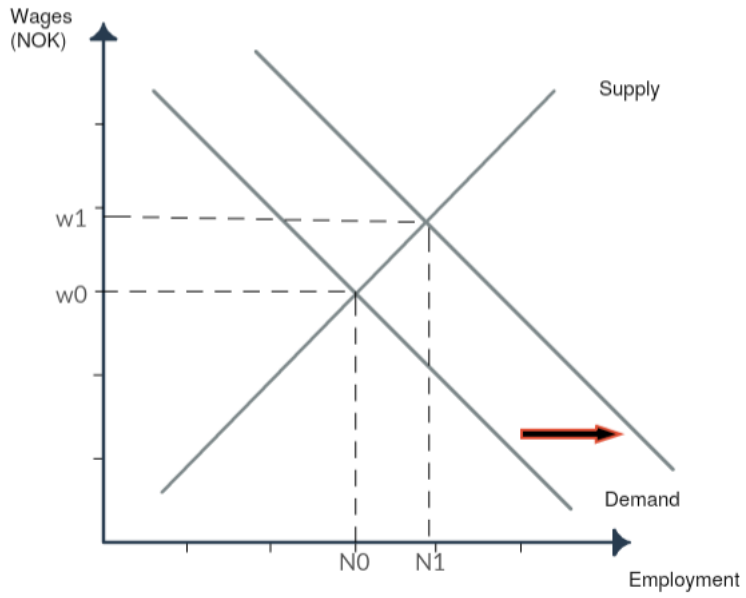
Figure 3: Short-run Impact of Immigration on Wages and Employment (Borjas, 2016)



3.2 Immigrants and Natives as Perfect Complements

If immigrants and natives are perfect complements, they do not compete in the same labour market. They are interdependent on each other, meaning that natives would increase immigrants' labour productivity and vice versa. An increase in immigration would therefore raise the value of natives' services. For example, if immigration leads to a greater supply of nannies, working parents could take advantage of the lower cost of child-care services, and have more time to dedicate to their chosen profession. A more productive workforce could yield positive benefits for firm performance. An increase in labour supply due to immigration will shift the demand curve outward, increasing native wages from $w0$ to $w1$ and native employment from $N0$ to $N1$, as depicted in Figure 4 (Borjas, 2016, p. 166).

Figure 4: Short-run Impact of Immigration on Native Wages and Employment (Borjas, 2016)



4 Literature Review

In this chapter we are investigating what economists have researched in the past, and summarized some of the methods used to find the effects of immigration. We conduct a summary of the relevant literature on native labour market outcomes and firm outcomes, concluding with remarks regarding how these prior studies can inform our empirical work.

4.1 Literature Regarding Native Labour Market Outcomes

As discussed the introduction, a major issue that economists have described in the canon of literature is finding causal estimates for the effect of immigration on some form of host country outcomes, most notably wages. In most instances, there is a pull effect present that is difficult to measure or control for in the given host country. There is a reason why immigrants are moving to a specific location, which could be favourable hiring conditions, a network of co-nationals or familiar services (language translation, restaurants, 'comforts of home'). Some economists have tried to seek natural experiments where these pull factors are neutralized. From a temporal standpoint, natural experiments occur when there is little immigration in one year, and then a sharp rise in immigration in subsequent years after a change in policy, liberalization of border restrictions, humanitarian crisis, or

some other push factor which is exogenous to the pull factors in the area where researchers are attempting to measure the effects of immigration.

The most notable natural experiment examined is that of the Mariel Boatlift, an event which saw 125,000 Cuban immigrants arrive in Florida over a six month span in 1980. Card (1990) utilized this natural experiment to estimate the effects of this event on the Miami labour market, concluding that the unexpected influx of immigrants had no adverse effects on native wages or rates of employment. Borjas (2017) found different results when the natural experiment was re-examined. He noted that at least 60% of the *Marielitos* were high school dropouts.[5] The skills of the arriving immigrants therefore had to be carefully matched with those of the native workforce. When examining the impact of this low-skilled group, the study reports a different result, showing that the wages of high school dropouts in Miami dropped by 10 - 30% as a result of the increase in immigrant labour supply. Examples of other natural experiments exploited by researchers are the repatriation of Algerians into the French labour market in the 1960s (Hunt, 1992), the Retornados return from Angola and Mozambique to Portugal in the 1970s (Carrington & De Lima, 1996), and the impact of mass migration from the former Soviet Union to Israel in the early 1990s (Friedberg, 2001).

The paucity of natural experiments, however, has driven researchers to find other ways to address the endogeneity issues. One solution is the shift-share instrumental variable approach, which has been a common theme in the previous literature on the effects of immigration. The method was first introduced by Altonji & Card (1991), which opened the door for extensive development and application of the instrument. Card (2001) refined the use of the shift-share instrumentation approach through the integration of prior observations by Bartel (1989) and LaLonde & Topel (1991), which note the tendency for immigrants to settle into cities with large immigrant populations sharing the same country of origin. Card's shift-share approach instruments immigrants' potential endogenous settlement patterns with the national inflows of immigrants that are influenced by past location choices of their co-nationals. In other words, the instrument predicts the inflow of immigrants to a given locale within the host country using the national-level inflows, as these are considered less endogenous with regards to local labour market conditions (Jaeger, Ruist, & Stuhler, 2018). Card (2001) uses the shift-share instrument to analyze the effect of immigrant inflows on occupation-specific labour market outcomes. He concludes that a shift in labour supply due to immigration to the U.S. is associated with a modest widening of the wage gap between more and less-skilled natives, coupled with a positive effect on average native wages. Foged & Peri (2016) find that an increase in the supply of refugees pushed less educated native workers to pursue less manually intensive occupations, and

[5] *Marielitos* was the common term given to the refugees arriving from Cuba during this period.

as a result immigration has had positive effects on native unskilled wages, employment, and occupational mobility. Jaeger et al. (2018) reveal at least 60 more papers that have included the use of the shift-share to estimate effects on broad topics such as Internal Migration, Crime, Prices, and Native Labour Market Outcomes. The 'native labour market outcomes' segment is the most prominent, with over twenty studies since 2001 published on the topic (e.g. Ottaviano & Peri, 2005; Ottaviano, Peri, & Wright, 2013; Foged & Peri, 2016).

4.2 Literature Regarding Firm Outcomes

There have been several recent papers which discuss immigrant labour supply effects on firm-level outcomes. Many of these divide immigrants into groups by educational level, as the effects of immigration on firm performance could vary across different skill-groups. Hatzigeorgiou & Lodefalk (2016) use an IV approach to estimate the causal effect of immigrants of firm-level exports. They found that only skilled and recent immigrants had a positive effect on firm exports. Ghosh, Mayda, & Ortega (2014) and Doran, Gelber, & Isen (2014) examined the effect of skilled foreign workers on U.S. firms by analyzing how an increase in H-1B visas would affect different firm level outcomes.[6] Ghosh et al. (2014) found that firms most frequently using H-1B workers would reap benefits in the form of higher average labour productivity and profits. Doran et al. (2014) concluded that an increase in H-1B visa lottery wins had insignificant effects on firms' patenting and research gains. An increase in visas caused at most a modest increase in firms' overall employment, with the associated negative effect of crowding out employment of other workers. They also report evidence that additional H-1B visas lead to lower average employee earnings and higher firm profits. The findings of Doran et al. (2014) adheres to the economic theory on immigration presented in Chapter 3, where an increase in immigrant labour supply could enable firms to take advantage of the subsequent downward pressure on wages, resulting in a positive effect on firm performance. No studies have, to our knowledge, used Norwegian data to examine these relationships. However, some papers reveal negative wage effects as a result of increased immigrant employment in the Norwegian labour market (e.g. Bratsberg & Raaum, 2012; Bratsberg, Raaum, Røed, & Schøne, 2014). If the conclusions reached by Doran et al. (2014) regarding wages and firm performance are applied to the findings of decreased wage effects in the Norwegian market, we would expect that those same wage effects will yield positive firm performance results in Norway.

[6]H-1B is the classification of visa in the U.S. which can only be obtained through lottery for highly skilled individuals. There is a fixed number of H-1B visas per year available to all applicants.

Studies show that wage adjustments would be less responsive to immigration if natives and immigrants are imperfect substitutes (e.g Ottaviano & Peri, 2012; Card, 2009). Imperfect substitutes in this context refers to the concept that immigrant workers might have slightly different skills or aptitudes for work than natives in the host nation, even though they have the same work experience and education. Ottaviano & Peri (2012) noted that if immigrants and natives are imperfect substitutes, the wage effect of additional immigrant inflows would be focused on the immigrants themselves, reducing the effect on natives. The reduced wage responses could in turn lessen the firm advantage of a cheaper workforce. Firms may, however, benefit from complementarities. For instance, less educated immigrant construction workers might complement native engineers and supervisors, raising the value of the firm's services as a whole. A more productive workforce, with all else held equal, will yield stronger firm performance results. Peri & Sparber (2009) find evidence for these effects, and show that natives and immigrants increase productivity by performing complementary tasks.

Several recent papers have discussed the effect of immigrants on firm performance using the shift-share IV approach to address the endogeneity of immigrants' location choices. One of these studies, conducted by Peri, Shih, & Sparber (2015), investigates how highly skilled foreign individuals affect innovation and productivity growth at the local level. They concluded that an increase in foreign STEM workers is associated with significant wage gains for college-educated natives, and the results imply that foreign STEM increased total factor productivity growth in U.S. cities.[7] Ottaviano, Peri, & Wright (2018) identify the effect of immigrants on imports, exports and productivity of service-producing firms in the U.K. by instrumenting the shift-share instrument on the local immigrant labour supply. They find that immigrants increase overall productivity and export, and decrease the need for importation of services. The study which appears to be the strongest to inform our research, is conducted by Mitaritonna et al. (2017). They estimate the impact of an increase in the local immigrant labour supply on firms' outcomes, allowing for heterogeneous effects across firms. Their results show that a supply-driven increase in the share of foreign born workers in a French *departement* (similar to a Norwegian county) increased the total factor productivity of firms in that *departement*.[8] Similarly, our study observes an increase in the share of foreign born workers in Norwegian Municipalities, and estimates the direction of the effect on firm level Return on Assets and Return on Equity. Mitaritonna et al. (2017) gives inspiration to our study in terms of utilizing a shift-share instrument to address endogeneity concerns and estimating effects on a measure

[7]Science, Technology, Engineering and Math (STEM) are fundamental inputs for innovation (Peri et al., 2015).

[8]Total Factor Productivity is a measure of firm performance calculated by the weighted average of labour and capital input (Mitaritonna et al., 2017).

of firm performance. These shared characteristics helped inform our choice of research methods.

4.3 Summary of Previous Literature

A review of the previous literature shows that the consequences of immigration has become a vast topic of study in the last couple of decades. A large part of the literature examines the effect of immigration on labour market outcomes, where wages is the most investigated context. We find that previous empirical studies present no consensus conclusion on the effect of immigration on native outcomes, which highlights the complexity of the topic. The great variety of estimation methods leaves the impression that the consequences of immigration are not easily estimated. However, when reviewing the literature that examines the link between immigration and firm performance, we observe overall positive effects, especially of high-skilled immigrant workers. This reveals that the effect on firm performance most likely depends on immigrants' skills and aptitudes. The literature also suggests that the effect on firm performance depends on immigrants' substitutability with the native workforce, both in terms of complements and wage adjustments. The negative wage effects established by Bratsberg & Raaum (2012) and Bratsberg et al. (2014) in the Norwegian labour market, together with the potential benefits of complimentary skills between the immigrant and native workforce, could subsequently positively impact overall performance of Norwegian firms.

Based on the reviewed literature, our hypothesis is that increases in the employed immigrant share will increase firm performance.

5 Data

We use panel data on all Norwegian firms from the years 2001-2008 in order to investigate the effect of employed immigrants on firm performance. We use detailed accounting data to create our preferred measurements of firm performance: Return on Assets (ROA) and Return on Equity (ROE). Our independent variable of interest is represented by the share of employed immigrants in each municipality. We have also collected data to create control variables. Furthermore, we create the shift-share instrument to account for endogeneity in the independent variable of interest.

The data used for this paper was pulled from various sources and merged into one master data set for analysis in STATA. The original data sources and our variables are described

in the following sections. Finally, we present our sample selection and summary statistics. Table 7 in the Appendix provides an overview of all the variables included in the data set.

5.1 Firm Performance

We utilize two dependent variables in all regression estimations: ROA and ROE. These are two of the most important indicators of firm performance, showing how profitable a firm is relative to its total assets and equity. We constructed the measures using accounting data provided by the Institute of Research in Economics and Business Administration (SNF). The data provided by SNF is an unbalanced panel which includes a substantial set of accounting and business variables from 1992-2014. It is based on the firm population data from the Brønnøysund Register Centre (Berner, Mjøs, & Olving, 2016).[9] This particular data set was chosen because of the firm-level data for the entirety of Norway that is made available. Other similar data sets, such as those available at SSB are limited in that they provide either aggregated or sample data. A drawback to the SNF data, however, is that it does not distinguish between single and multi-plant firms. Plants located in different municipalities will therefore not be included in the data, but appear as a single observation in the municipality where the firm is registered.

We pull data from the SNF 'Business Data Files' and the 'Accounting Data Files' spanning from the years 2001-2008. Both provide detailed firm information. We merge these data sets and use the accounting variables to create the firm performance measurements. The construction of these variables is as follows:

$$ROA_{it} = Net\ Income_{it}/Firm\ Assets_{it}, \tag{1}$$

$$ROE_{it} = Net\ Income_{it}/Firm\ Equity_{it}, \tag{2}$$

Where i is a given firm and t is year.

The two measurements are closely related, as a firm's equity is the difference between the value of its total assets and all of its liabilities. ROE helps investors assess how their investments are generating income, while ROA indicates how well the management is using company assets to generate earnings. Taking into account the key differences between

[9]The Brønnøysund Register Centre has submitted annual firm data to SNF via Bisnode DB Norway AS. Some variables in the data set are added from other sources. SNF has, in collaboration with Menon Business Economics AS, standardized variable names, file structures, and cleaned the data.

ROA and ROE, we include both in our analysis to get a more nuanced picture of the firm performance.

5.2 Share of Employed Immigrants

We use the Microdata platform to pull the number of employed immigrants and the total working population in each Norwegian municipality every year from 2001-2008. Microdata was developed in a collaboration with SSB and the Norwegian Centre for Research Data (NSD), and provides researchers and students at approved research institutions with access to register data from SSB (Microdata.no). The platform allows the user to customize which pieces are pulled from the master data set, thus we are able to extract the variables and years of interest. Microdata does not provide user access to the individual level data set because of privacy protection requirements. Users are only able to process and analyze available register variables at aggregate levels.[10] The data pulled from this platform allows us to construct the percentage of employed immigrants out of total working population in each municipality, which constitutes our independent variable of interest. We are interested in the impact of immigrants that are actively engaged in working life, which means that we excluded immigrants on welfare schemes, those participating in introduction programs, and those earning less than the basic income.[11] We do the same to the total working population.

Our independent variable of interest is constructed as follows:

$$IMM_{st} = Total\ Immigrants\ Employed_{st}/Total\ Employees_{st}, \tag{3}$$

where IMM_{st} is the immigrant share in a given municipality s and year t. While ROA and ROE are measured at the firm level, our independent variable is measured at the municipal level. We assume that the immigrant share at the municipal level is highly correlated with the immigrant share at the firm level, so we can use the municipal-level share of employed immigrants to make inference about firm level employment.

[10]The Microdata platform protects confidentiality, as it only allows the user indirect contact with personal data. The platform ensures that all output is anonymous, and that the data remains in SSB's possession (Microdata.no).

[11]The basic income is a rate used by the Norwegian National Insurance (Folketrygden) to calculate a number of welfare benefits. The rate is adjusted every year on 1 May in line with the general wage inflation (NAV, 2018).

5.3 Control Variables

We include variables representing firm age, firm size and industry in our empirical analysis. We believe that our variable of interest, employed immigrant share, is correlated with unobserved variables in the error term, resulting in biased estimates of the direct effect of employed immigrant share on firm performance. Variables regarding firm characteristics are added to estimate the parameter of interest more precisely, and to capture more variation in firm performance.

We include a variable for firm age in our regression models to control for potential firm life-cycle effects. The variable is generated by subtracting the the firm's year of foundation from the current accounting year. Both variables are extracted from the SNF data set. We use the log of firm age in our empirical analysis.

Firm size can be measured by number of employees, total assets and sales revenues. All variables are collected from the the SNF data set. Including them allows us to control for differences in firm size between firms and over time. One of the challenges of comparing the effect on a large data set of companies that operate in a diverse set of markets is choosing an effective control for the size of the firm. In our analysis, we have chosen to use all variables as proxies for firm size. Our choice is motivated by a study conducted by Al-Khazali & Zoubi (2005) which reveals a weak correlation between sales and total assets across industries and time, indicating that the variables impact firm performance differently. Their results suggest that all firm size proxies should be included in the regression model to capture more variation in firm size. We use the log of all the firm size proxies in our empirical analysis.

In addition to firm age and firm size, we include a dummy variable indicating which industry each firm in the sample belongs to. The effect of employed immigrants on firm performance might vary between industries. When creating the dummy variables for industry code, the categories described in Table 8 in the Appendix are utilized. These are referenced in the SNF Data Quality Assurance Guide (Berner et al., 2016) and identify what type of activities a firm engages in. The dummy variables help our study differentiate between potentially exceptional outcomes that exist in certain industries.

5.4 Shift-Share Instrument

The shift-share instrument has been effective in addressing the issue of endogeneity in previous literature. We are following the shift-share instrument described by Card (2009), in which he predicts where future immigrants would choose to settle, based on the location

choices of earlier immigrants. By using an expected value for future immigrants, Card (2009) and other studies have been able to address the endogeneity present in immigrants' location choices otherwise. The shift-share instrument used by Card (2009) is constructed as follows:

$$\tilde{m_{jt}} = \sum_o \frac{M_{ojt^0}}{M_{ot^0}} \frac{\Delta M_{ot}}{L_{jt-1}} \tag{4}$$

The key outcome in this model is the expected immigrant inflow rate $\tilde{m_{jt}}$, which is presented as a weighted average of the national inflow rates from each source country. The M_{ojt^0}/M_{ot^0} represents the share of immigrants from country o in labour market j at reference date t^0 which predates t. $\Delta M_{ot}/L_{jt-1}$ represents the national inflow rates from each country of origin, where ΔM_{ot} is the number of new arrivals from a given country o and time t at the national level, and L_{jt-1} is the local population in each labour market in the previous period. The instrument relies on the assumption that the immigrant settlement pattern is exogenous to local demand conditions.

The shares in the shift-share instrument might, however, still be correlated with unobserved local economic conditions if these are serially correlated. If the immigrants at time t^0 settled in Norway as a result of some serially correlated economic conditions that also affects changes in firm performance, the instrument would have failed in addressing the endogeneity problem. One way to overcome this issue is to use a reference date t^0 far enough in the past in order to reduce the correlation between the instrument and current demand conditions (Jaeger et al., 2018). The intuition is that if enough time has passed between the chosen base year and the years of research interest (2001-2008), we can be comfortable in our assumption that the conditions that attracted the original immigrants have changed enough so that the instrument is not correlated with current unobserved local demand conditions. We have therefore chosen our reference date to be 1995, six years before our period of interest.

The shift-share instrument is partly pulled from the Microdata platform and partly from SSB.[12] The shares M_{ojt^0}/M_{ot^0} are pulled from Microdata and constructed according to the distribution of immigrants in 1995. We extract $\Delta M_{ot}/L_{jt-1}$ from SSB, where L_{jt-1} is pulled for the years 2000-2007 and ΔM_{ot} for 2001-2008.[13] The shift-share instrument is constructed using all immigrant origin countries represented in Norway in the period of

[12]'Statistics Norway (SSB) is the national statistical institute of Norway and the main producer of official statistics. They are responsible for collecting, producing and communicating statistics related to the economy, population and society at national, regional and local levels' (SSB, 2019c).

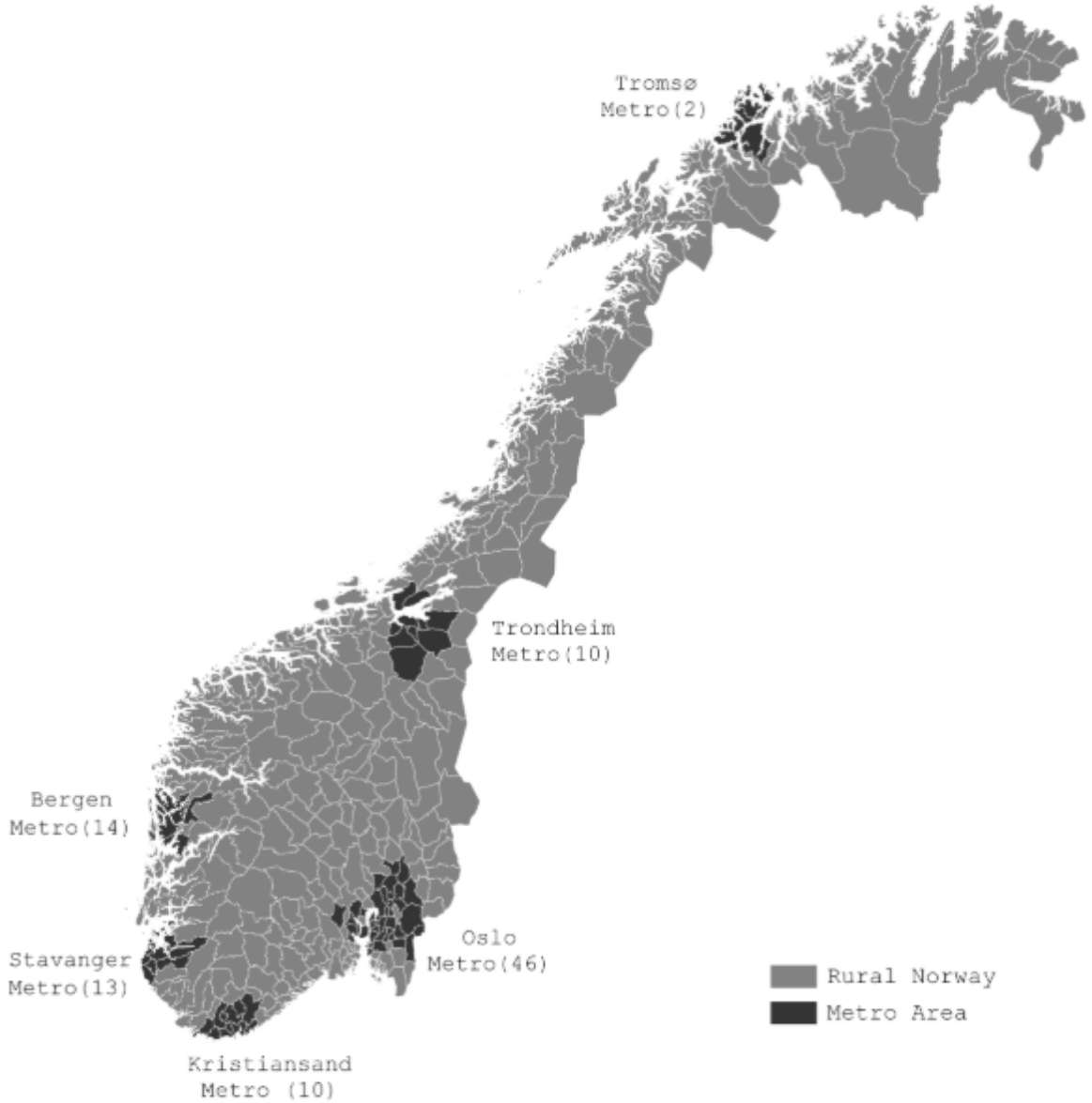
[13]SSB rounds off the figures for immigration. This means that the aggregated number of immigrants from each country group may differ slightly from the actual figures.

interest.

The shift-share instrument requires spatial variation, and there are several methods available to draw internal borders and areas of measurement for Norway. The methods available include municipality (which there are over 400), county, region, and metropolitan areas. In weighing the various options, we chose to draw the borders based on the Norwegian government's 2003 report on Norwegian cities and metropolitan areas, as it would be too comprehensive to calculate the shift-share instrument for each municipality. In summary, they characterized 6 metropolitan areas/labour markets (Oslo, Bergen, Stavanger, Kristiansand, Tromsø, Trondheim), and defined which municipalities are associated with each of these metropolitan areas (Det Kongelige Kommunal- og regionaldepartementet, 2003, pp. 141-146). To encapsulate the remaining municipalities that were not associated with any of the 6 metropolitan areas, we assigned a seventh group, called 'Rural Norway'. A list of metro areas and their associated municipalities is provided in Table 10 in the Appendix.

The metropolitan areas defined are relevant for evaluating immigrant and employment outcomes for several reasons. These metro areas are the regional hubs for their respective geographic area of Norway. They serve as a general labour market, are characterized by strong internal commuting, and are each differentiated from rural Norway by their population density (Kommunal- og moderniseringsdepartementet, 2003). In these ways, they serve as the best way to tell the story of how the labour markets of Norway are defined, which is why we use the metro areas in the construction of our shift-share instrument. We simply define labour market j as a given Norwegian metropolitan area.

Figure 5: Norwegian Metropolitian Areas



5.5 The Merged Datasets

To create one merged data set for analysis, we combined the information on firms from the SNF data base with the share of employed immigrants in each municipality. Both data sets include a municipal code, which makes it possible to merge them using the code as primary key. This process yielded a single raw data set with 1,579,524 observations covering the period 2001-2008. By matching observations through the municipality code, each firm is provided with the immigrant share for their municipality. This means that all firms located within a municipality will be assigned the same yearly immigrant share, which will allow us to analyze the effect of employed immigrants on firm performance. Finally, each firm is assigned a dummy variable indicating their associated metro area, which is used for the construction and inclusion of the shift-share instrument in the data set.

5.6 Sample Selection

The end goal of the sample creation is to find the resulting data which has the most accurate, complete, and voluminous sample possible. By taking the actions described in Table 1, we reduce the number of observations from 1,579,524 to 168,813. We have excluded inactive firms, as they have missing observations on several of the accounting variables. We want to exclude sole proprietorships and small firms from the data set, and we therefore remove firms with sales revenue below 10,000,000 NOK. Furthermore, we have excluded firms with missing municipality code, employees, industry code and firm performance measures. We notice that some firms report extreme values for ROA and ROE, which could skew our regression results. To account for extreme outliers in the firm performance measures, we remove firms with ROA and ROE greater than 500 or less than -500. Moreover, we exclude firms which are not matched properly with an employed immigrant share. Finally, we observe that a small number of firms are paired with an employed immigrant share of 1 (100%). When inspecting the associated municipalities, we find that the observations belong to municipalities where the employed immigrant share is smaller than the total working population, which indicates a mistake in the data collection from Microdata. We therefore remove firms with an employed immigrant share equal to 1.

Table 1: Cleaning The Dataset

Action No.	Action Taken	Number of Observations
1	All Observations from 2001-2008	1,579,524
2	Remove inactive firms	-
3	Remove firms with less than 10,000,000 NOK annual sales revenue	-
4	Remove firms with no reported employees	-
5	Remove firms missing municipality code	-
6	Remove firms missing industry code	-
7	Remove firms missing ROA	-
8	Remove firms missing ROE	-
9	Remove firms with outlier ROA and ROE	-
10	Remove firms with missing employed immigrant share	-
11	Remove firms with employed immigrant share = 1 (measurement error)	-
12	Complete sample	168,813

Note: Only starting and ending observations count shown

The sample of 168,813 observations is the final data sample that we will be utilizing in our empirical analysis. The completed data set provides observations for each firm over the eight year period of analysis, identified by a unique organization number. Since the panel data is unbalanced, not all firms appear in all the years of interest. The number of firms which are included in each year varies as indicated in Table 9 in the Appendix.

5.7 Summary Statistics

Table 2 presents the summary statistics of the variables we use in our empirical analysis. The accounting characteristics in this table indicate that Norwegian firms on average reported positive Returns on Assets and Equity between 2001 and 2008. In our sample, the average firm has a ROA of 7,86%, ROE of 52%, firm assets of 126 million NOK and annual sales of 118 million NOK. The average ROA of 7,86% implies that for every 1 NOK invested in assets, 0,0786 NOK is generated in net income for all firms on average

from 2001-2008. An average ROE of 52% means that all firms on average generate 0,52 NOK of net income for every 1 NOK invested by shareholders.

In addition to being required for implementation of a shift-share strategy, we can use the metropolitan areas to identify the differences in firms operating in different parts of Norway. Table 3 reports the mean and number of observations by metro area. We see that the average ROA and ROE are greater in the more populous metropolitan areas such as Oslo, Bergen and Stavanger.

Table 2: Summary Statistics: All of Norway

Variable	Mean	Standard Deviation	Min	Max
Immigrant Share	,0876024	,0426197	0	,3387851
ROA	,0793999	,5348288	-179,2639	27,26866
ROE	,5272695	6,22817	-442	485,5
Number of Employees	44,46484	276,8413	1	25752
Firm Assets	129678,4	2878048	7	5,44e+08
Annual Sales	119560,9	2511664	10000	5,59e+08
Firm Age	14,70699	14,72285	0	336
IV Value	,0048538	,0035426	,0012453	,0133917
Observations	165209			

Note: Firm Assets and Annual Sales in 000's NOK

Table 3: Mean by Metro Area

	(1) All of Norway	(2) Oslo	(3) Bergen	(4) Stavanger	(5) Kristiansand	(6) Tromso	(7) Trondheim	(8) Rural Norway
ROA	0,0786	0,0838	0,0829	0,104	0,0875	0,0663	0,0854	0,0693
ROE	0,520	0,609	0,553	0,640	0,624	0,293	0,656	0,415
Number of Employees	44,40	61,66	40,24	57,03	43,39	41,96	39,92	30,38
Firm Assets	126255,3	186199,7	73428,9	434828,8	75510,5	53316,6	58050,7	55709,0
Annual Sales	118921,3	153522,9	79623,3	452234,3	88415,9	65214,3	68333,5	58981,3
Firm Age	14,92	15,74	15,04	12,96	14,93	14,02	14,42	14,62
IV_Value	0,00483	0,00816	0,00359	0,00459	0,00383	0,00419	0,00332	0,00267
Observations	165209	56781	11856	10408	3919	2140	7277	72828

Note: Firm Assets and Annual Sales in 000's NOK

Table 4 presents the average shares of employed immigrants by metro area in the event window investigated. We observe that Oslo metro area has the largest share of employed immigrants in the sample at 13,2%, while Rural Norway has the lowest at 5,75%.

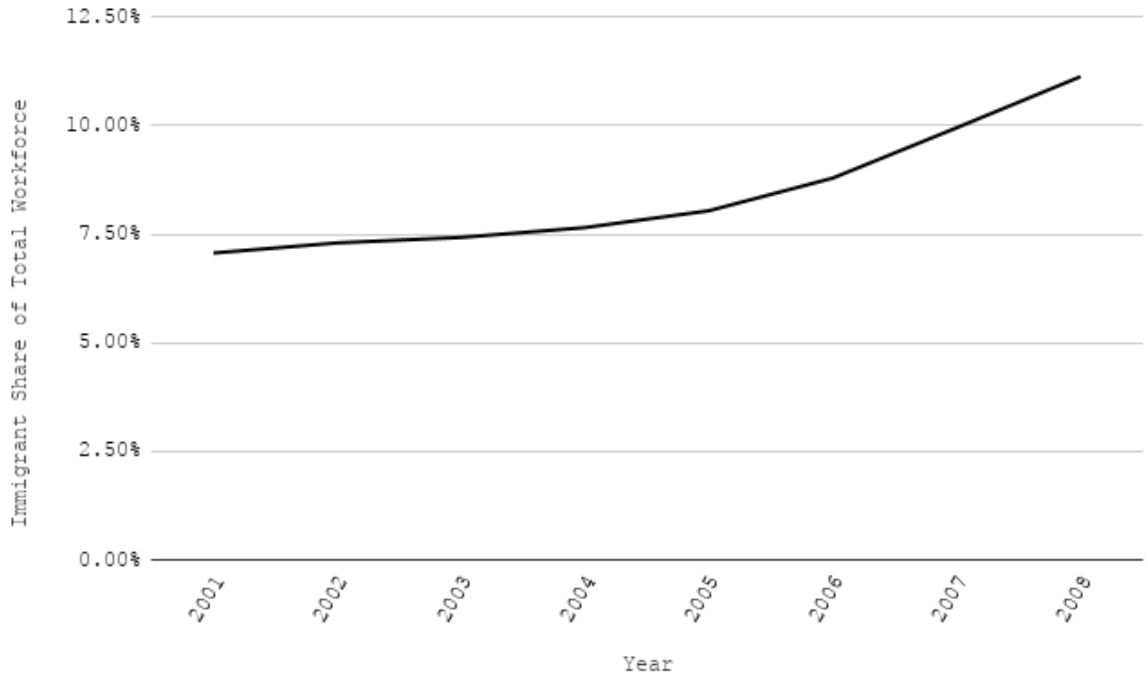
Table 4: Employed Immigrant Share by Metropolitan Area (mean)

	(1) All of Norway	(2) Oslo	(3) Bergen	(4) Stavanger	(5) Kristiansand	(6) Tromso	(7) Trondheim	(8) Rural Norway
Immigrant Share	0,0877	0,132	0,0722	0,0945	0,0904	0,0762	0,0610	0,0575
Observations	168831	58269	12303	10788	4020	2200	7436	73815

Note: Immigrant Share is Immigrant Workers / Total Workers in a given Municipality
Note: The values presented are the average of the municipalities in a given metro area from 2001-2008

Figure 6 shows how the employed immigrant share of the total workforce was increasing from 2001-2008. The graph depicts a steeper trend after the EU enlargement in 2004.

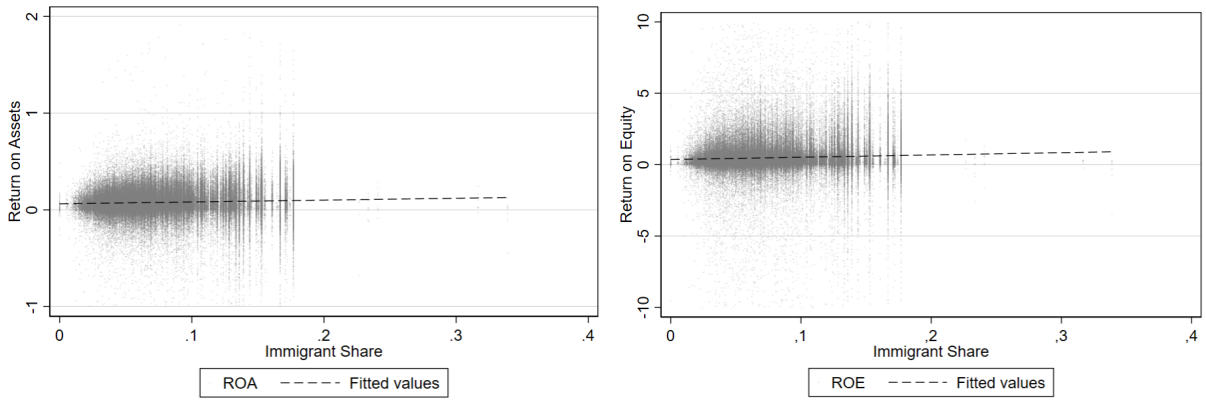
Figure 6: Norway: Immigrant Share of Total Workforce, 2001-2008 (SSB)



Note: Annual Immigrant Share = Total Employed Immigrants / Total Employed

Figure 7 provides a visual representation of the data sample used in this study. One item to highlight is the clustering on the higher end of the immigrant share distribution. This illustrates the method used to assign immigrant share from a given municipality to all the firms in that municipality. Both scatter plots seem to indicate a positive relationship between the employed immigrant share and firm performance. We can confirm this relationship by referencing Table 5, which shows the correlation between all variables included in our empirical models. We observe small positive correlations with the employed immigrant share of 0,0155 and 0,0141 for ROA and ROE, respectively.

Figure 7: Scatter Plot and Fitted Values



(a) Return on Assets (b) Return on Equity

When observing Table 5, we note that the correlation between some of the control variables is high. The correlation between total assets and and number of employees is 0,3558, while it is 0,3816 between number of employees and total sales. Total assets and total sales have the highest correlation of 0,7819. These results indicate that there might be some interactions between the variables that could create multicolinearity, which in turn would reduce the precision of the estimate coefficients.

Table 5: Correlation Matrix

	Immigrant Share	IV Value	ROA	ROE	No. Employees	Firm Assets	Annual Sales	Firm Age
Immigrant Share	1,0000							
IV Value	0,7478	1,0000						
ROA	0,0155	0,0142	1,0000					
ROE	0,0141	0,0086	0,0306	1,0000				
No. of Employees	0,0575	0,0314	-0,0082	-0,0060	1,0000			
Total Assets	0,0276	0,0147	-0,0015	-0,0015	0,3558	1,0000		
Total Sales	0,0238	0,0131	-0,0004	-0,0011	0,3816	0,7819	1,0000	
Firm Age	0,0379	0,0300	0,0002	-0,0155	0,0525	0,0435	0,0337	1,0000

6 Empirical Strategy

The goal of our empirical analysis is to identify the causal effects of employed immigrants on firm financial performance, specifically ROA and ROE. To gain a understanding of these relationships, we will utilize several different regression methods in STATA. The regression methods we use are pooled OLS, fixed effects and the shift-share IV approach. In this chapter we present the regression methodologies and model specifications for our

empirical analysis. We start by introducing our main model, followed by a description of the theory and intuition behind using the various models.

6.1 Main model

We define our main model as:

$$Y_{it} = \beta_0 + \beta_1 IMM_{it} + \beta_k X_{it} + \alpha_i + u_{it} \tag{5}$$

Where Y_{it} denotes the dependent variables ROA and ROE for a given firm i at time t, IMM_{it} is the employed immigrant share, and X_{it} is a vector representing all the control variables included in our analysis. The control variables we use are firm age, number of employees, total assets, sales revenues, a time dummy and an industry dummy. The error term is composed of an unobserved time-invariant individual firm effect α_i and the idiosyncratic error term u_{it}. We are mainly interested in identifying the coefficient, β_1, which represents the change in Y_{it} caused by a one percentage point change in IMM_{it}.

Equation (5) represents our preferred model. However, as we only have data on the employed immigrants in each municipality, we would need to adjust the model:

$$Y_{it} = \beta_0 + \beta_1 IMM_{st} + \beta_k X_{it} + \alpha_i + u_{it} \tag{6}$$

Equation (6) is the regression we will use in our empirical analysis. The IMM_{it} is substituted by IMM_{st}, which represents the municipal-level immigrant share. We assume that IMM_{st} is highly correlated with IMM_{it}, which implies that firms located in a municipality with a higher employed immigrant share are more likely to employ a similarly high share of immigrants. This is conditional on firm type and industry, but our analysis is based in this simple assumption.

6.2 Pooled OLS Regression

Pooled Ordinary Least Squares estimation is the starting point in providing a baseline estimation of our coefficient of interest. The estimates will serve as a point of comparison to our fixed effects and IV models.

A pooled cross section is a data configuration where observations drawn from the same population are combined to produce a single data set. These observations are usually

drawn across different points in time (Wooldridge, 2018, p. 765). The data set consists of independently sampled observations, which implies that the model treats a firm in one year as independent from the observation of the same firm one year later (Wooldridge, 2018, pp. 402-403).

The pooled OLS model assumes exogeneity, meaning that the error term is uncorrelated with the independent variable. A violation of this assumption would yield endogeneity bias, meaning that the value of the coefficients are not reflective of their true population value. A way of controlling for the differences is by including any factors that we suspect are correlated with the dependent and independent variables. However, some control variables may be unobservable or difficult to include in the model. Examples of such unobserved characteristics could be company culture, corruption, managerial practices and attitude towards immigrants. If these characteristics are not controlled for, they will end up being absorbed by the error term, which in turn would bias our results. The pooled OLS model could also lead to less efficient estimates due to serial correlation, which occurs if the error terms of the same firm in different time periods are correlated over time (Wooldridge, 2018, pp.320-321). In our case, company culture is an example of an unobserved variable that we suspect would create serial correlation, as it oftentimes is deeply embedded in the organization and persists over multiple time periods.

6.3 Fixed Effects Regression

Fixed effects and random effects are estimation techniques used to eliminate unobserved time-constant firm specific effects α_i that might be correlated with the independent variables. The difference between the two methods is that fixed effects allows for correlation between the time-constant firm specific effects and the independent variable, while random effect by assumption requires α_i to be random and uncorrelated with the independent variables (Wooldridge, 2018, pp. 435-451). To test for correlation we conducted a Hausman test, using both ROA and ROE as dependent variables.[14] The test results indicate that there is a correlation between α_i and the independent variables for both ROA and ROE, which means that the random effect assumption is violated. Hence, we choose to use fixed effects estimation to address the endogeneity.

The fixed effects model uses transformation to remove the unobserved time-invariant effect prior to estimation, and then estimating the resulting model by using OLS. The method is equivalent to adding a dummy for each firm to the regression equation (Wooldridge, 2018, pp. 435-451).

[14]Hausman Test results are provided in Table 12 the Appendix.

Fixed effects estimation transforms equation (6) by taking the time de-meaned value of ROA and ROE in a given firm:

$$\overline{Y_i} = \beta_0 + \beta_1 \overline{IMM_s} + \beta_k \overline{X_i} + \overline{\alpha_i} + \overline{u_i} \tag{7}$$

The model then subtracts equation (7) from equation (6) to get the transformed model:

$$Y_{it} - \overline{Y_i} = (\beta_0 - \beta_0) + \beta_1 (IMM_{st} - \overline{IMM_s}) + \beta_k (X_{it} - \overline{X_i}) + (\alpha_i - \overline{\alpha_i}) + (u_{it} - \overline{u_i}) \tag{8}$$

Because all unobserved time-invariant firm effects are eliminated from the equation, the pooled OLS estimation will be consistent, conditional on the idiosyncratic error term u_{it} being uncorrelated with the independent variables. A drawback of the model is that it eliminates the observable time-invariant variables. This means that we cannot estimate the effect of any time-constant observable variables on the dependent variable. As a result, industry dummies will be eliminated from the model.

6.4 Instrumental Variables Estimation

The IV estimation method can be used when correlation between the independent variables and the error term is suspected. In our model we use the shift-share instrumental variable $\tilde{m_{jt}}$ for a given metro area j in year t. The method uses the instrument to predict the independent variable (which is correlated with the error term) and replace the predicted values with its actual realized values. The IV method ensures that the instrument affects the outcome solely through the effect of the independent variable of interest. A valid instrument is correlated with the independent variable, but conditional on this correlation shows no independent association with any other variables correlated with the dependent variable. This means that the instrumental variable $\tilde{m_{jt}}$ is required to meet two important assumptions:

(i) Instrument exogeneity: $\text{cov}(\tilde{m_{jt}}, u_{it}) = 0$

(ii) Instrument relevance: $\text{cov}(\tilde{m_{jt}}, IMM_{st}) \neq 0$

The first property ensures that the instrument and the error term u_{it} are uncorrelated, while the second property ensures that the instrument must be related, either positively or negatively, to the endogenous independent variable IMM_{st}. In practice, we can test the instrumental relevance by regressing the instrument and all independent variables that

are not correlated with the error term on IMM_{st}. The instrumental variable satisfies the requirement when the estimated coefficient of the instrument $\tilde{m_{jt}}$ is statistically significant. Testing restriction (i), however, is a problem in practice because the error term u_{it} is unobservable. One should therefore use economic theory or common sense to establish the validity of this assumption (Wooldridge, 2018, pp. 461-488).

For the estimation of the IV results we consider the model of Two Stage Least Squares (2SLS). As the name suggests, the method uses two steps to reach the causal effect of interest. The First Stage links the instrument and independent variable:

$$IMM_{st} = \theta_0 + \theta_1 \tilde{m_{jt}} + \theta_k X_{it} + e_{it} \tag{9}$$

The model then estimates the independent variable $\hat{IMM_{st}}$ and uses the predicted value in the equation of interest:

$$Y_{it} = \beta_0 + \beta_1 \hat{IMM_{st}} + \beta_k X_{it} + u_{it} \tag{10}$$

7 Results

In this chapter, we detail the main findings of our empirical analysis, which are presented in Table 6. In addition to the methodologies described in Chapter 6, we include a median quantile regression as a control for potential outliers that could skew our results. Table 11 in the Appendix provides the complete estimation results with all associated control and dummy variable coefficients displayed.

Table 6: Regression Table (OLS - Median Quantile Regression - Fixed Effects - 2SLS)

	(1) (ROA) OLS	(2) (ROA) Q50	(3) (ROA) FE	(4) (ROA) 2SLS	(5) (ROE) OLS	(6) (ROE) Q50	(7) (ROE) FE	(8) (ROE) 2SLS
Immigrant Share	0,0998*	0,198***	-0,0539	0,129**	1,914***	0,910***	-4,644*	1,927***
	(0,0393)	(0,00840)	(0,0615)	(0,0443)	(0,404)	(0,0352)	(1,953)	(0,526)
Log Firm Age	0,00867***	0,00389***	-0,00452	0,00866***	-0,0217	-0,0438***	0,0221	-0,0219
	(0,00151)	(0,000355)	(0,00236)	(0,00143)	(0,0206)	(0,00149)	(0,0750)	(0,0169)
Log Employees	-0,0189***	-0,0118***	-0,0610***	-0,0188***	-0,141***	-0,0429***	-0,0478	-0,141***
	(0,00202)	(0,000398)	(0,00182)	(0,00161)	(0,0257)	(0,00167)	(0,0580)	(0,0191)
Log Assets	0,00868	-0,0166***	0,0673***	0,00857***	-0,150***	-0,104***	-0,142*	-0,150***
	(0,00959)	(0,000440)	(0,00199)	(0,00177)	(0,0209)	(0,00184)	(0,0632)	(0,0211)
Log Sales	0,00105	0,0194***	0,0674***	0,000890	0,196***	0,107***	0,575***	0,196***
	(0,0105)	(0,000599)	(0,00232)	(0,00241)	(0,0288)	(0,00251)	(0,0736)	(0,0287)
Year Dummy	YES	YES	YES	YES	YES	YES	YES	YES
Industry Dummy	YES	YES	NO	YES	YES	YES	NO	YES
Firm Fixed Effects	NO	NO	YES	NO	NO	NO	YES	NO
IV Estimation	NO	NO	NO	YES	NO	NO	NO	YES
Observations	162180	162180	162180	162180	162180	162180	162180	162180
R^2	0,003		0,036	0,003	0,002		0,001	0,002
Adjusted R^2	0,003		-0,222	0,003	0,002		-0,265	0,002
First stage F-statistic				225617				225617

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

7.1 Pooled OLS Regression Results

The OLS regression results are presented in columns (1) and (5) of Table 6, and display the conditional mean effect of employed immigrants on ROA and ROE, respectively. Both estimation results report a positive effect of immigrants on firm performance. Increasing the immigrant share with one percentage point is associated with a 0,000998 percentage point increase in ROA and a 0,01914 percentage point increase in ROE. The relationships are statistically significant at the 10% level (ROA) and the 1% level (ROE).

R^2 is a measure of how well the model explains the variation in firm performance. Adjusted R^2 adjusts for the number of variables in the model (Wooldridge, 2018, pp. 200-203). The OLS regression results show positive, but very small adjusted R^2 for both OLS regressions, which indicates that firm performance is poorly predicted by the variables included in the OLS models.

Mean regression can be very sensitive to outliers in the data set, possibly disrupting the

regression results. Despite the effort to clean the data sample as described in Chapter 5, we suspect that there still are some outliers affecting the OLS estimates. To control for this, we run a median quantile regression. The median quantile regression is similar to OLS, but will provide estimates based on the median, rather than the mean of the population (Angrist, 2009, pp. 269-270). The results from the median quantile regression are presented in Table 6 in columns (2) and (6). Both coefficients remain positive, but change slightly in magnitude. The effect of immigrant share on ROA increases to 0,00198 percentage points, while the effect on ROE decreases to 0,00910 percentage points. The coefficients of the immigrant share are now statistically significant at the 1% level for both regression estimations.

7.2 Fixed Effects Regression Results

The fixed effects regression results are presented in Table 6 column (3) and (7). The model eliminates the time-invariant firm fixed effects that are not included in the model, such as firm culture and management practices. When introducing this method of estimation, the coefficient for the employed immigrant share flips to negative for both ROA and ROE. Increasing the immigrant share with one percentage point is associated with a -0,000539 percentage point decrease in ROA and a -0,04644 percentage decrease in ROE. The relationship between immigrant share and ROA is not statistically significant while it is significant for ROE at the 10% level.

The fixed effects regression results shows negative adjusted R^2 for both ROA and ROE. Adjusted R^2 turns negative when the unexplained variation is larger than the total variation. So if the R^2 is very small, the adjusted R^2 might turn negative.

7.3 IV Estimation Results

The final results from the 2SLS regression are presented in Table 6 in column (4) and (8), together with the first-stage regression F-statistic. The correlation matrix in Table 5 reports a correlation value of 0,7478 between the employed immigrant share and the instrumental variable. We evaluate the strength of the instrument through the criterion of an F-statistic above 10 proposed by Staiger & Stock (1994). An instrument with an F-statistic below 10 is considered weak. Our F-statistic of 225617 indicates that our instrument is strong, which confirms the instrument relevance. This implies that the instrument is relevant in explaining the variation in the employed immigrant share.

The 2SLS results indicate that immigrants have a positive effect on both ROA and ROE.

Increasing the immigrant share with one percentage point is associated with a 0,00129 percentage point increase in ROA, and a 0,01927 percentage point increase in ROE. Both relationships are statistically significant at the 5% level (ROA) and the 1% level (ROE), which is an improvement compared to the OLS and fixed effects model. The R^2, however, still indicates poor predictive power for both IV estimations.

7.4 Summary of Results

The regression models used in this empirical analysis reveal slightly differing effects of employed immigrants on the firm performance metrics of Return on Assets and Return on Equity. The pooled OLS and IV estimation yield positive and statistically significant results for both ROA and ROE, supporting our hypothesis that employed immigrants contributes to positive firm performance results. However, the fixed effects regression reveal negative coefficients on employed immigrants for both ROA and ROE. Finally, we see that the mean results differ from the median outcomes for both firm performance measures. The results indicate that the mean regression might be affected by outliers, suggesting that using quantile regression could be more efficient than OLS.

8 Discussion

The main goal of this thesis has been to answer the question: *'What is the effect of employed immigrants on firm financial performance?'* As discussed in previous sections of the paper, this question is complex, and economists have struggled to reach consensus on the effects of immigration and their findings' implications on policy decisions for decades. Our study has been inconclusive as well, as the empirical methods applied have yielded conflicting results. Despite the inconclusive nature of the results presented, we have several interesting insights to discuss in the following sections.

8.1 Discussion on Empirical Strategy and Findings

The data that we were able to pull from SNF is a large and reliable data set for our analysis. In comparing with the prior literature on the same topic, the approximately 1.5 million observations encapsulating all firms in Norway over an eight year period stands up as a sufficient quantity for econometric application. By merging data from several available sources, we were able to create a final robust data set. After cleaning the data

and dropping observations that were missing entries, we can be confident that there were no shortcomings in the chosen data set that significantly limited our ability to conduct this analysis.

One point of consideration that we shortly mentioned in Chapter 5 and 6 is the availability of municipal-level observations of employed immigrant share in favor of firm-level employed immigrant share. We view this data limitation as a positive characteristic for our empirical models, as the use of municipal-level data might reduce the correlation between the error term and our independent variable. When we think about the example of a firm's management hiring practices, we can imagine that this unobservable variable would have a higher correlation with the firm-level immigrant share than the municipal-level immigrant share. By using municipal-level aggregate data, we have confidence that we overcome some of the endogeneity issues present in the independent variable.

The OLS regression estimation has yielded positive coefficients for our independent variable of interest, employed immigrant share. These results follow the economic intuition we discussed in Chapter 3, where we likely have two factors at play: The first is a situation where working immigrants are coming to Norway at a higher rate and depressing wages through an increase of labour supply. In turn, firms are able to generate larger profits, modestly increasing their Return on Assets and Return on Equity. A secondary factor that could be at play leading to positive OLS results are the benefits of complementary roles of natives and immigrants. It is possible that immigrants were taking jobs that complement the native workforce, thus driving productivity of firms up. As we discussed in the Literature Review, our hypothesis that higher immigrant shares will lead to stronger firm performance is based on prior studies and economic theory. However, the results from our OLS estimations should be interpreted with caution, as they likely suffer from omitted variable bias. Although we control for those factors that we deem important for estimating the effects of immigrants on firm performance, we cannot exclude that some unobservable factors might bias our estimates.

The median regression model would suffer from the same bias, but in our view it improves the OLS result by controlling for firms that report extraordinary values of ROA and ROE. Despite dropping outliers from the sample prior to applying our estimation models, we still observe some outstanding values of both ROA and ROE reported in individual years, and those observations at the top and bottom ends of the distribution could influence our OLS results. By using the median quantile regression we lessen the impact of the outliers, and produce a more efficient estimate for both dependent variables.

The results of the fixed effects model are negative, which could indicate that the OLS results suffer from an upwards bias. The model removes the firm specific time-invariant

unobservable factors which may have caused the OLS regression to over-estimate the coefficient of the employed immigrant share. An example of such a variable could be management attitudes towards immigrants, which we assume to be fairly stable over time. If management attitudes towards immigrants are positively correlated with both employed immigrant share and firm performance, our OLS estimates would be biased upwards. The exclusion of the industry dummies might also be contributing to the negative results. By looking at Table 11 in the Appendix, we see that the industry dummy coefficients in the other regression models generally are statistically significant and vary across industries. This gives us reason to suspect that the industry dummies are having some effect on the immigrant share estimates, but we are not confident on the extent of that effect. Thus, we think it is possible that the exclusion of the industry dummies is creating the negative coefficients on employed immigrants in the fixed effects model.

By removing the time-invariant individual firm effects, the fixed effects model arguably generates more efficient estimates than the OLS model. However, the fixed effects approach seems to exacerbate the significance of the independent variable for both ROA and ROE, indicating that the model is not the best to draw inference about the population.

Although the fixed effects model removes unobserved time-invariant firm specific effects, it does not account for correlation between the idiosyncratic error term u_{it} and the independent variable. The shift-share IV approach represents our effort to control for this correlation, which might bias the fixed effects regression results. The instrument arguably removes the endogeneity of immigrants' location choices, which strengthens our belief that the IV estimates are the most reliable generated by our research for both Return on Assets and Return on Equity.

8.2 Limitations of the Study

We are hopeful that by outlining some limitations of this study, we can give direction to future research on this topic. We have summarized and cited several studies that separate immigrants into skill-set groups and estimate the effect of the different groups on various host country outcomes. However, identifying differences between immigrant groups is not within the scope of this study. We treat all immigrants as homogeneous with respect to skills, aptitude, certifications, experience and all other factors that could influence an immigrant-employee to have more or less impact on the eventual performance of a firm. In addition, we have only considered immigrants who are already employed during the years of study. This limitation is not necessarily consequential for the estimates, but is notable in the greater context of effects of overall immigration on firm performance. By

including only employed immigrants, primarily we are neglecting to capture the effects of the non-working population. Secondarily, if these immigrants are already employed, we can infer that they have some level of skill above a non-employed immigrant, whether that is language skills, interpersonal skills, or any other factor that goes into employability in Norway. Implementing skill-cell methods could more precisely capture the positive or negative effects of individual contributions to firm performance.

We neglected to utilize time lags in all regression models, which could have yielded more efficient results if included. New hires take time to be integrated into a firm and to be producing at full capacity, whether they are immigrants or not. This means that newly employed immigrants might not impose the same immediate effect on firm performance as an experienced employee. To capture the delayed response of the firm performance to a change in the employed immigrant share, we could have introduced a time lag for comparison with the models used in our empirical analysis.

In constructing the shift-share instrument, we assumed that our choice of 1995 as the reference year would be sufficient to mitigate the correlation between the instrument and some serially correlated current local economic conditions that affects firm performance. However, our concern is that we were not successful in choosing a base year far enough in the past to reduce this correlation sufficiently. If this concern is proven accurate, it would violate the instrument exogeneity assumption. We could have addressed this potential problem by choosing a reference year even further back in time. Some studies also address the problem by testing for serial correlation in the residuals of the regression (e.g. Dustmann, Frattini, & Preston, 2012).

9 Conclusion

In this study we have combined municipal-level aggregate data and individual firm-level panel data to estimate the effect of the working immigrant population on firm performance in Norway during the period 2001-2008. The conducted research reveals that the effects vary depending on the empirical method applied. The OLS and IV regression results show positive effects of employed immigrants on both Return on Assets and Return on Equity. We find a small negative effect for both firm performance measures when using fixed effects estimation. As mentioned in Chapter 8, we place the highest confidence on the IV estimates in generating our concluding remarks.

As a result of the negative fixed effects regression results and the limitations described earlier in the paper, we cannot confirm our hypothesis that employed immigrants have a

positive effect on firm performance. However, our primary conclusion is that we do not find evidence that employed immigrants have a negative effect on firm performance. This is an important distinction, as it relates to the public discourse, common understanding, and debate regarding immigration policies. Citing evidence that immigrants have negative effects on native outcomes is oftentimes part of the bedrock of anti-immigration and far-right populist movements. If future studies from numerous countries continue to reach similar conclusions, it seems that inflammatory rhetoric towards immigrant populations and anti-immigration policies will be increasingly difficult to justify. Future studies reaching similar conclusions for Norway could be crucial for informing the debate regarding immigration. As we highlighted in the introduction, there is currently conflicting opinions among researchers and political parties on how best to preserve the welfare state as currently constructed, and further evidence regarding native outcomes could help Norwegian leaders orient towards a unified future plan.

Through our study and review of relevant immigration literature, we see that the benefits or drawbacks of immigration are far from settled science. As the world becomes a more connected place deeper into the 21st century, it is important to continue the research in this field and inform the public regarding the findings. The continued immigration discussion is relevant to policymakers and citizens, as the empirical literature suggests that there are persistent effects on employment outcomes, firm behavior, social dynamics, the welfare state and numerous other measures of societal qualities. The shift-share IV method represents an increasingly popular form of immigration effects estimation, and although we do not expect our findings to be judged as being of great consequence to the broad immigration discussion, we are bullish that this contribution to the body of immigration literature is with merit.

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Appendix

Table 7: Variables used in the regression models

Variable Name	Measurement
Return on Assets (ROA)	Net Income / Firm Assets,
Return on Equity (ROE)	Net Income / Firm Equity,
Employed Immigrants	Ratio of employed immigrants in each municipality
Shift-Share Instrument	Predicted inflow of immigrants to a given Norwegian metro area
Accounting year	2001 - 2008
Industry group	Based on industry group code
Firm Age	Logarithm of the number of years since the firm was founded
Total Assets	Logarithm of total assets
Total Sales	Logarithm of total sales
Number of Employees	Logarithm of the number of employees in each firm

Table 8: SN2007 Industry Codes

Industry Code	Description
1	Primary Industries (Agriculture and Fishing)
2	Oil/Gas/Mining
3	Manufacturing
4	Energy/Water/Sewage/Utilities
5	Construction
6	Trade
7	Shipping
8	Transport and Tourism
9	Telecom/IT/Media
10	Finance and Insurance
11	Real Estate and Services
12	General Services
13	Research and Development
14	Public Sector and Culture

Table 9: Number of firms per year

Year	Number of Firms
2001	15,119
2002	16,281
2003	17,309
2004	19,073
2005	21,377
2006	24,836
2007	28,356
2008	26,463
Total	168,813

Table 10: Norwegian Metro Areas and Municipalities

Metro Area	Municipality Number	Municipality Name
Oslo Metro	301	Oslo
	213	Ski
	216	Nesodden
	217	Oppegård
	229	Enebakk
	219	Bærum
	228	Rælingen
	230	Lørenskog
	231	Skedsmo
	233	Nittedal
	119	Marker
	121	Rømskog
	122	Trøgstad
	123	Spydeberg
	124	Askim
	125	Eidsberg
	127	Skiptvedt
	138	Hobøl
	211	Vestby
	214	Ås
	215	Frogn
	220	Asker
	627	Røyken
	628	Hurum
	221	Aurskog-Høland
	226	Sørum
	227	Fet
	234	Gjerdrum
	235	Ullensaker
	236	Nes

Norwegian Metro Areas and Municipalities (Continued)

Metro Area	Municipality Number	Municipality Name
	237	Eidsvoll
	238	Nannestad
	239	Hurdal
	533	Lunner
	104	Moss
	135	Råde
	136	Rygge
	137	Våler
	602	Drammen
	624	Øvre Eiker
	625	Nedre Eiker
	626	Lier
	702	Holmestrand
	711	Svelvik
	713	Sande
	714	Hof
Kristiansand Metro	1001	Kristiansand
	926	Lillesand
	928	Birkenes
	935	Iveland
	1002	Mandal
	1014	Vennesla
	1017	Songdalen
	1018	Søgne
	1021	Marnardal
	1029	Lindesnes

Norwegian Metro Areas and Municipalities (Continued)

Metro Area	Municipality Number	Municipality Name
Stavanger Metro	1102	Sandnes
	1103	Stavanger
	1119	Hå
	1120	Klepp
	1121	Time
	1122	Gjesdal
	1124	Sola
	1127	Randaberg
	1129	Forsand
	1130	Strand
	1141	Finnøy
	1142	Rennesøy
	1144	Kvitsøy
Bergen Metro	1201	Bergen
	1241	Fusa
	1242	Samnanger
	1243	Os
	1245	Sund
	1246	Mountains
	1247	Askøy
	1251	Vaksdal
	1253	Osterøy
	1256	Meland
	1259	Øygarden
	1260	Radøy
	1263	Lindås
	1264	Austrheim
Tromsø Metro	1902	Tromsø
	1936	Karlsøy

Norwegian Metro Areas and Municipalities (Continued)

Metro Area	**Municipality Number**	**Municipality Name**
Trondheim Metro	1601	Trondheim
	1624	Rissa
	1648	Midtre Gauldal
	1653	Melhus
	1657	Skaun
	1662	Klæbu
	1663	Malvik
	1664	Selbu
	1714	Stjørdal
	1718	Leksvik

Table 11: Complete Regression Table (OLS - Quantile Regression - Fixed Effects - IV)

	(1) ROA OLS	(2) ROA Q50	(3) ROA FE	(4) ROA IV	(5) ROE OLS	(6) ROE Q50	(7) ROE FE	(8) ROE IV
Immigrant Share	0,0998*	0,198***	-0,0539	0,129**	1,914***	0,910***	-4,644*	1,927***
	(0,0393)	(0,00840)	(0,0615)	(0,0443)	(0,404)	(0,0352)	(1,953)	(0,526)
2001	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
2002	0,00570*	0,00673***	0,00251	0,00569	0,0719	0,0472***	0,0744	0,0723
	(0,00277)	(0,00146)	(0,00210)	(0,00588)	(0,0621)	(0,00611)	(0,0667)	(0,0699)
2003	0,00614*	0,00421**	0,000870	0,00609	0,0375	0,0486***	-0,000283	0,0379
	(0,00259)	(0,00144)	(0,00214)	(0,00580)	(0,0590)	(0,00603)	(0,0680)	(0,0689)
2004	0,0182	0,0183***	0,0130***	0,0181**	0,417***	0,173***	0,354***	0,418***
	(0,00937)	(0,00141)	(0,00221)	(0,00569)	(0,0557)	(0,00591)	(0,0703)	(0,0676)
2005	0,0311***	0,0171***	0,00662**	0,0309***	0,0664	0,0929***	-0,0116	0,0668
	(0,00208)	(0,00138)	(0,00234)	(0,00558)	(0,0561)	(0,00579)	(0,0745)	(0,0663)
2006	0,0326***	0,0201***	-0,00593*	0,0322***	0,114	0,0830***	0,0385	0,114
	(0,00219)	(0,00136)	(0,00263)	(0,00551)	(0,0593)	(0,00570)	(0,0835)	(0,0655)
2007	0,0390***	0,0287***	-0,00915**	0,0383***	0,164**	0,0853***	0,102	0,164*
	(0,00259)	(0,00134)	(0,00314)	(0,00547)	(0,0634)	(0,00563)	(0,0997)	(0,0650)
2008	0,00800*	0,00550***	-0,0437***	0,00697	0,0141	-0,00271	-0,0607	0,0142
	(0,00352)	(0,00136)	(0,00375)	(0,00559)	(0,0641)	(0,00570)	(0,119)	(0,0665)
Industry 1	0	0		0	0	0		0
	(.)	(.)		(.)	(.)	(.)		(.)
Industry 2	0,0397***	0,0410***		0,0392*	0,0475	0,0807***		0,0470
	(0,00821)	(0,00425)		(0,0171)	(0,238)	(0,0178)		(0,203)
Industry 3	0,0306***	0,0175***		0,0302**	-0,248	0,0141		-0,248*
	(0,00666)	(0,00258)		(0,0104)	(0,205)	(0,0108)		(0,123)
Industry 4	0,00186	0,0187***		0,00174	-0,394	0,0149		-0,395*
	(0,00671)	(0,00343)		(0,0138)	(0,233)	(0,0144)		(0,164)
Industry 5	0,0710***	0,0468***		0,0703***	0,0514	0,170***		0,0511
	(0,00885)	(0,00259)		(0,0105)	(0,208)	(0,0109)		(0,124)
Industry 6	0,0342**	0,00683**		0,0333**	-0,295	0,00163		-0,296*
	(0,0128)	(0,00252)		(0,0102)	(0,207)	(0,0106)		(0,121)
Industry 7	-0,0464	0,0122**		-0,0473**	-0,0571	0,0661***		-0,0581
	(0,0452)	(0,00450)		(0,0181)	(0,284)	(0,0189)		(0,215)
Industry 8	0,0250**	0,00353		0,0239*	-0,157	0,0512***		-0,159
	(0,00915)	(0,00275)		(0,0111)	(0,211)	(0,0115)		(0,132)
Industry 9	0,0263**	0,0332***		0,0248*	-0,224	0,0215		-0,226
	(0,00813)	(0,00293)		(0,0119)	(0,214)	(0,0123)		(0,141)
Industry 10	0,109***	0,0729***		0,107***	1,043**	0,213***		1,043***
	(0,0133)	(0,00551)		(0,0222)	(0,381)	(0,0231)		(0,264)
Industry 11	0,0192**	0,0109***		0,0185	-0,0141	0,0954***		-0,0140
	(0,00636)	(0,00313)		(0,0126)	(0,248)	(0,0131)		(0,150)
Industry 12	0,0569***	0,0470***		0,0554***	0,168	0,177***		0,167
	(0,00776)	(0,00272)		(0,0110)	(0,219)	(0,0114)		(0,131)
Industry 13	-0,00212	-0,00452		-0,00235	-0,279	-0,0851**		-0,268
	(0,0109)	(0,00680)		(0,0275)	(0,214)	(0,0285)		(0,326)
Industry 14	0,0329***	0,0102***		0,0317**	-0,164	0,00406		-0,165
	(0,00775)	(0,00298)		(0,0120)	(0,225)	(0,0125)		(0,143)
Log Firm Age	0,00867***	0,00389***	-0,00452	0,00866***	-0,0217	-0,0438***	0,0221	-0,0219
	(0,00151)	(0,000355)	(0,00236)	(0,00143)	(0,0206)	(0,00149)	(0,0750)	(0,0169)
Log Employees	-0,0189***	-0,0118***	-0,0610***	-0,0188***	-0,141***	-0,0429***	-0,0478	-0,141***
	(0,00202)	(0,000398)	(0,00182)	(0,00161)	(0,0257)	(0,00167)	(0,0580)	(0,0191)
Log Assets	0,00868	-0,0166***	0,0673***	0,00857***	-0,150***	-0,104***	-0,142*	-0,150***
	(0,00959)	(0,000440)	(0,00199)	(0,00177)	(0,0209)	(0,00184)	(0,0632)	(0,0211)
Log Sales	0,00105	0,0194***	0,0674***	0,000890	0,196***	0,107***	0,575***	0,196***
	(0,0105)	(0,000599)	(0,00232)	(0,00241)	(0,0288)	(0,00251)	(0,0736)	(0,0287)
Constant	-0,0492***	0,0106*	-1,074***	-0,0481**	0,240	0,271***	-3,665***	0,243
	(0,0115)	(0,00455)	(0,0205)	(0,0183)	(0,281)	(0,0191)	(0,652)	(0,218)
Observations	162180	162180	162180	162180	162180	162180	162180	162180
R^2	0,003		0,036	0,003	0,002		0,001	0,002
Adjusted R^2	0,003		-0,222	0,003	0,002		-0,265	0,002

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 12: Hausman Test Results

	(1) ROA	(2) ROE
chi2	391,92	69,85
Prob>chi2	0,0000	0,0000
Observations	162980	162980