The impact of Sweden’s Negative Repo Rate on FDI:
A quantitative analysis of how Sweden’s monetary policy has affected foreign direct investments
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Gustaf Jungnelius,
Jönköping University
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Abstract

Sweden’s central bank implemented a negative interest rate policy (NIRP) in 2015, one year after adopting a zero-interest rate policy. Due to the monetary policy’s untested framework, experts are divided on the effectiveness of such a policy as well as its fortitude when faced with an economic recession. The lack of research on how the interest rate affects various economic metrics has left ample room for analysis and discussion on the subject. The aim of this thesis is to analyze how Sweden’s monetary policy has affected the flow of foreign direct investments (FDI). Specifically, the paper will be focused on discovering the effect of the Riksbank’s negative repo rate policy on net FDI inflows between 2006 and 2017. Our quantitative analysis found no significant relationship between Sweden’s repo rate and its FDI inflows. However, significance was found in the variables exchange rate, research and development expenditures, corporate taxes, and wages.
**Abbreviations**

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<th>Abbreviation</th>
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<td>EU</td>
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<td>FDI</td>
<td>Foreign Direct Investment</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>NIRP</td>
<td>Negative Interest Rate Policy</td>
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<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
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<td>OLS</td>
<td>Ordinary Least Squares</td>
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1. Introduction

In December of 2018, the Swedish central bank (the Riksbank) raised the repo rate for the first time in eight years, at the time foreboding the end of a new-age monetary policy. The decision to raise the rate from −0.50% to −0.25% was rationalized by a decreasing demand for expansionary monetary policy, rising cost pressures linked with slowing Gross Domestic Product (GDP) growth, and inflation expected to stay around the target level of 2% (Sveriges Riksbank, 2018). After nearly four years of a negative repo rate, forecasts project that the Riksbank will further raise the interest rate as 2019 ends and 2020 nears (Sveriges Riksbank, 2019).

The Riksbank is Sweden’s central authority for monetary governance, responsible for the Swedish economy’s policy and oversight. Its main concerns are ensuring a working payment system and stabilizing the Swedish economy around its target inflation rate of 2%. The Riksbank influences the inflation rate through changes in the repo rate, which allow the central bank to shift incentives from savings to consumption and investment or vice versa. (Sveriges Riksbank, 2019). This steers the economy towards the target inflation rate of 2%.

Following the global financial crisis of 2008, central banks around the world reassessed the monetary policies that had led them to the rubble they found themselves in. The Riksbank was joined in turning towards negative interest policy rates (NIRP) by the central banks of Japan, Switzerland, Denmark, and the Eurozone (Sveriges Riksbank, 2019). The long-term ramifications of several high-profile central banks utilizing an unproven monetary policy are unknown, and experts today seem divided on future contingency plans for economic recessions.

Today, Sweden’s economy is performing relatively well. According to the World Economic Forum’s annual Global Competitiveness Index which measures 140 countries on metrics such as labor market and financial market development, Sweden was ranked 9th overall. Despite having a population of roughly 10 million, Sweden placed in the 90th percentile for the majority of meta-categories (World Economic Forum, 2019). Compared with the same report from 2015, Sweden has improved its ranking in every single category, in particular macroeconomic stability and financial market development where Sweden’s ranking rose from 17th to 1st and 14th to 6th, respectively (World Economic Forum, 2019).

During the past decades, the stock of foreign direct investments (FDI) as a percentage of GDP has increased within the European Union (EU). However, following the financial crisis
of 2008, FDI inflows began to decrease and to this day have not recovered to pre-crisis level. At the same time as FDI inflows have decreased, monetary conditions within the EU have been continuously relaxed in an attempt to incentivize consumption and investment (Albulescu & Ionescu, 2018).

The 2019 A.T. Kearney FDI Confidence Index, which ranks countries based on their attractiveness for foreign investments, describes Sweden as a “stable and business-friendly regulatory environment” (A.T. Kearney, 2019). Historically, Sweden’s FDI inflows have been volatile. In 1999 Sweden saw a record high 60.63 billion USD flow into the country. Just 15 years later in 2014, Sweden’s FDI was at a record low –8.62 billion USD. 2017 saw 31.53 billion USD in FDI (The World Bank, 2019).

The current discussion about FDI gives much attention to discussing the effectiveness of a NIRP as well as central banks’ preparedness for future economic recessions (Eggertsson, Juelsrud, Summers, & Wold, 2019). With untested monetary policies being implemented by central banks in an effort to stimulate markets and a looming economic recession, the subject of how a negative repo rate has affected Sweden’s economy is of interest for understanding what trajectory the Swedish economy is headed towards. Furthermore, there is an ongoing analysis of the determinants of FDI that has yet to produce a conclusive result, leaving room for new voices to enter the discussion and contribute.

1.1 Aim
The purpose of this thesis is to discover if the Riksbank’s monetary policy of implementing a negative repo rate has affected the flow of foreign direct investments into Sweden. Specifically, we will be looking at Sweden’s monetary policy between 2006 and 2017 to better understand what relationship may exist between the two variables.

1.2 Delimitations
In researching the effect of Sweden’s repo rate on FDI, we will be using theories of monetary policy as an academic foundation for our study. Little consideration will be given to fiscal policy as the repo rate is not strongly connected with fiscal policy and its theories. Though some variables fall under the umbrella of fiscal policy, we are viewing these objects through the perspective of monetary policy.

Given our aim, the information that is of most relevance comes first and foremost from Sweden. To strengthen our analysis of what links may exist between our variables, we’ve included data from 16 Organization for Economic Co-operation and Development (OECD)
countries. The selection of countries was primarily dictated by the availability and quality of data. While more than 16 countries were initially chosen for inclusion in the analysis, several proved rather difficult in finding complete data on the correct variables for all the years.

The inclusion of only OECD countries certainly creates the risk of bias in our data. To keep an unbiased analysis, we’ve included countries that represent a multitude of differing monetary policies. We’ve also chosen countries from different geographical locations, representing five continents. Furthermore, the countries have economies of different sizes who have actionized very differently since the financial crisis of 2008. We are confident that the inclusion of 16 diverse countries allows us to complete a fair analysis of the question at hand.

The timespan of 2006 to 2017, while seemingly random at first glance, was carefully chosen to include data that would capture the effect of the 2008 financial crisis as well as the state of economies before and after Sweden implemented its negative repo rate. In order to fully understand the impact, we need to include data prior to 2015 when Sweden installed its NIRP. These years capture the effects that will ultimately describe how Sweden’s negative repo rate has affected its economy, specifically its FDI.

Some countries included in the analysis are missing data for specific years, the most prevalent being 2017. While this is certainly an issue, it did not exclude them from inclusion in our regression tests. The concern of missing datasets is certainly worth analyzing, but pockets of missing data were deemed to be outweighed by the overall quality and quantity of total data found for the included countries.

While the two variables we are interested in testing are repo rate and FDI, we’ve included several other variables to control for underlying gravities. The number of variables were limited to those whose inclusion could be strongly rationalized. Too many variables would only muddy the water and potentially lead to spuriousness in our regressions.
2. Theoretical Framework

In this section we aim to present the most important theories that form the basis of our hypothesis and research question.

2.1 Macroeconomics and Monetary Policy

This thesis is perceived through the scope of monetary policy. In order to understand monetary policy, we must introduce the pillars that underlie its theoretical framework, namely macroeconomic theory, interest rates, and the connection to global markets.

A country's money market is steered by the invisible hand of economics, aligning income and interest rates to an equilibrium level with consumers’ demand and money supply. An increase in interest rates incentivizes savings, leading to a lower demand for money. The capability to steer saving, consumption, and investment behavior through interest rates and money supply are key tools overseen by the central bank (Gärtner, 2016).

By raising or lowering the money supply in the economy, the central bank indirectly raises or lower interest rates. Over time, specific monetary policy instruments such as the Taylor Rule have been created which allow central banks to be proactive towards macroeconomic events. These involve interest rates, exchange rates, inflation, and income for example (Gärtner, 2016).

2.2 Swedish Monetary Policy and the Repo Rate

The Riksbank is responsible for Sweden’s monetary policy, steering the economy towards key objectives through flexible inflation targeting. According to the legislation, Sveriges Riksbank Act, the objective of monetary policy in Sweden is to maintain price stability (Sveriges Riksbank, 2016). The annual target rate for inflation is set at 2% and measured through increases in consumer price index with at fixed interest rate (CPIF). While the focus of monetary policy is maintaining a stable inflation rate, it also supports the central bank’s encompassing economic policy to create sustainable growth, maintain a high level of employment, and ensure a safe and efficient payment system (Sveriges Riksbank, 2019).

The repo rate sets the borrowing or deposit rate for domestic banks for a period of seven days. By increasing the repo rate, the central bank is hoping to cool off the economy, abating inflation before it reaches hazardous levels. By decreasing the repo rate, a central bank achieves an expansionary monetary policy. The aim here is to stimulate economic growth by raising inflation levels. This ultimately leads to decreasing prices, higher levels of
consumption and investments, and an increase in aggregate demand. By lowering the returns on placing funds outside of the economy, parties are incentivized to consume, borrow, and invest. As economic activity is increased, prices rise due to the increased aggregate demand. This in turn heats up the economy pushing up inflation levels towards the target rate of 2% (Sveriges Riksbank, 2019).

The repo rate has both short-term and long-term effects. This is due to the lag effect that occurs because of the progressive effect a change in the repo rate has on an economy. As the repo rate sets the borrowing and lending rate for national banks, the short-term effects are the impact on national banks’ activities as well as the trickledown effects on households and firms. The long-run effects are the impact that a change in the repo rate has on expectations for future policy changes and national inflation levels (Sveriges Riksbank, 2019).

2.3 Nominal and Real interest Rates
In discussing interest rates, a distinction must be made between nominal and real interest rates. Real interest rates are nominal interest rates adjusted to isolate the effect of inflation. Real interest rates are more relevant when analyzing consumption and investment as it adjusts for inflation which in turn denominate the true value of money.

Real Interest Rate = Nominal Interest Rate – Inflation Rate

When discussing repo rates, nominal interest rates are the correct metric to use. While negative real interest rates have occurred often, negative nominal interest rates are a new occurrence (Sveriges Riksbank, 2016).

2.4 Negative Interest Rate Policy (NIRP)
A negative interest rate policy is when a central bank sets its interest rate below zero. This usually follows a zero-interest rate policy (ZIRP). Central banks turned to a NIRP for the first time in history between 2012 and 2016. While negative real interest rates have been implemented many times throughout modern history, nominal interest rates have never been set below zero until this decade (Eggertsson et al., 2018).

Since the 1980s, interest rates have been on the decline. The growing trend of lowering interest rates has caused worries about temporal stagnation, which is long-run stagnation at near zero levels. This can weaken central banks’ ability to steer economies towards the inflation target rate, allowing hazardous levels of inflation and economic instability (Cuba-Borda, 2019).
With several countries recently implementing a NIRP, as shown in appendix F, questions on its effect on economies and markets have been raised, leading to an increase in studies on the subject. The rationale behind the policy is that it stimulates the economy through the bank lending channel (Eggertsson et al., 2018).

2.5 Transmission Mechanism

As central banks are the only body that can influence money supply, they indirectly determine interest rates. By raising or lowering interest rates through shifts in the money supply, central banks affect investment spending and aggregate demand, which in turn affect price level and income level. This impacts national banks who are connected to their central banks via the market interest rate, but also private businesses and households who turn to national banks for loans and savings (Bystedt, 2014).

Observing the effect of changes in interest rates on economies is complicated by the existing time-lag. This lag results as an effect of a slow-churning economy that may take months or years to fully adapt to changes in monetary policy (Grip, 2014). If interest rates are increased today, then aggregate demand does not immediately decrease. The economy needs time to adapt to the changes in monetary policy, taking expectations for future changes in monetary policy into the equation.

When evaluating the transmission mechanism, looking for how changes in monetary policy affect economies and their interconnected markets, it is important to acknowledge that there are many different channels through which the transmission mechanism works and influences the economy. One must first evaluate each channel individually before looking at the final impact on the economy following a change in monetary policy. These channels include the interest rate channel, asset price channel, the exchange rate channel, and the credit channel (European Central Bank, 2019).
2.6 Foreign Direct Investment Theories

Foreign Direct Investments describes ownership of a domestic asset by a foreign entity. More specifically defined, FDI is an “Investment from one country into another that involves establishing operations or acquiring tangible assets, including stakes in other businesses” (Financial Times Lexicon, 2019). While this can include government investments in the overarching definition, FDI tends to describe private investments.

The significance of FDI can be attributed to its role in creating long-term networks between countries, making it a central element of international economic integration (OECD I Library, 2019). One positive spillover of FDI are technology transfers between countries, acting as an important catalyst for economic development. Regarding the determinants of FDI, there exists numerous theories on the subject that differ in their conclusions. Today, no one unifying theory conclusively defines the determinants of FDI flows from one country into another, though there are interesting approaches to how to tackle this issue.

One such approach is the theory by Stephen Hymer suggesting that there would be no foreign direct investments if perfect competition existed in the market. As local firms should access information quicker, their advantage would lead to barriers for foreign actors to enter the market. Hymer’s conclusion is that foreign direct investments are a result of an imperfect market in which foreign firms must possess certain advantages (Hymer, 1977). The internationalization theory builds on Hymer’s proposed FDI determinants, arguing that FDI
takes place if the benefit gained from firm-specific advantages outweigh the relative costs of operations in the foreign country (Denisia, 2010).

Another approach is the product life-cycle theory by Raymond Vernon which worked to explain American foreign direct investments made after World War 2 (Ayal, 1981). According to the theory, as time passes, the production advantages of exporting countries develop and subsequently pass, leading to an inverse relationship where the developing countries who once imported the good now instead export. This change in competitive advantage led to American firms performing production activities in foreign countries in an effort to keep market shares, leading to an increase in FDI (Denisia, 2010).

Adding another layer to the discussion of FDI determinants is the theory of exchange rates, which highlights the influence of uncertainty on FDI. The theory is based on an empirical analysis showing that real exchange rates are linked with FDI. However, the theory failed to explain simultaneous FDI between countries with different currencies (Denisia, 2010).

The most widely known approach to explaining why FDI occur is a combination of three different theories, called the OLI Framework and developed by John H. Dunning in 1979 (1980). The theory suggests that firms engage in FDI when three conditions are met. The first condition is ownership advantage, which entails exploitation of firm-specific asset advantages. The second condition is location advantage, entailing that a firm benefit from placing operations in a foreign country. The third condition is internalization of assets. After calculating cost-benefits, the firm must find it more advantageous investing abroad rather than outsourcing the operations to an existing foreign firm (Goederham, Grøgaard, & Nordhaug, 2013). As the location condition is the only condition linked with external factors such as country-specific natural resources, cost of transportation, cultural elements, wage levels, macroeconomic stability, and government regulations, it is the only condition that policy makers can influence in order to attract FDI inflows.

2.7 Previous Research
Regarding the subject of a negative interest rate’s impact on economic markets and metrics, our research has shown that there exists relatively little research delving into its causes and effects. This can be attributed to the monetary policy’s short implementation period; only four years since Sweden installed a negative repo rate. Furthermore, the determinants of foreign direct investments are still relatively unknown, though extensive research has been made on certain variables in different markets. This thesis has utilized several external
2.7.1 Impact of Monetary Policy Uncertainty and Banking Stability on Inward FDI
Claudiu Albulescu and Adrian Ionescu (2018) analyzed the long-run relationship between monetary policy and banking stability. The paper specifically sought to understand the relationship between FDI inflows and a country’s financial situation. In total, 16 EU countries were analyzed between 2001 and 2015 using OECD statistics. While traditional theories of FDI determinants tend to focus on the structure, size, and institutional quality of the host country, Albulescu and Ionescu instead looked at the financial characteristics of the host country, specifically access to investment capital.

The authors reached the conclusion that there exists a “significant long-run relationship between FDI, monetary uncertainty, banking stability, and economic growth” (Albulescu & Ionescu, 2018). The link between a country’s financial situation and its FDI inflows was broken down into monetary uncertainty having a negative effect on FDI while both banking stability and economic growth had a positive effect on FDI. The authors note that the analysis put forth in their paper can be of significant value for international investors who search for low-hanging fruit in the form of stable economies experiencing a period of boom. Furthermore, Albulescu and Ionescu (2018) highlight similarities of their research with another study of Turkey which argued that lower inflation and interest rates, among other factors, increase FDI inflows in the host nation.

2.7.2 Determinants of FDI in Developed and Developing Countries
A study by Saini and Singhania (2017) on the determinants of FDI in developed and developing countries focused on the relationship between FDI, GDP, GDP growth, interest rate differential, among other variables. The aim was to test FDI inflows in several forms of panel OLS models. The interest rate differential was measured through home country interest rate less LIBOR US. The study did not find a significant relationship between the interest rate differential and FDI. The authors explained that this occurred as FDI is a long run investment decision, and therefore is not affected by short run interest rates.

2.7.3 The Dynamic Effect of FDI and Interest Rates on GDP in South Africa
Habanabakize and Daniel Meyer (2018) examined the relationship between FDI, interest rate, and GDP in South Africa. The results from their econometric model showed a long-run
relationship between FDI, interest rate, and GDP. The authors found no significant relationship between the repo rate and FDI in South Africa during the time period analyzed. The authors attributed this lack of a link between FDI and repo rate to “rising risks associated with investments in the country” which stem from political instability, poor infrastructure, low levels of highly skilled workers, and low economic growth (Habanabakize & Meyer, 2018, p. 29). Linking their work with ongoing political developments in South Africa, the authors recommended policymakers to focus on attracting foreign investors by creating opportunities for investment and improving the South African economy. These large-scale efforts would have positive long-run effects on economic growth in South Africa.

2.7.4 Determinants of FDI Inflows in Advanced Economies

Research by the European Central Bank on the role of economic structures as determinants of FDI inflows found that a measurable relationship between the two variables. The catalyst for the research was to understand the euro area’s role in future investment channels, a consequence of increasing flows to developing countries. The authors show that the results of their analysis are that “the quality of institutions and economic structure does matter for attracting FDI inflows in advanced economies”. In particular, the authors found that stable labor and product markets for attracting foreign investors. When considering determinants of FDI inflows, the authors could strengthen their stance that variables such as labor costs, tax policies, and openness were relevant in the discussion (Dellis, Sondermann, & Vansteenkiste, 2017, p. 19).

2.8 Hypothesis

Our hypothesis is that there is an inverse relationship between Sweden’s repo rate and FDI inflows. Decreasing interest rates should attract more foreign investments into the country as an expansionary monetary policy should signal to investors that the economic development is steered towards growth. Lower interest rates also incentivize consumption and investment while making it easier to borrow, all conducive to reaping higher returns on investments for both domestic and foreign investors.
3. Method

To test the relationship between Sweden’s repo rate and its FDI, several complementing methods were used to understand the subject, test the hypothesis, and analyze for significant results.

3.1 Literature review

While our concluding result and analysis leaned heavily on regressions, tests, and quantitative data, time and energy were invested in finding existing research which gave us insight into the topics discussed in this thesis.

3.2 Quantitative Research

Our quantitative research was designed to collect accurate data on variables relevant for our research question and analyze them with several econometric means. Data was gathered primarily from respective central bank’s database, the World Bank, and the OECD. Other sources were used to verify the accuracy of the data. Since we are measuring both time series and cross-section country effects, our data is organized into panel data. Due to the absence of several datapoints, the panel data is unbalanced.

In order to find patterns of significance in our data, we have run a series of regressions, the main one being an Ordinary Least Squares (OLS) regression.

Following our OLS regression, we have stress-tested our results with several diagnostics tests aimed at finding spuriousness or hazardous symptoms in the data. These are discussed in section 3.3, Methodology.

The empirical model used in our quantitative analysis is as follows:

$$ FDI_{it} = \beta_0 + \beta_1 FX_{it} + \beta_2 GDP\ Growth_{it} + \beta_3 INFL_{it} + \beta_4 OPENNESS_{it} + \beta_5 R&D\ Exp_{it} + \beta_6 RATE_{it} + \beta_7 TARIFF_{it} + \beta_8 TAX_{it} + \beta_9 WAGE_{it} + \varepsilon_{it} $$(1)

\( \beta_0 = \) intercept  \\
\( \varepsilon_{it} = \) error term  \\
\( i = \) cross-sectional identifier (country 1, 2, …, 16)  \\
\( t = \) time series data (year 2006, 2007, …, 2017)

The variable $FDI$ is our dependent variable while the variables $FX$, $GDP\ Growth$, $INFL$, $OPENNESS$, $R&D\ Exp$, $RATE$, $TARIFF$, $TAX$, and $WAGE$ are our independent variables. More information about the variables used in our analysis is presented in section 4, Data.
3.3 Methodology

Several diagnostics tests were performed on the empirical model to discover any notable characteristics in the data.

Prior to running our data through the main OLS regression, we tested the selection of variables for stationarity. The presence of non-stationarity in variables is a concern for successful analyses as it is an indicator of spurious relationships between variables (Gujarati & Porter, 2009). Due to the structure of our data being panel data, we used a Levin, Lin, and Chu unit root test. The results gave evidence of stationarity (see appendix A), therefore no variables were lagged.

Following the execution of a Levin, Lin Chu unit root test, we ran the data through our main OLS regression using the empirical model presented above (see equation 1). Several versions of the model were run in order to gain insight into our results and truly understand the links between different variables. The results gave evidence of autocorrelation (see the Durbin Watson value in appendix B).

To check for heteroscedasticity in our data, each variable was analyzed in its scatter plot form (see appendix E). The purpose of testing for heteroscedasticity is to make sure that the disturbance term is homoscedastic. In the event of heteroscedasticity, the OLS estimator would be unbiased but not efficient (Gujarati & Porter, 2009). The results gave signals of heteroscedasticity.

The results from the first variations of the empirical model (see appendix B) showed several variables with non-significant p-values at the 5% level. Therefore, we ran an OLS regression including only the significant variables (see appendix C). The Durbin-Watson statistics from the two regressions were both below 2 but close to 0, indicating positive autocorrelation (see appendices B and C).

Due to the presence of both autocorrelation and heteroscedasticity, the use of a HAC Newey-West robust standard error estimator was warranted. Newey-West estimators take the issue of autocorrelation and heteroscedasticity into account and corrects for them (IHS Global Inc., 2015). The results from these regressions are presented and discussed in section 5, Result.

The variable RATE is our focus point for this thesis. Therefore, a Granger Causality test was run to discover any causality between the dependent variable FDI and RATE. The results are presented and discussed in section 5, Result.
To round out our analysis, a Stepwise regression without robust standard errors was run on our variables. This runs variables in an automatic selection, using p-values as criterion. A Stepwise (forward) regression estimates the variables one at a time, eliminating those whose p-value exceeds a maximum criterion (Eviews, 2019). The output from the Stepwise regression validated our choice of variables for the analysis (see appendix D).
4. Data

The variables used in our analysis of the relationship between Sweden’s repo rate and its FDI are as following: FDI, FX, GDP Growth, INFL, OPENNESS, R&D Exp, RATE, TARIFF, TAX, and WAGE. FDI inflows is our dependent variable as its relationship to the other variables is what we want to discover. Our independent variables are FX, GDP Growth, INFL, OPENNESS, R&D Exp, RATE, TARIFF, TAX, and WAGE. The independent variables were chosen due to their relevance in the discussion of monetary policy, repo rate, and FDI. This selection was supported by our literature review.

Our study will include data from a time period of 12 years, specifically 2006 to 2017. The time span was chosen as it allows a thorough analysis of national markets both before and after the implementation of a negative repo rate while also taking into account the recession of 2008. Geographically, we are primarily focusing on Sweden. However, as previously stated, we are including data from 16 countries to strengthen our analysis of the relationship between repo rate and FDI. The countries included can be found in appendix F. All countries are classified as OECD countries. By selecting a wide but concise list of data points, we hope to better understand how Sweden’s NIRP has impacting its economy, specifically FDI.

4.1 Dependent Variable

Our dependent variable is FDI which denotes net foreign direct investment inflows. All data used was gathered from the World Bank’s database and is measured in net inflows of 100 million USD from foreign investors as a part of a country’s balance of payment (The World Bank, 2019). Broadly speaking, Sweden’s FDI between 2006 and 2017 have been relatively low compared with the average of our 16 countries (see figure 2). In 2014, Sweden’s FDI was negative which means that divestments were greater than investments.
Figure 2. Sweden’s net FDI inflows compared with the average net FDI inflows of the 16 countries included in our model

Source: Data retrieved from The World Bank (2019).

Foreign Direct Investments is a topic that is earning greater interest in specific areas of economic research. One of the attraction points to this subject is that the determinants of FDI are still relatively inconclusive. The significance of FDI is that it plays a large role in economic development, of significance when regarding the growth of developing countries. The benefits of attracting FDI include positive spillovers such as high-quality jobs, technology spillovers, and improved economic conditions (Saini & Singhania, 2017).

4.2 Independent Variables

In this section we will present our independent variables.

FX

The variable FX denotes a country’s exchange rates, which give a relative measure of the strength of a national currency compared with a foreign currency (OECD, 2019). All data used was collected from the OECD’s database and is measured in the national currency’s relative value to one USD. The Swedish Krona has experienced both appreciation and depreciation during the last 20 years. Coinciding with the implementation of a negative interest rate policy, the Swedish Krona depreciated sharply, but has stayed relatively stable.
since the initial shock though the general trend is negative (OECD, 2019); (Sveriges Riksbank, 2019).

Imperfect markets are one gravity that has been found to explain why exchange rates affect FDI. Economics published research in 1991 which found information imbalances between interconnected markets caused foreign financing to be more expensive than domestic financing. In turn, a depreciation of the domestic currency causes the relative value of domestic financing to diminish, leading to foreign investments in domestic assets (Stein & Froot, 1991). This was complemented by a 1992 study which presented evidence that relative wealth, not relative labor costs, affect inward foreign direct investments (Klein & Rosengren, 1992). Both sources highlight the importance that imperfect markets play in understanding FDI, noting that foreign investors can buy “another country’s assets and technologies cheaply when its currency is weak” (Mariel & Pankova, 2010). Other underlying gravities include the influence of profits (Buch & Kleinert, 2006), the influence of firm activity (Chen, Rau, & Lin, 2005), future expectations following shocks (Chakrabarti & Schoinick, 2002), and volatility (Goldberg & Kolstad, 1995).

**GDP Growth**

The variable GDP Growth denotes annual GDP growth. All data used was collected from the World Bank’s database and is measured in the annual GDP growth as a percentage of total GDP (The World Bank, 2019). Sweden’s GDP growth has generally followed the same patterns as the global average, with some variations during the past decades. In 2017, the World Bank recorded GDP growth of 2.11% in Sweden, slightly lower than the world average of 3.15% (The World Bank, 2019).

GDP Growth’s role as a determinant of FDI has become increasingly interesting for those studying the flow of investments from developed countries to developing countries. Investors search for low-hanging fruit where returns can be maximized at a certain risk (Berk & DeMarzo, 2017). As such, stable economies going through periods of growth are important variables for some investors (Dellis, Sondermann, & Vansteenkiste, 2017).

**Inflation**

Inflation measures the “erosion of living standards” (OECD, 2019). All data was gathered from the World Bank’s database and is measured in annual growth rate (The World Bank,
In 2017, Sweden’s inflation levels were at 1.79%, an increase compared with 2015’s 0.05%, a noticeable change in inflation over time (The World Bank, 2019).

A low inflation rate has been shown to attract foreign direct investment. Low levels of inflation are indicators of the central bank implementing an expansionary monetary policy. Investors searching for low-hanging fruit in areas of growth would thereby attract to low inflation levels (Asiamah, Ofori, & Afful, 2019).

**Openness**

The variable Openness denotes trade’s share of a country’s GDP. More specifically, this represents the sum of imports and exports as a percentage of total GDP, reflecting the openness of an economy to international trade channels (Saini & Singhania, 2017). All data is gathered from the World Bank’s database and is measured in percent of GDP (The World Bank, 2019). According to the data given by the World Bank, Sweden’s trade as a percent of GDP was 87.01% while the world average was 57.85% (The World Bank, 2019). Sweden has traditionally pursued an open environment that is inducive for strong channels of trade. According to the Economic Complexity Index’s report from 2017, Sweden is the world’s 31st largest exporter, with exports worth 143 billion USD, while it imported 141 billion USD. The country’s net trade balance for the year was 2.28 billion USD (Observatory of Economic Complexity, 2019).

A 2017 working paper published by the European Central Bank confirmed earlier research that argues that variables such as openness, tax rates, and labor costs were determinants of FDI inflows (Dellis, Sondermann, & Vansteenkiste, 2017). This has been further strengthened by research into specific country such as Pakistan (Hakro & Ghumro, 2007) and larger geographical studies (Adinda, 2018).

**R&D Expenditure**

The variable R&D Expenditure denotes the total investments in research and development by “resident companies, research institutes, university and government laboratories, etc., in a country” (OECD, 2019). All data used was collected from the World Bank database and is measured in percentage of GDP (The World Bank, 2019). The general trend of R&D Expenditure in Sweden is one of decline, with its total share of GDP decreasing since 2003. In contrast, the global average has been marginally increasing throughout the decades (OECD, 2019). However, since 2014, the variable’s share of GDP has increased, as has total
R&D investments. The catalyst to this trend is a growing business enterprise sector, which alone saw an increase of 8.8 billion SEK in R&D expenditures during the same time span (Statistics Sweden, 2018).

R&D expenditures follows the same discussion of imperfect markets acting as an attraction point for FDI. While R&D expenditures have been shown to play less of a role than variables such as openness and exchange rates, research shows that it does affect FDI (Ablov, 2015).

**Rate**

The variable rate denotes a country’s repo rate. The repo rate is a central bank’s main monetary policy tool, setting the interest rate that banks can borrow or deposit funds for a period of seven days (Sveriges Riksbank, 2019). All data was gathered from each country’s respective central bank’s database and is measured in annual percentage (see appendix F). Despite being introduced as recently as February of 2015, Sweden has one of the longest lasting NIRPs in modern history. Denmark installed a NIRP in 2012, but the two country’s interest rates lie relatively close at -0.65% and -0.50%, respectively. Compared with the average of our analyzed countries, Sweden has a drastically lower repo rate (see figure 4). This can be attributed to the fact that only a select few countries have implemented a NIRP.

One point to highlight is that Sweden has been relatively late in increasing its repo rate, with the average decline ending around 2015, the same time that Sweden dipped below a zero-interest rate and hit negative rates (see figure 3).

*Figure 3. Sweden’s repo rate and the average repo rate of all 16 countries included*

![Rate Chart](image)

*Source: Data retrieved from each country's central bank (see appendix F).*
With a negative interest rate policy being a relatively untested monetary policy, research on its effect on economies and economic variables such as foreign direct investments are inconclusive. Albulescu and Ionescu’s (2018) paper on the long-run relationship between monetary policy and banking stability found evidence that investments in a country are affected by the perceived economic stability. This work complemented the earlier research of Coskun (2001) who argued that lower interest rates increased FDI inflows. In contrast, a study of the relationship between FDI, interest rates, and GDP in South Africa found no significant relationship between the repo rate and FDI. A systemic destabilization of South Africa’s economic development was reasoned to be the cause (Habanabakize & Meyer, 2018). Though the results of Albulescu and Ionescu’s findings compared with Habanabakize & Meyer differ, both highlight that investors search for strong, stable economies to invest in, alluding to a relationship in the right environment.

**Tariff**

The variable Tariff denotes a country’s tariff rate on all weighted goods. All data used was collected from the World Bank’s database and is measured in %. Sweden’s tariff rate is below the global average, 1.79% compared with 2.59%, respectively (The World Bank, 2019). Sweden’s tariffs are aligned with the European Union’s (EU) laws and regulations, with additional rates for non-EU trade partners such as the United States of America (The International Trade Administration (ITA), 2018).

With an increasingly globalized world in which borders are transforming from country-specific to geopolitical-specific, tariffs are emerging as important factors to FDI. This again connects to the theory that market imperfections play an important role in investment attraction, as investors search for exploitable advantages for returns. Hope is that policymakers will further connect markets by lowering barriers to trade, aligning policy with tested theory (Khan & Nawaz, 2010).

**Tax**

The variable Tax stands for corporate income tax rate, denoting the government rate that firms pay on profits. This means that foreign investors are taxed on the income earned in Sweden (PWC, 2018). All data used was collected from the OECD database and is measured in the country’s “basic central government statutory corporate income tax rate” (OECD Stat, 2019). Sweden’s current corporate tax rate is below the average EU tax rate, a decision that was put in effect by the Swedish government as recently as January of 2019 (EY, 2018).
Since 2009 when Sweden held one of the highest rates in the EU at 28%, the rate has been lowered to its present 21.4% and is expected to be lowered to 20.6% in 2021. The EU average sits at 21.5% (Reuters, 2018).

When analyzing the determinants of FDI, corporate taxes and exchange rates are viewed as the significant drivers of FDI behavior (Mariel & Pankova, 2010). In a paper from 2005, attention is brought to FDI’s diverse behavior depending on the magnitude of taxes in both the domestic and foreign country and the type of tax. The issue of double taxation is complicated, with earlier research showing that there is no way for investors to avoid taxes on earnings in foreign countries, though a country’s tax policies influence firm activity (Blonigen, 2005). De Mooij and Ederveen (2001, p. 1) studied the relationship between taxation and FDI from 2001 found that “a 1%-point reduction in the host-country tax rate raises foreign direct investment in that country by 3.3%”. Though there are variations and weaknesses when working with such large data samples, the findings of the meta-analysis support the theory that tax rates play a part in FDI behavior.

**Wage**

The variable Wage denotes labor costs, which is a measurement of average wages, taking into account the average number of employees, average labor hours, and total wages. All data used was collected from the OECD database and is measured in USD (OECD, 2019). Sweden’s labor costs are broadly in line with OECD averages (OECD Better Life Index, 2019).

The idea that labor costs would be a determinant of FDI follows the track of exchange rates in that an underlying gravity may be that investors search for low-hanging fruit as a result of imperfect markets. Custorella (2017) found that changes in labor costs encouraged FDI, supporting the theory that relative labor costs are linked with FDI. The role of wages was strengthened by an econometric analysis of FDI determinants which found that the “the factors that have the greatest effect on attracting FDI are market size, labor quality, export orientation, infrastructure, and wage rate” (Calhoun, Yearwood, & Willis, 2002, p. 17).
4.2 Descriptive Statistics

Table 1. Descriptive Statistics

<table>
<thead>
<tr>
<th>Measure</th>
<th>FDI</th>
<th>Infl</th>
<th>Rate</th>
<th>FX</th>
<th>Openness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100 Millions USD</td>
<td>%</td>
<td>%</td>
<td>NATUSD</td>
<td>% of GDP</td>
</tr>
<tr>
<td>Mean</td>
<td>417,80</td>
<td>2,01</td>
<td>2,35</td>
<td>127,93</td>
<td>80,85</td>
</tr>
<tr>
<td>Median</td>
<td>136,87</td>
<td>1,94</td>
<td>1,92</td>
<td>5,87</td>
<td>72,09</td>
</tr>
<tr>
<td>Maximum</td>
<td>5090,87</td>
<td>8,72</td>
<td>10,00</td>
<td>1276,93</td>
<td>169,84</td>
</tr>
<tr>
<td>Minimum</td>
<td>-249,26</td>
<td>-1,35</td>
<td>-0,75</td>
<td>0,50</td>
<td>24,49</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>60,89</td>
<td>0,12</td>
<td>0,15</td>
<td>20,91</td>
<td>2,55</td>
</tr>
<tr>
<td>Skewness</td>
<td>3,34</td>
<td>0,71</td>
<td>1,06</td>
<td>2,64</td>
<td>0,77</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>11,79</td>
<td>1,10</td>
<td>1,01</td>
<td>6,02</td>
<td>0,19</td>
</tr>
</tbody>
</table>

| Number of countries | 16 | 16 | 16 | 16 | 16 |
| Observations       | 192 | 192 | 183 | 192 | 192 |

<table>
<thead>
<tr>
<th>Measure</th>
<th>Tax</th>
<th>Wage</th>
<th>R&amp;D Exp</th>
<th>Tariff</th>
<th>GDP Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>USD</td>
<td>% of GDP</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Mean</td>
<td>23,45</td>
<td>37311,85</td>
<td>2,10</td>
<td>2,40</td>
<td>2,17</td>
</tr>
<tr>
<td>Median</td>
<td>24,00</td>
<td>38246,75</td>
<td>1,78</td>
<td>1,88</td>
<td>2,30</td>
</tr>
<tr>
<td>Maximum</td>
<td>35,00</td>
<td>62616,22</td>
<td>4,43</td>
<td>8,67</td>
<td>7,03</td>
</tr>
<tr>
<td>Minimum</td>
<td>8,50</td>
<td>15172,01</td>
<td>0,31</td>
<td>0,49</td>
<td>-6,60</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0,46</td>
<td>954,84</td>
<td>0,09</td>
<td>0,11</td>
<td>0,17</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0,45</td>
<td>0,13</td>
<td>0,23</td>
<td>2,32</td>
<td>-1,09</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>0,09</td>
<td>-0,95</td>
<td>-1,09</td>
<td>4,95</td>
<td>2,63</td>
</tr>
</tbody>
</table>

| Number of countries | 16 | 16 | 16 | 16 | 16 |
| Observations       | 192 | 192 | 162 | 190 | 192 |

Table 1 offers descriptive statistics of the variables included in our analysis. The number of observations is 192 with exceptions for RATE, R&D EXP, and TARIFF who had 183, 162, and 190 observations, respectively. This is a result of incomplete datasets from the sources used. Incomplete data is discussed further in section 1.2, Delimitations.

The variables FDI and FX are shown to have outliers, based off the relatively large standard deviations and wide range of minimum and maximum values. The presence of outliers is strengthened by the large difference between mean and median. The variable GDP Growth also exhibits a wide range but does not have a large difference in its central values.

The variables RATE and INFL show similar values, explained by the nature of the variables, where the repo rate is a tool for steering inflation (Sveriges Riksbank, 2019).
### 4.3 Correlation Matrix

**Table 2. Correlation Matrix**

<table>
<thead>
<tr>
<th></th>
<th>FDI</th>
<th>Infl</th>
<th>Rate</th>
<th>FX</th>
<th>Openness</th>
<th>Tax</th>
<th>Wage</th>
<th>R&amp;D Exp</th>
<th>Tariff</th>
<th>GDP Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infl</td>
<td>0.01</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rate</td>
<td>-0.12</td>
<td>0.60</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FX</td>
<td>-0.15</td>
<td>0.16</td>
<td>0.14</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td>-0.39</td>
<td>0.08</td>
<td>0.18</td>
<td>0.11</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax</td>
<td>0.37</td>
<td>0.15</td>
<td>-0.04</td>
<td>-0.12</td>
<td>-0.61</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wage</td>
<td>0.42</td>
<td>-0.43</td>
<td>-0.42</td>
<td>-0.26</td>
<td>-0.31</td>
<td>0.01</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R&amp;D Exp</td>
<td>0.05</td>
<td>-0.40</td>
<td>-0.44</td>
<td>0.15</td>
<td>-0.14</td>
<td>0.23</td>
<td>0.47</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tariff</td>
<td>-0.16</td>
<td>0.11</td>
<td>0.11</td>
<td>0.73</td>
<td>-0.04</td>
<td>0.11</td>
<td>-0.18</td>
<td>0.19</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GDP Growth</td>
<td>-0.06</td>
<td>0.03</td>
<td>0.12</td>
<td>0.16</td>
<td>0.05</td>
<td>-0.09</td>
<td>-0.21</td>
<td>-0.04</td>
<td>0.18</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2 is our correlation matrix, used to check for multicollinearity. As mentioned in section 4.2, Descriptive Statistics, the variables `RATE` and `INFL` are strongly correlated, due to the natural link between the two variables; the repo rate is a central bank’s main policy tool for steering inflation towards the target level of 2% (Sveriges Riksbank, 2019). Table 2 also highlights the correlation between `FX` and `TARIFF` as well as `OPENNESS` and `TAX`. 
5. Result

The unit root test presented in section 3.3, Methodology showed that all variables are stationary (see appendix A). We also recognized the presence of both autocorrelation and heteroscedasticity. Following these results, the OLS regression in appendix B was run using Newey-West robust standard errors. The results are presented in table 3.

*Table 3. OLS Regression with robust standard errors*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-1865.8120**</td>
<td>893.5903</td>
<td>0.0386</td>
</tr>
<tr>
<td>FX</td>
<td>0.9538*</td>
<td>0.4908</td>
<td>0.0539</td>
</tr>
<tr>
<td>GDP Growth</td>
<td>38.7032*</td>
<td>20.5360</td>
<td>0.0615</td>
</tr>
<tr>
<td>Inflation</td>
<td>36.3340</td>
<td>43.6599</td>
<td>0.4067</td>
</tr>
<tr>
<td>Openness</td>
<td>0.4106</td>
<td>2.5831</td>
<td>0.8739</td>
</tr>
<tr>
<td>R&amp;D Expenditure</td>
<td>-201.2288**</td>
<td>85.4462</td>
<td>0.0199</td>
</tr>
<tr>
<td>Rate</td>
<td>-12.6988</td>
<td>48.0273</td>
<td>0.7918</td>
</tr>
<tr>
<td>Tariff</td>
<td>-173.1666*</td>
<td>94.8767</td>
<td>0.0701</td>
</tr>
<tr>
<td>Tax</td>
<td>67.9042**</td>
<td>26.8772</td>
<td>0.0126</td>
</tr>
<tr>
<td>Wage</td>
<td>0.0358***</td>
<td>0.0121</td>
<td>0.0037</td>
</tr>
</tbody>
</table>

R-squared 0.4205

where *, **, *** indicates significance at 0.10, 0.05 & 0.01

The results presented in table 3 show a $R^2$ value of 0.4205, meaning that roughly 42% of the variance in FDI can be explained by the independent variables. In this regression, only the variables R&D EXP, TAX, and WAGE are significant at 5% significance level. R&D EXP has a relatively large negative effect on FDI inflows, with a coefficient of –201.23. In comparison, TAX and WAGE have positive effects on FDI, with coefficients of 67.90 and 0.04, respectively.

The variable RATE, which is the focal point for this thesis, is shown to not be significant. To analyze this further, we test the causality relationship between RATE and FDI later on in this section. If we choose a significance level of 10%, all variables except INFLATION, OPENNESS and RATE are significant.

Continuing with our quantitative analysis, we ran solely the significant variables from earlier regressions (see table 3) using Newey-West robust standard errors. The results are found in table 4.
Table 4. OLS Regression with robust standard errors

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-1758.6120***</td>
<td>633.7320</td>
<td>0.0062</td>
</tr>
<tr>
<td>FX</td>
<td>0.9631**</td>
<td>0.4615</td>
<td>0.0385</td>
</tr>
<tr>
<td>R&amp;D Expenditure</td>
<td>-216.2856***</td>
<td>75.3875</td>
<td>0.0047</td>
</tr>
<tr>
<td>Tariff</td>
<td>-165.6607*</td>
<td>88.4054</td>
<td>0.0628</td>
</tr>
<tr>
<td>Tax</td>
<td>68.8162***</td>
<td>23.6460</td>
<td>0.0041</td>
</tr>
<tr>
<td>Wage</td>
<td>0.0352***</td>
<td>0.0103</td>
<td>0.0008</td>
</tr>
</tbody>
</table>

R-squared: 0.4205

where *, **, *** indicates significance at 0.10, 0.05 & 0.01

Analyzing the results in table 4, $R^2$ is the same as table 3 at 0.4205 while all included variables with the exception of TARIFF are significant at the 5% significance level. The constant is still negative and large, although smaller than in the previous regression. The R&D EXP coefficient is relatively larger but still contains a negative sign. The same is true for TAX which also is larger while keeping the same sign. In contrast, the variable WAGE has decreased marginally, though keeping the same sign. In this regression, we also have FX as a significant variable. FX has a positive effect on FDI with a positive coefficient of 0.96. The variable RATE is not included in this regression.

Next, we ran a Granger Causality test to see if the independent variable RATE Granger causes the dependent variable FDI. The results are shown in table 5.

Table 5. Granger Causality Test

<table>
<thead>
<tr>
<th>Null Hypothesis:</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RATE does not Granger Cause FDI</td>
<td>151</td>
<td>3.6592**</td>
<td>0.0281</td>
</tr>
<tr>
<td>FDI does not Granger Cause RATE</td>
<td></td>
<td>0.8101</td>
<td>0.4468</td>
</tr>
</tbody>
</table>

where *, **, *** indicates significance at 0.10, 0.05 & 0.01

Table 5 reveals that the p-value of the first null hypothesis “RATE does not granger cause FDI” is less than 0.05, meaning that we can reject the null hypothesis at 5% significance level and conclude that there is causality between the variables RATE and FDI. The second hypothesis, however “FDI does not granger cause RATE” has a p-value larger than 0.05, meaning that we do not reject the null hypothesis at 5% significance level. From our data, there is no Granger causality between FDI and RATE.
6. Analysis

Our literature review highlighted the importance of stability for increasing FDI inflows. Specifically, stability in a country’s institutions, economic structures, banks, and economic growth. The denominator for these pillars were that they induced economic growth and contributed to strong labor and product markets, each essential for attracting foreign investors (Dellis, Sondermann, & Vansteenkiste, 2017). With Sweden being described as a “stable and business-friendly regulatory environment” (A.T. Kearney, 2019) containing some of the world’s highest performing institutions, macroeconomic stability, product and labor markets, and financial systems (World Economic Forum, 2019), the attraction to foreign investors is high.

Another highlight of our literature review was the suggestion that market imperfections are a key gravity for FDI inflows. Research indicated that foreign investors actively searched for low-hanging fruit in the form of exploitable opportunities for return on investments (Khan & Nawaz, 2010). This was discussed in several research papers analyzing the determinants of FDI, linking it to variables such as inflation, repo rate, exchange rates, GDP growth, R&D expenditures, and tariffs. As the focus of this thesis is the connection between Sweden’s repo rate and FDI inflows, research linking repo rates with perceived economic stability provided direction for the research (Albulescu & Ionescu, 2018). Furthermore, it was shown that lower interest rates attracted foreign investors, thus increasing FDI inflows (Coskun, 2001). This supports the idea that repo rates act as a signal for investors that a central bank may be heading towards implementing an expansionary monetary policy in an attempt at stabilizing its economy. Since implementing a NIRP in 2015, Sweden has seen its FDI inflows increase from 8.71 billion USD to 31.53 billion USD, further supporting the link between repo rates and FDI inflows (The World Bank, 2019).

Referring to table 3, which analyzed all variables in an OLS regression using robust standard errors, the variable RATE was shown to be not significant, indicating a lack of relationship between RATE and FDI. The indication that there is no link between Sweden’s repo rate and its FDI inflows follows Habanabakize and Meyer’s analysis of South Africa which also found no significant relationship between the two variables (Habanabakize & Meyer, 2018). This result can be explained by earlier research which concluded that the disconnect between FDI and repo rates was due to FDI being a long-run investment which was ultimately unaffected by interest rate changes (Saini & Singhania, 2017).
While the variable $RATE$ was found to not be significant, our Granger Causality test suggests that there is a kind of Granger causality between the variables $RATE$ and $FDI$. Given the results of our regressions, we cannot conclusively say that there is a link between Sweden’s repo rate and its FDI inflows.

Our hypothesis at the start of this thesis was that there existed an inverse relationship between the repo rate and FDI in which a decreasing repo rate would result in increasing FDI inflows. The catalyst for this direction in thought was previous research conducted in Turkey on the determinants of FDI which concluded that there was an inverse relationship between the two variables (Coskun, 2001). While Turkey’s and Sweden’s economies differ in many aspects, like South Africa, the lack of previous research on the subject made all relevant pieces of research admissible in our construction of an understanding of the topic. Though the results of our quantitative analysis show no significant relationship between $RATE$ and $FDI$, the coefficient is negative which partially aligns with our hypothesis (see section 2.8).

While no significant relationship was found between $RATE$ and $FDI$, four variables were shown to have significant effects on $FDI$ (see table 4). This specific regression ran the variables using robust standard errors. The four variables which resulted in significant p-values were $FX$, $R&D \text{ EXP}$, $TAX$, and $WAGE$.

The variable $FX$ was shown to have a relatively small but positive coefficient (see table 4), meaning an increase in $FX$ results in an increase in $FDI$. As discussed in section 4.1.2, Independent Variables, an increase in $FX$ represents a depreciation of the domestic currency against USD. Thus, as the Swedish krona depreciates, foreign direct investments Sweden would increase. This directly confirms the work of Stein and Froot (1991) who analyzed the role of information imbalances and found that a depreciation of a currency lead to the relative value of domestic financing to diminish, attracting foreign investments. The catalyst for this behavior is that the weakening of a currency allows foreign investors to purchase goods, services, and technologies for a relatively lower price due to the existence of an imperfect market (Mariel & Pankova, 2010).

The variable $R&D \text{ EXP}$ was shown to have a relatively large negative coefficient of -216.2856. This indicates that increasing investments in research and development would translate into lower FDI inflows. This result surprised us, though further inspection revealed that it does follow previous research by Mariel and Pankova (2010) who said that investors search for low-hanging fruit in the form of cheap technology investments. An increase in
domestic investments in research and development may signal to foreign investors that the existing low-hanging fruit may have been rapidly captured. Increasing domestic investments may also indicate a heating up of the economy in the form of growth, often followed by inflation and a reactionary monetary policy.

The variable \( TAX \) is shown to have a positive coefficient (see table 4). The results from the regression translate into a 1 unit increase in \( TAX \) leading to a 68.8162 unit increase in FDI inflows. The results from our regressions are contradictory to previous research. De Mooij and Ederveen (2001, p. 1) analyzed the elasticity between \( TAX \) and \( FDI \) and found that “a 1%-point reduction in the host-country tax rate raises foreign direct investment in that country by 3.3%”. With Sweden currently holding one of the OECD’s lowest tax rates and planning on reducing it further by 2021, our regression suggests FDI should decrease (Reuters, 2018). However, since 2014, Sweden’s \( FDI \) inflows have increased.

The variable \( WAGE \) is shown to have a positive coefficient (see table 4). The results indicate that a 1-unit increase in the wage level lead to a 0.0352 unit increase in \( FDI \). This positive relationship breaks the theory of cost-benefit of investing abroad (Gooderham, Grogaard, & Nordhaug, 2013), which implies that low wages would create competitive advantage for production, thus attracting foreign investors looking for stable returns. However, higher wages may be seen as an indicator of growth which has been shown to be an important factor for investment channels (Dellis, Sondermann, & Vansteenkiste, 2017).

Apart from the variables discussed above, the results suggest that the variables \( GDP \), \( GROWTH \) and \( TARIFF \) have a significant effect on \( FDI \) at a 10% significance level. The positive impact of \( GDP \), \( GROWTH \) goes in line with previous research that suggest that economic growth attracts FDI (Albulescu & Ionescu, 2018). The variable \( TARIFF \), however, has a relatively large negative impact on \( FDI \) at 10% significance level. This could be explained as trade barriers being seen as a discouragement for foreign investors since it makes trading more expensive (Khan & Nawaz, 2010).

6.1 Limitations

As with any research paper, there are limitations to the analysis presented in this thesis. One such limitation is the issue of missing data. Due to the large number of variables (10) and relatively large timespan (12 years) several sources were combed for data. There are pockets of missing data, but the total sum of data collected allowed us to conduct an analysis in our opinion. The ability to fill those pockets would strengthen the analysis, but overall the quality
is adequate. Another limitation with the analysis presented in this thesis is the lifespan of Sweden’s NIRP, implemented as recently as 2015. As this thesis is written in 2019, our greatest limitation is time. Unfortunately, this is a factor that we are unable to affect. Changes in monetary policy take time to affect every level of economies, with some research pointing to a lag-effect of up to eight years (Grip, 2014). With only four years since Sweden put its NIRP in effect, the full effect of this move may yet have come into effect, setting a limitation on the analysis of this thesis.

At the outset of our thesis, our goal was to analyze the connection between repo rates and FDI in Sweden. However, due to the continuing issue of time, there wasn’t a strong enough foundation to stand on if only using data from Sweden. Thus, we were advised to include data from other countries to ensure an unbiased and deep analysis of the issue. However, at the conclusion of our work there was no analysis which isolated Sweden from the aggregated data. Thus, the purpose and the analysis are misaligned.
7. Conclusion

The purpose of this thesis was to examine the relationship between Sweden’s monetary policy and foreign investments. More specifically, we sought to understand if the negative interest policy implemented in 2015 has had an effect on net FDI inflows.

Given the results of our quantitative analysis, we cannot conclude that there is a link between Sweden’s repo rate and its FDI inflows. While the results of our regressions show no significant relationship between the two variables, our Granger Causality test did indicate that \( RATE \) does Granger cause \( FDI \). In regard to the other variables included in the analysis, four were found to have an effect on FDI inflows: \( FX \), \( R&D \) EXP, \( TAX \) and \( WAGE \). While some relationships to FDI follow established theories and previous research, others did not. This could be an issue with the data used in our analysis.

Looking ahead, future research on the determinants of FDI in Sweden should focus on the effect of tax policies and exchange rates as they were heavily discussed in previous research and often found to be the main drivers of FDI growth. With a looming economic recession and monetary policy still in its infancy, more data will become available allowing for more accurate and deeper research into the relationship between repo rates and foreign direct investments. With relatively little experience with such a monetary policy, policymakers should invest in research that works to understand how future conditions will strain the foundations of a NIRP. A deeper knowledge on its structure would increase Sweden’s preparedness for when an economic recession occurs.

As relatively little time has passed since the 2008 financial crisis and the implementation of the world’s first NIRPs, there is a narrow and weak foundation to build a thesis on. Bachelor thesis tend to follow established channels of research and strengthen existing structures of thought. The authors of this thesis decided to forgo the safety of established research topics and instead tread into the unknown plains of negative interest rates. This involved a great deal of risk as ideas, thoughts, analysis, and conclusions had to be sewed together using various sources due to the lack of singular, proven models and theories. Our hope is that the results of our paper can act as a catalyst for future research and add some piece of value to the discussion. Whatever flaws that this thesis contains, we hope that the daring adventure of attempting to tackle this complex issue outweigh the negatives.

In regard to the value that this paper offers policymakers, our conclusions may not yield answers to how to act in future times of critical decision making. However, if central banks
are going to continue to turn to negative interest rates, then we urge economists and politicians to invest in researching the causes and effects of all the known variables so to understand how markets will mature over time. We look forward to reading future essays on the subject and learning what the true determinants of FDI are as well as the effects that negative interest rates have on economies, including but not limited to foreign investments into the country.
8. References


9. Appendix

Appendix A. Panel Unit Root Test: Levin, Lin & Chu Test

Table 6. Common Unit Root Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>LLC Statistics</th>
<th>P-value</th>
<th>Stationary (at 5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fdi</td>
<td>-9.26212***</td>
<td>0.0000</td>
<td>Yes</td>
</tr>
<tr>
<td>GDP Growth</td>
<td>-10.4304***</td>
<td>0.0000</td>
<td>Yes</td>
</tr>
<tr>
<td>FX</td>
<td>-2.4161***</td>
<td>0.0078</td>
<td>Yes</td>
</tr>
<tr>
<td>Inflation</td>
<td>-7.1172***</td>
<td>0.0000</td>
<td>Yes</td>
</tr>
<tr>
<td>Openness</td>
<td>-2.3175**</td>
<td>0.0102</td>
<td>Yes</td>
</tr>
<tr>
<td>R&amp;D Expenditure</td>
<td>-3.7196***</td>
<td>0.0001</td>
<td>Yes</td>
</tr>
<tr>
<td>Rate</td>
<td>-22.5212***</td>
<td>0.0000</td>
<td>Yes</td>
</tr>
<tr>
<td>Tariff</td>
<td>-7.6621***</td>
<td>0.0000</td>
<td>Yes</td>
</tr>
<tr>
<td>Tax</td>
<td>-1.1856**</td>
<td>0.0347</td>
<td>Yes</td>
</tr>
<tr>
<td>Wage</td>
<td>-2.7126***</td>
<td>0.0033</td>
<td>Yes</td>
</tr>
</tbody>
</table>

H₀: The variable has a unit root = non-stationary
H₁: The variable does not have a unit root = stationary

where *, **, *** indicates significance at 0.10, 0.05 & 0.01

Appendix B. OLS Regression 1

Table 7. OLS Regression 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-1865.8120</td>
<td>525.7190</td>
<td>-3.5491</td>
<td>0.0005</td>
</tr>
<tr>
<td>FX</td>
<td>0.9538</td>
<td>0.3407</td>
<td>2.7998</td>
<td>0.0058</td>
</tr>
<tr>
<td>GDP_GROWTH</td>
<td>38.7032</td>
<td>24.7470</td>
<td>1.5640</td>
<td>0.1200</td>
</tr>
<tr>
<td>INFL</td>
<td>36.3340</td>
<td>43.5373</td>
<td>0.8345</td>
<td>0.4054</td>
</tr>
<tr>
<td>OPENNESS</td>
<td>0.4106</td>
<td>2.1779</td>
<td>0.1885</td>
<td>0.8507</td>
</tr>
<tr>
<td>R_D_EXP</td>
<td>-201.2288</td>
<td>65.2008</td>
<td>-3.0863</td>
<td>0.0024</td>
</tr>
<tr>
<td>RATE</td>
<td>-12.6988</td>
<td>37.5030</td>
<td>0.3386</td>
<td>0.7354</td>
</tr>
<tr>
<td>TARIFF</td>
<td>-173.1666</td>
<td>60.5406</td>
<td>-2.8603</td>
<td>0.0049</td>
</tr>
<tr>
<td>TAX</td>
<td>67.9042</td>
<td>13.8726</td>
<td>4.8948</td>
<td>0.0000</td>
</tr>
<tr>
<td>WAGE</td>
<td>0.0358</td>
<td>0.0063</td>
<td>5.6669</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared        | 0.4205       | Mean dependent var | 444,6276 |
Adjusted R-squared | 0.3840      | S.D. dependent var  | 895,3285 |
S.E. of regression | 702.7108    | Akaike info criterion | 16,0109 |
Sum squared resid  | 70613744    | Schwarz criterion   | 16,2090 |
Log likelihood    | -1214.8330  | Hannan-Quinn criter. | 16,0914 |
F-statistic       | 11,5277     | Durbin-Watson stat  | 0.4653  |
Prob(F-statistic) | 0.0000       |                     |         |
Appendix C. OLS Regression 2

Table 8. OLS Regression 2

Dependent Variable: FDI

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-1758.6120</td>
<td>276.4307</td>
<td>-6.3619</td>
<td>0.0000</td>
</tr>
<tr>
<td>FX</td>
<td>0.9631</td>
<td>0.3249</td>
<td>2.9647</td>
<td>0.0035</td>
</tr>
<tr>
<td>R_D_EXP</td>
<td>-216.2856</td>
<td>56.7669</td>
<td>-3.8101</td>
<td>0.0002</td>
</tr>
<tr>
<td>TARIFF</td>
<td>-165.6607</td>
<td>57.8774</td>
<td>-2.8623</td>
<td>0.0048</td>
</tr>
<tr>
<td>TAX</td>
<td>68.8162</td>
<td>11.0324</td>
<td>6.2376</td>
<td>0.0000</td>
</tr>
<tr>
<td>WAGE</td>
<td>0.0352</td>
<td>0.0053</td>
<td>6.6425</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R-squared</td>
<td>0.4093</td>
<td>Mean dependent var</td>
<td>445,5855</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.3901</td>
<td>S.D. dependent var</td>
<td>878,9947</td>
<td></td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>686.4729</td>
<td>Akaike info criterion</td>
<td>15,9378</td>
<td></td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>72571743</td>
<td>Schwarz criterion</td>
<td>16,0531</td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-1269.0230</td>
<td>Hannan-Quinn criter.</td>
<td>15,9846</td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>21.3378</td>
<td>Durbin-Watson stat</td>
<td>0.4639</td>
<td></td>
</tr>
</tbody>
</table>

Appendix D. Stepwise Regression

Table 9. Stepwise Regression

Dependent Variable: FDI

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAGE</td>
<td>0.0371</td>
<td>0.0054</td>
<td>6.8484</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>-1955.0400</td>
<td>302.6870</td>
<td>-6.4590</td>
<td>0.0000</td>
</tr>
<tr>
<td>R_D_EXP</td>
<td>-200.0377</td>
<td>60.4429</td>
<td>-3.3095</td>
<td>0.0012</td>
</tr>
<tr>
<td>TAX</td>
<td>67.9757</td>
<td>11.2944</td>
<td>6.0186</td>
<td>0.0000</td>
</tr>
<tr>
<td>FX</td>
<td>0.9351</td>
<td>0.3295</td>
<td>2.8381</td>
<td>0.0052</td>
</tr>
<tr>
<td>TARIFF</td>
<td>-174.6863</td>
<td>58.3374</td>
<td>-2.9944</td>
<td>0.0032</td>
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<tr>
<td>GDP_GROWTH</td>
<td>37.0188</td>
<td>23.6612</td>
<td>1.5645</td>
<td>0.1198</td>
</tr>
<tr>
<td>INFL</td>
<td>29.3993</td>
<td>36.5833</td>
<td>0.8036</td>
<td>0.4229</td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R-squared</td>
<td>0.4206</td>
<td>Mean dependent var</td>
<td>445,5855</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.3939</td>
<td>S.D. dependent var</td>
<td>878,9947</td>
<td></td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>684.3284</td>
<td>Akaike info criterion</td>
<td>15,9435</td>
<td></td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>71182413</td>
<td>Schwarz criterion</td>
<td>16,0972</td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-1267.4770</td>
<td>Hannan-Quinn criter.</td>
<td>16,0059</td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>15.7608</td>
<td>Durbin-Watson stat</td>
<td>0.4674</td>
<td></td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.0000</td>
<td></td>
<td></td>
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</tbody>
</table>

*Note: p-values and subsequent tests do not account for stepwise selection.
Appendix E. Graphical detection of Heteroscedasticity

Figure 4. Graphical Heteroscedasticity Test
### Appendix F. Country List

#### Table 10. Country List

<table>
<thead>
<tr>
<th>Country</th>
<th>Source for the variable rate</th>
<th>NIRP</th>
<th>If yes; years</th>
<th>Rate in 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>Bank of Canada</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chile</td>
<td>Central Bank of Chile</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Czech National Bank</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Denmark</td>
<td>Danmarks Nationalbank</td>
<td>Yes</td>
<td>2012-present</td>
<td>-0.65</td>
</tr>
<tr>
<td>Hungary</td>
<td>Central Bank of Hungary</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Israel</td>
<td>Bank of Israel</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Japan</td>
<td>Bank of Japan</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Korea, Rep.</td>
<td>Bank of Korea</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mexico</td>
<td>Banco de Mexico</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Reserve Bank of New Zealand</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Norway</td>
<td>Norges Bank</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Poland</td>
<td>National Bank of Poland</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sweden</td>
<td>Sveriges Riksbank</td>
<td>Yes</td>
<td>2015-present</td>
<td>-0.5</td>
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<tr>
<td>Switzerland</td>
<td>Swiss National Bank</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Bank of England</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>United States</td>
<td>Macrotrends LLC</td>
<td>No</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*All sources are included in the reference list*