B.Sc. in Business Administration

The Effects of Foreign Exchange Rate Movements on the Stock Prices of Eimskip, Icelandair and Marel

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Declaration of Research Work Integrity

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By signing the present document, we confirm and agree that we have read RU’s ethics code of conduct and fully understand the consequences of violating these rules regarding our thesis.

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Abstract

The aim of this study was to analyze the effects of exchange rate movements on the stock prices of Eimskip, Icelandair and Marel. The period analyzed spans eight years, from 2010 to 2018, during which capital controls are in place. Regression analysis was used in the study to examine the effects of exchange rate movements on the stock prices of the three companies. The results of the study showed that exchange rate movements do not affect Eimskip’s stock price at all and while some exchange rates are statistically significant for Icelandair and Marel, the models of those currencies explain almost nothing regarding the movements in stock prices of the companies. The results, furthermore, indicate an inefficient market as investors are slow to incorporate the fluctuation of the ISK when calculating companies’ values. The study has some limitations caused by the capital controls, market inefficiency, limitations on individual companies and omitted variable bias.
Preface

This thesis is a part of a B.Sc. degree in Business Administration at Reykjavík University. The thesis accounts for 12 ECTS credits and was written during the spring semester of 2018. The instructors of this thesis were Dr. Már Wolfgang Mixa and Dr. Ewa Ryszarda Lazarczyk Carlson. The authors would like to thank them for great advice and guidance with the thesis. The authors would also like to thank Mariusz Zembrowski for his help to polish the thesis.
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1 Introduction

The Icelandic economy has undergone some turbulent episodes since the year 2000. There was a great upswing in the Icelandic economy during the period of 2003 until 2008. This pertains to the events surrounding the financial crisis in 2008. Iceland is highly dependable on foreign trade. In 2016, imports to Iceland counted 43% of the country’s GDP while the exports were 49%. In comparison, imports in the USA counted 15% of the country’s GDP and exports counted 12%, while imports in the UK counted 30% and exports 28% of the country’s GDP (Organization for Economic Co-operation and Development, 2018).

Due to the high degree of foreign trade in Iceland, the ISK plays a major role when it comes to the prosperity of Icelandic companies that engage in foreign trades. In recent years, this has caused difficulties for some companies in Iceland that depend on export. Rapid growth in tourism has led to increased capital inflows, resulting in 27.62% appreciation of the ISK for the last 8 years.

In a recent conference held by the Icelandic Chamber of Commerce and Confederation of Icelandic Enterprise in 2018, Pétur Halldórsson, CEO of Nox Medical, expressed concerns regarding the appreciation of the ISK since 2015. The strong ISK has resulted into what is equivalent to a 20% annual inflation over the last 40 months’ period for Nox Medical. Bragi Fjalldal, CEO of Meniga, agreed with Pétur on this issue. The main concerns of Meniga are their competitiveness on a global scale (Þórðarson, 2018). In a news article, Katrín Pétursdóttir, CEO of Lýsi, said that the appreciation of the ISK has created significant problems for the company’s operating environment (Gunnarsson, 2017).

To verify this, one way is to look at annual or quarterly reports of the companies and see if there is a foreign currency trade loss/gains. Another way is to compare the stock prices to exchange rate movement that a company is exposed to. The Efficient Market Hypothesis states that stock prices movements incorporate all new information about companies (Bodie, Kane & Marcus, 2014). If a company engages in foreign trade, then a change in the exchange rate should be viewed as new information about the future costs and revenues of a company and the new exchange rate should be reflected in the stock price movement.

A study conducted by Wong (2017) showed evidence of a high correlation between exchange rate market and stock market. Kollias, Mylonidis and Paleologue (2012) analyzed the relationship between the EUR/USD exchange rate and the two European stock indexes, FTSE Eurotop 300 and FTSE ETX All-share. Their results showed that the exchange rate does
not influence the stock indexes in the long term. The exchange rate, however, positively affects the indexes in the short term under normal circumstances.

Kattering (2009) looked at the relationship between the stock indexes Dow Jones Industrial Average and Standard and Poor’s 500 and 8 USD cross exchange rates and found limited impact of exchange rates on the stock indexes. The study indicated that the stock indexes are currency insensitive and that the relationship changes between different time periods.

Baranidharan (2016) studied the relationship between the BSE sensex return stock index and the return of EUR, GBP, USD and JPY. Baranidharan concluded that the effects of exchange rate movements on stock prices are significantly negative when the exchange rate appreciates. Tsagkanos and Siriopoulos (2013) agree with Baranidharan (2016). Their results suggest a causal relationship from stock prices to exchange rates that is long-run in the EU and short-run in the USA.

Jalbert (2014) studied the relationship of the stock indexes Dow Jones Industrial Average, NASDAQ Composite, NASDAQ 100, S&P 400, S&P 500, Philadelphia Housing, Russell 3000 RUA and Russell 1000 RUI and the Dollar Index. The results showed negative correlation between the stock indexes and the Dollar Index.

The previous studies show inconsistency and therefore drawing any conclusions about the Icelandic market would be imprudent. Our gathering of such studies indicates, however, that such research has not been conducted in Iceland.

The aim of this research is to study whether the stock prices of three listed Icelandic companies are affected by changes in the exchange rates that these companies are exposed to.

Our focus will be on the three large companies Eimskip, Icelandair and Marel that weigh heavily against the OMXI8 stock index and have a high percentage of their costs and revenues in foreign currencies.

The research question of this thesis is “Are the stock prices of Eimskip, Icelandair and Marel affected by movements of foreign exchange rates of the currencies that each company is exposed to?”. Due to increased media attention and because the companies are exposed to foreign currency, it is hypothesized that exchange rate movements positively affect the stock prices of Eimskip, Icelandair and Marel.

When estimating exchange rate exposure, there are two commonly used approaches: a direct approach which involves using cash flow data or accounting-based cash flow proxies
and an indirect approach which uses historical market price data and historical exchange rate movements (Krapl & O’Brien, 2015). The research question will be answered by using the indirect approach. Linear regression models will be used to seek statistical evidence regarding the research subject, with the dependent variable being the stock price and the independent variables being the currencies.

This study is structured as follows: The first chapter discusses the foreign exchange rate market in general, exchange rate risk and three types of risk caused by currency volatility; translation exposure, transaction exposure and operating exposure. Different hedging strategies used by companies and the history of the ISK is studied, before and after the financial crisis of 2008. Other historical currency crises are also studied. The following chapter analyzes the three companies Eimskip, Icelandair and Marel with a focus set on their risk factors attributed to exchange rate exposures. The methods used to analyze the effects of foreign exchange rate movements on the three companies are then presented. The main limitations capital controls, market inefficiency and individual company limitations are discussed in the following chapter. The results are then presented for each company and the limitations of the analysis. Finally, the study ends with a discussion and conclusions.
2 The exchange rate market

The foreign exchange market is an over-the-counter market for the trading of currencies. The exchange rate for foreign currencies is determined on this market. Exchange rate is the ratio between two currencies which determines the value of a currency against another currency. The ratio determines how much it costs to purchase one unit of a currency with another currency. When countries trade, they use the exchange rate to convert prices of goods and services. Most people use currency when they purchase goods. In order to conduct a foreign trade and business, a currency needs to be exchanged. To illustrate this, a company in Iceland that imports products from Europe has to pay for the products in its local currency, often euros (EUR). In order for the Icelandic company to conduct the trade, it must exchange the ISK for EUR and uses the exchange rate to do so. As the ISK depreciates, Icelandic companies importing goods and services have to pay more for each product or service they purchase. The opposite is true if the ISK were to appreciate. Importing companies benefit from appreciation whereas exporting companies benefit when the currency depreciates.

2.1 Exchange rate risk

Exchange rate exposure is the uncertainty created by the movement in the exchange rates between the currencies. When examining exchange rate risk or any other risk of a particular financial asset, the standard deviation of the daily, weekly, monthly or yearly changes is calculated. The standard deviation means by how much each change deviates from the mean change; this is called volatility. The formula for standard deviation is as follows:

\[ \sigma = \sqrt{\frac{\sum(x - \bar{x})^2}{N}} \]

Where:
\(x\) is an observation
\(\bar{x}\) is the average of all observations
\(N\) is the numbers of observations

The risk increases as the volatility gets higher. This is because each change will deviate more from the mean.
As the exchange rates become more volatile, the operations of companies are put at risk because exchange rates affect the operation profit of companies (Lessard & Lightstone, 1986). Companies that have their income, cost, debts and other factors on the balance sheet in different currencies face exchange rate risk. An example of this risk is highlighted in a company that has income in foreign currency. Companies are exposed to three types of risk caused by currency volatility: transaction exposure, translation exposure and operating exposure (Shapiro, 2013).

2.1.1 Translation exposure

According to Shapiro (2013), translation exposure is the change in income statement items and the book value of balance sheet assets and liabilities that are caused by an exchange rate change. Companies that operate internationally will have foreign currency denominated assets and liabilities, revenues and expenses according to Shapiro. The main issue is that international companies need to have their financial statement in home currency. Both foreign currency balance sheet accounts and income statements must be converted to the home currency. Assuming such conditions, every change in the exchange rate will affect either liabilities, revenues, expenses or all of them. However, to what degree companies are affected by currency fluctuation depends on how these factors/variables are distributed.

2.1.2 Transaction exposure

Transaction exposure is the given level of risk that a company is exposed to when involved in international trade. The risk is that exchange rates will deviate after a company enters a financial obligation. When Icelandair enters into a financial obligation such as buying a certain amount of aviation fuel in the future, the company is exposed to exchange rate risk as the exchange rate in US dollars can change by the time the contract is initiated. Derivatives such as forward or future contracts can be used to minimize the short-term effects and are frequently used by international companies to hedge themselves from the uncertainty. By using a forward contract, the exchange rate can be locked in and the risk exposure can be eliminated to a certain extent (Shapiro, 2013).

2.1.3 Operating exposure

Shapiro (2013) describes operating exposure as the extent to which currency fluctuations can alter a company’s future operating cash flows, that is, its future revenues and costs. All companies, even domestic firms that have all their cash flows denominated in home currency, have operating exposure if their revenue or costs are affected by currency fluctuation. Unexpected exchange rate changes can have great impact on a company’s competitive situation.
A study conducted by Priestley and Ødegaard (2007) shows evidence that US industries are exposed to changes in exchange rate. Furthermore, companies with substantial international trade have higher significant exposure, which relates more to operating exposure. The exposure coefficients change in regard to trade, tariffs and quotas, international competition, hedging and firm behavior.

*Table 1 - Strong vs weak domestic currency. Shapiro, 2013, p 75*

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<th>Strong domestic currency</th>
<th>Disadvantages</th>
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<td>Prices of imported goods, services and raw material are lower, benefiting consumers.</td>
<td>Domestic exports become less competitive in foreign markets.</td>
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<tr>
<td>Lower import prices help hold down prices of competing domestic products, which reduces domestic inflation.</td>
<td>Domestic firms face more competition domestically from lower-priced foreign imports.</td>
</tr>
<tr>
<td>Cost to domestic firms and individuals of foreign investment is lower.</td>
<td>Domestic country loses jobs in the traded-goods sector.</td>
</tr>
<tr>
<td>Foreign capital attracted to a strong currency leads to a lower domestic interest rates.</td>
<td>Higher cost of operating domestically reduces foreign direct investment domestically, slowing job creation by foreign firms.</td>
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<th>Weak domestic currency</th>
<th>Disadvantages</th>
</tr>
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<tbody>
<tr>
<td>Domestic exports become more competitive in foreign markets.</td>
<td>Prices of imported goods, services and raw materials are higher, hurting consumers.</td>
</tr>
<tr>
<td>Domestic firms are more competitive domestically against higher-priced foreign imports.</td>
<td>Reduced price competition of domestic products, which increases domestic inflation.</td>
</tr>
<tr>
<td>Domestic country gains jobs in traded-goods sector. Lower cost of operating domestically increases foreign direct investment domestically, boosting job creation by foreign firms.</td>
<td>Cost to domestic firms and individuals of foreign investment is higher. Foreign capital fleeing a weak currency leads to higher domestic interest rates.</td>
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Table 1 summarizes how a strong and a weak domestic currency can affect foreign trade domestically. When the domestic currency is strong, it becomes cheaper to import goods which should lead to lower prices and reduce domestic inflation. This also means that investing abroad costs less and should attract foreign capital and lead to lower domestic interest rates. While the import is doing well with strong currency, the export becomes less competitive in foreign markets and the domestic firms face more competition from lower-priced foreign imported goods. A weak domestic currency means the exact opposite.

The degree to which a company is exposed to exchange rate risk is equal to how much the company will be affected by a change in exchange rate. Exposure is defined as the amount of foreign currencies which represents the sensitivity of the future, real domestic-currency value of any physical or financial asset to random variations in the future domestic purchasing powers of these foreign currencies at some specific future date (Adler & Dumas, 2014).
2.2 Hedging the exchange rate risk

This section will present two widely used hedging strategies to limit or eliminate risk of financial securities such as currencies.

2.2.1 Natural Hedging

Natural hedging is one out of two hedging strategies used to reduce exchange rate risk that a company is exposed to. Natural hedging is when a company has optimized its proportion of different currencies related to expenses and revenues. Usually, such companies operate on a global scale and have revenues and expenses in several currencies. Therefore, a company holds a natural hedge on its currency risk if it also generates expenses in that currency.

2.2.2 Derivatives

A derivative can be defined as a financial instrument whose value depends on and derives from the values of underlying assets. Very often, the variables’ underlying derivatives are prices of traded assets. A stock option, for example, is a derivative whose value is dependent on the price of a stock. The types of derivatives are many, such as forward contracts, swaps, options, and other derivatives that are entered by financial institutions, fund managers and corporate treasurers (Hull, 2015).

A relatively simple derivative is a forward contract. It is an agreement to buy or sell an asset at a certain future time for a certain price. It can be contrasted with a spot contract, which is an agreement to buy or sell an asset almost immediately. Forward contracts can be used to hedge foreign currency risk (Hull, 2015).

An example of hedging with forward contract could be an Icelandic company that has to transfer 1 million EUR to Germany after 6 months. If the EUR/ISK exchange rate is 120 now and the company thinks that the exchange rate will be higher after 6 months, for example 140, the company could enter into a forward contract now where an exchange rate for example 125 is locked in. The company will transfer at the exchange rate 125 after 6 months instead of the exchange rate on the market by that time. If the exchange rate turns out to be 140, then the company profited by 15,000,000 ISK because it pays 125,000,000 ISK for 1 million GBP instead of 140,000,000 ISK.

2.3 The Icelandic krona

The ISK has been an independent currency with a floating exchange rate since 2001. A floating exchange rate is a regime where the currency price is set by the foreign exchange market based on supply and demand compared with other currencies. This is the opposite of a fixed exchange
rate, in which the government entirely or predominantly determines the rate. Baxter and Stockman (1989) and Flood and Rose (1995) found no detectable difference in macroeconomic performance between floating and fixed exchange rate. This study will not distinguish between the two rates any further.

2.3.1 Before the financial crisis

Fluctuations of the ISK in an international context before the financial crisis shows that the ISK did not fluctuate as much as one would think. In fact, fluctuations were relatively close to other currencies.

![Figure 1 - Comparison of AUD, NZD and ISK against the EUR from 11.11.1999 to 27.4.2018. Source: Landsbankinn](image)

During major global economic shocks, such as the stock market downturn of 2000-2003 and the financial crisis in 2008, the ISK fluctuated more than other currencies (Central bank of Iceland [CBI], 2017a). When comparing the ISK to currencies of other countries with similar advanced economies such as Australia (AUD) and New Zealand (NZD), one can see that the exchange rate fluctuations are relatively similar during normal times. The fluctuations of the ISK is greater than both AUD and NZD during economic shocks. This is illustrated in Figure 1, which compares the ISK, AUD and NZD against the EUR from 1999 to 2018.

Figure 1 shows how the ISK fluctuated a lot more than AUD and NZD during the financial crisis of 2008. However, before and after the crisis, the fluctuations seem similar.
Between the years 1999 and 2007, the volatility of the AUD, NZD and ISK against the EUR was 10%, 11.25% and 10.16%, respectively. The volatility of the currencies went to 21.76%, 16.72% and 42.41%, respectively in 2008.

When considering other currencies such as the USD and the GBP between the years 2000 and 2008, the EUR appreciated against the USD by 35.56%, against the GBP by 52.62% and by 129.04% against the ISK. Figure 2 compares the USD, GBP and the ISK against the EUR. This graph illustrates again how the ISK fluctuates much more than other currencies during an economic meltdown such as in 2008.

![Figure 2 - Comparison of USD, GBP and ISK against the EUR from 4.1.2000 to 31.12.2008.](image)

Source: Landsbankinn
When analyzing the volatilities of the USD, GBP and the ISK against the EUR, it is clear that the ISK is not more volatile than other currencies when normal economic times are ongoing, this can be seen in Figure 3.

Figure 3 - Annual volatility comparison of USD, GBP and ISK against EUR between 2000 and 2008. Source: Landsbankinn

Figure 3 shows that the ISK has a similar volatility as the USD and GBP and it also shows that the ISK is less volatile than both the USD and GBP in 2000 and 2004 and less volatile than the USD in 2002 and 2003. In 2005, the ISK started to become more volatile and went from 6.5% in 2004 to 9.0% in 2005, 14.7% in 2006, 12.5% in 2007 and reaching an all-time high of 42.4% in 2008. Severe loss of confidence in the Icelandic financial assets generated an uncertainty and massive capital outflows, which later resulted in major depreciation of the ISK.
2.3.2 During the capital controls

The financial crisis in 2008 led to the introduction of the capital controls by the Central Bank of Iceland (CBI) in November 2008, which had the objective of preventing further heavy capital outflows that could have forced an even more profound weakening in the exchange rate, with a result of higher inflation.

The inflation went from 3.4% in August 2007 to 17.1% in January 2009 and finally reached a relatively stable 2.1% inflation in February 2014. This is illustrated in Figure 4. Many households and businesses where exposed to exchange rate risk due to heavy leverage in foreign-denominated and inflation-index debt. One could say that the Icelandic economy was not only facing one financial crisis, but two, the first one being a banking crisis and the second one being a currency crisis, commonly known as a twin crisis. The currency crisis had a direct impact on people and firms (Iceland Chamber of Commerce, 2011). Some of the consequences regarding the capital controls were unattractive foreign investment opportunities as well as making financial institution a burden to service domestic companies operating on a global scale. The capital controls may also, according to a publication from the Iceland Chamber of Commerce, reduce the stock market activity and affect Iceland’s global competitiveness (Iceland Chamber of Commerce, 2011).

Throughout history, restriction on capital in- and outflow have been used as a tool to limit capital outflows and the depreciation of the currency. Much debate surrounds the effectiveness of capital controls. Critics believe that such restrictions inherently limit economic

Figure 4 - ISK Index (left axis) and annual inflation (right axis). Source: Landsbankinn and Statistics Iceland.
progress and efficiency in the long term as well as impact investment decisions, while proponents consider them prudent because they increase the safety of the economy. A research conducted by Satyanath and Berger (2007) indicated that capital controls had a negative impact on investment efficiency, increases the cost of allocation capital for small- and medium size firms and reduces foreign direct investment. This is consistent with the publication conducted by the Icelandic Chamber of Commerce (2011).

Investment efficiency is a function of the risk, return and total cost of an investment management structure, subject to the fiduciary and other constraints within which investors must operate (Hodgson, Ford, Streatfield & Urwin, 2000).

Graham, PeltoMäki and Sturludöttir (2015) investigated whether capital controls affect stock market efficiency. Their findings suggest that the Icelandic stock market was relatively more efficient during periods of capital controls relative to periods of free capital flows. This is opposite to results of the report by the Iceland Chamber of Commerce (2011). Market efficiency will be further discussed in chapter 4.

During the period of capital controls in Iceland, the ISK stabilized as the volatility dropped and the ISK started to appreciate. Figure 5 summarizes the annual volatility and annual change of the ISK currency index.

![Figure 5 - Annual change and annual volatility of the ISK Index during the capital control years. Source: Landsbankinn](image)

Following the financial crisis in 2008, the volatility of the ISK Index jumped to 11.81% in 2009 as the ISK depreciated by 8.06% following an 11.18% appreciation in 2010 as the volatility quickly dropped to 4.34%. During period of capital controls, the ISK was less volatile than the NOK, SEK, USD and GBP compared to the EUR.
The average annual volatility from 2000 to 2017 for each currency was 9.1% (NOK), 9.8% (USD), 8.0% (GBP), 8.7% (SEK) and 9.6% (ISK), however if the period from 2009 to 2016 is analyzed, the average annual volatilities were 10.1% (NOK), 10% (USD), 8.8% (GBP), 9.4% (SEK) and 5.1% (ISK). Figure 6 illustrates this.

![Figure 6 - Annual volatility comparison of NOK, USD, GBP, SEK and ISK compared to the EUR from 2000 to 2017. Source: Landsbankinn](image)

The capital controls initially intended for a short period, however, they lasted longer than anyone would have predicted back in 2008. One of the reason was the so-called offshore ISK risk. Offshore ISK is ISK currency in Iceland owned by foreign investors. Lifting the capital controls too soon could result in a major outflow of capital resulting in a quick depreciation of the ISK and to prepare for this, the CBI bought foreign currency to build up a strong currency reserve (CBI, 2011).

When a central bank introduces capital controls, buys or sells currency, it is called intervention. The CBI had to intervene in order to follow up their plan to lift the capital controls that were introduced in 2011. When a central bank purchases foreign currency, it exchanges domestic currency. This exchange increases the supply of the domestic currency, resulting in lower price of the domestic currency against the foreign currency. The opposite happens when the central bank sells foreign currency, thus the ISK exchange rate is determined by the supply and demand. The CBI’s limitations on the study will be further discussed in chapter 4.
2.3.3 After the capital controls

On the 25th of May 2016, the CBI announced that the bank will be selling foreign currency to owners of offshore ISK as a part of their plan to lift the capital controls (CBI, 2016).

The capital controls on the public, companies and pension funds were fully lifted on March 14th, 2017. Following that, the ISK depreciated by 2.7% against the EUR, 3.2% against the USD and 2.5% against the GBP. As mentioned above, the volatility of the EUR/ISK exchange rate had an average of 5.1% but in 2017, the volatility jumped to 10.7% which is higher than the average volatility between the years 2000 - 2017.

![Figure 7 - Daily percentage movements of EUR/ISK exchange rate (left axis) and EUR/ISK exchange rate (right axis) from 24.8.1999 to 27.4.2018. Source: Landsbankinn](image)

Daily movements of the ISK against the EUR are presented in Figure 7, representing the fluctuation of the ISK/EUR exchange rate. The figure illustrates the importance of the capital controls and shows how the volatility decreased after the capital controls were introduced. Figure 8 also shows how the fluctuations increased as the capital controls were lifted.

The CBI announced on March 12th, 2017 that the capital controls were going to be fully lifted on March 14th, 2017 and the stock market responded well after the announcement.
The OMXI8 stock index increased by 4.4% between the 10th and 17th of March while the ISK depreciated by 1.4% during the same period. The lifting of the capital controls had a positive effect on the stock prices of Eimskip and Marel. The stock price of Eimskip increased by 1.4% while Marel’s stock price increased by 0.9% on March 14th, 2017. The total increase was 3.2% for Eimskip and 2.8% for Marel between the period of March 10th and March 17th, 2017. Icelandair’s stock fell by 7.4% and then rebounded on March 13th with a 2.8% increase and then another 1.1% increase the following day. The total increase in Icelandair’s stock between March 10th and March 17th was 2.8%.

The day after the capital controls were lifted, the CBI announced that it was too soon to tell the effects of the lifting of the capital controls on the economy but that equilibrium between inflow and outflow will be reached. The announcement also stated that short-term fluctuations will however increase and that the CBI will try to eliminate these short-term fluctuations. (CBI, 2017b).

Figure 8 - OMXI8, Eimskip, Icelandair, Marel and EUR/ISK exchange rate compared during the capital control lifting. Source: Keldan & CBI
2.4 Historical currency crisis

In his book Multinational Financial Management, Alan C. Shapiro (2013) talks about the Asian currency crisis and how such a crisis impacts the economy and firms. The Asian currency crisis began in Thailand 1997, starting with currencies and stock markets across Asia plunging from 40% to 80%. This all happened despite a booming economy with low inflation, balanced budgets, a trustworthy and well managed central bank, high domestic savings and strong export industries. This is a somewhat similar situation to Iceland before the financial crisis in 2008. One of the explanation that Shapiro points out as the main driver to this crisis is twofold: first is the appreciation of the dollar and depreciation of the yen and yuan that reduced the export competitiveness of most East Asian countries. Second is the huge short-term foreign debt that skyrocketed. Shapiro further points out that the exchange rate is critical to every country as domestic and global economy is tied together.

Looking at historical currency crises can help to better understand how such crises can affect the stock market and the economy. The Mexican Peso Crisis was characterized by the intervention of the Mexican central bank in the foreign exchange market to peg to the USD by issuing a denominated public debt in dollar to buy pesos. This action caused the peso to strengthen. An overvalued peso recognized by investors resulted in huge capital outflows from Mexico to the United States. Given the outflows of capital and the uncertainty, foreign investors raised the risk premium. This is similar to a domino effect because one event leads to the next and so on. As a result, banks raised interest rates, meaning that the cost of borrowing was higher. Usually, when interest rates are raised, stock markets are affected negatively. The devaluation of the peso led to an economic crisis with a stock market crash, bankruptcies and an annual inflation rate of around 52%. The capital outflows started when investors noted that the peso was overvalued. Investors feared devaluation which became the main reason for the stock market crash because foreign investors sold all their shares.
3 The stock market

A stock market is a place where shares of publicly listed companies can be traded. Stock markets can be split down to a primary market and a secondary market. The primary market is a market where a company issues its shares for the first time to the public, this is called an initial public offering (IPO). The secondary market is a market where the shares from the primary market are being traded between investors. The price of a share equals the price of which the last trade occurred at, this means that the price of shares is decided by the supply and the demand of each investor. Investors value stocks by using valuation models and try to incorporate as much information as possible to the model in order to find the intrinsic value of the stock. Information is a key word because the Efficient Market Hypothesis (EMH) states that there are three different forms of market efficiency and each form has a different degree of information incorporation to the stock price. The forms are called weak-form EMH, semi strong-form EMH and strong-form EMH.

The weak-form hypothesis asserts that stock prices already reflect information that can be derived by examining market trading data such as the history of past prices, trading volume or short interest. This version of the hypothesis implies that trend analysis is fruitless. Past stock price data are publicly available and virtually costless to obtain. The weak-form hypothesis holds that if such data ever conveyed reliable signals about future performance, all investors already would have learned to exploit the signals. Ultimately, the signals lose their value as they become widely known because a buy signal, for instance, would result in an immediate price increase (Bodie et al, 2014).

The semi strong-form hypothesis states that all publicly available information regarding the prospects of a firm must be reflected already in the stock price. Such information includes, in addition to past prices, fundamental data on the firm’s product line, quality of management, balance sheet composition, patents held, earning forecasts, and accounting practices. Again, if investors have access to such information from publicly available sources, one would expect it to be reflected in stock prices (Bodie et al, 2014).

The strong-form version of the efficient market hypothesis states that stock prices reflect all information relevant to the firm, even including information available only to company insiders. This version of the hypothesis is quite extreme. Few would argue with the proposition that corporate officers have access to pertinent information long enough before public release to enable them to profit from trading on that information (Bodie et al, 2014).
3.1 The Icelandic stock market

On April 29th, 2018 the total market value of the Icelandic stock market (OMX) was around 814.4 billion ISK, divided by 16 companies operating in 9 sectors. Twelve out of the 16 companies went public after the financial crisis. Table 2 summarizes the market value of each company, percentage of the total market value, in which sector each company operates and the company’s date of IPO.

Table 2 - The OMX companies, their market value (April 26th, 2018), sector and date of initial public offering. Source: Keldan

<table>
<thead>
<tr>
<th>OMX company</th>
<th>Market value (MV)</th>
<th>% of total MV</th>
<th>Sector</th>
<th>Date of IPO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marel</td>
<td>264,297,114,492 ISK</td>
<td>32.5%</td>
<td>Technology</td>
<td>30.12.1992</td>
</tr>
<tr>
<td>Reitir</td>
<td>64,687,826,140 ISK</td>
<td>7.9%</td>
<td>Real estate</td>
<td>09.04.2015</td>
</tr>
<tr>
<td>HB Grandi</td>
<td>61,483,030,710 ISK</td>
<td>7.5%</td>
<td>Fisheries</td>
<td>30.12.1992</td>
</tr>
<tr>
<td>Hagar</td>
<td>46,628,721,474 ISK</td>
<td>5.7%</td>
<td>Retail</td>
<td>16.12.2011</td>
</tr>
<tr>
<td>Eimskip</td>
<td>42,180,465,980 ISK</td>
<td>5.2%</td>
<td>Transporting</td>
<td>16.11.2012</td>
</tr>
<tr>
<td>Síminn</td>
<td>41,361,229,786 ISK</td>
<td>5.1%</td>
<td>Telecommunication</td>
<td>15.10.2015</td>
</tr>
<tr>
<td>Reginn</td>
<td>39,500,506,270 ISK</td>
<td>4.9%</td>
<td>Real estate</td>
<td>02.07.2012</td>
</tr>
<tr>
<td>Eiðk</td>
<td>35,255,080,437 ISK</td>
<td>4.3%</td>
<td>Real estate</td>
<td>29.04.2015</td>
</tr>
<tr>
<td>VÍS</td>
<td>31,284,610,402 ISK</td>
<td>3.8%</td>
<td>Insurance</td>
<td>24.04.2014</td>
</tr>
<tr>
<td>N1</td>
<td>28,125,000,000 ISK</td>
<td>3.5%</td>
<td>Oil and retail</td>
<td>19.12.2013</td>
</tr>
<tr>
<td>Sjóvá</td>
<td>24,578,096,562 ISK</td>
<td>3.0%</td>
<td>Insurance</td>
<td>11.04.2014</td>
</tr>
<tr>
<td>TM</td>
<td>24,480,950,251 ISK</td>
<td>3.0%</td>
<td>Insurance</td>
<td>08.05.2013</td>
</tr>
<tr>
<td>Sýn</td>
<td>21,076,988,801 ISK</td>
<td>2.6%</td>
<td>Telecommunication</td>
<td>18.12.2012</td>
</tr>
<tr>
<td>Skeljugur</td>
<td>13,710,882,538 ISK</td>
<td>1.7%</td>
<td>Oil and retail</td>
<td>09.12.2016</td>
</tr>
<tr>
<td>Origo</td>
<td>10,070,574,858 ISK</td>
<td>1.2%</td>
<td>Information technology</td>
<td>04.11.1997</td>
</tr>
<tr>
<td><strong>Total MV</strong></td>
<td><strong>814,413,896,614 ISK</strong></td>
<td><strong>100.0%</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The market is very small when compared to markets of larger countries such as the USA and UK, where the number of listed companies is around 4,400 and 2,900 respectively (The World Bank, 2017). The market participants in Iceland are mainly pension funds and mutual funds that have had their capital locked in Iceland due to capital controls from 2008 to 2017. The pension funds and other market participants will be discussed further in chapter 4.
Figure 9 shows the development of the OMXI8 index during the period of 2010 and 2015, which was booming, with an increase of 84.1%. All companies are exposed to exchange-rate risk either directly or indirectly, despite whether they have their cost and revenues in foreign or domestic currency (Marston, 2001). This means that all companies face translation exposure, transaction exposure or operating exposure or perhaps two or even all three types. Furthermore, Marston’s study showed that industry structure has a major effect on economic exposure. This means that all companies in the OMXI8 stock index are exposed one way or another to exchange rate risk and since each company is exposed in different ways, only the companies Eimskip, Icelandair and Marel will be analyzed in this study.

Wong (2017) showed evidence of high correlation between the exchange rate market and the stock market. Furthermore, two explanations are given for this relationship, the good market approach and the portfolio balance approach. The good market approach states that real stock prices are influenced by the real exchange rate in a way that when the real exchange rates depreciate, export firms’ global competition is stronger. This is because a cheaper currency increases the demand for the products or services from other countries. The results are increased exports which lead to more profits for the firm. In the end, this will reflect in the stock prices of the firms as more value is created. The same thing is true for the opposite, if the exchange rate appreciates. This depends on whether a company is an importing or exporting company. The second explanation is the portfolio balance approach which assumes that real
stock price affects real exchange rate. A bull stock market will attract inflows of foreign capital for investment in the stock market. With increased demand for stocks, the stock price will increase, and the real exchange rate appreciates. Moreover, increase in stock prices will lead to increase in the net worth of the firms. The firms will expand their production and sale. This will increase aggregate demand in the economy, which will increase interest rate and attract more inflows of capital from abroad. Conversely, a bear stock market will lead to depreciation of real exchange rate (Frankel, 1983; Ülkü & Demirci, 2012; Tsagkanos & Siriopoulos, 2013; Moore & Wang, 2014; Caporale, Hunter & Ali, 2014).

We have now discussed the studies of effects between stock prices and currency fluctuations. Now we introduce the companies we will analyze in a concise manner with a focus on their currency exchange exposure.

3.1.1 Eimskip

Eimskip is a maritime transporting company which was founded January 17th, 1914. The company currently operates in 20 countries all over the world and has 1,830 employees. Eimskip’s proportion of its revenues and expenses in ISK are around 22% and 26% respectively. Eimskip mentions their currency risk in the annual report 2017:

Eimskip is exposed to currency risk on sales, expenses and borrowings that are denominated in currencies other than the functional currencies of the company and its entities. The majority of the company’s revenue and assets, and of its obligations and interest-bearing debt, are denominated in currencies other than the ISK. The subsidiaries use the local currency where they are based, except Eimskip Ísland ehf., where the functional currency is the EUR.

The company believes that the natural currency balance of its operations provides hedging and is investing in some external hedging instruments, such as derivatives. When planning for large investments in non-EUR currency, due consideration is given to whether hedging is prudent. Decisions on this are made on a case-by-case basis. Assets and liabilities in the balance sheet are mostly denominated in EUR or the relevant operating currency of the entities. The mismatch of the other nonoperating currencies on the balance sheet is mainly related to two currencies, the ISK and the USD, as is shown in a table under note 18 in the Consolidated Financial Statements 2017. (Eimskip, 2017, p.43)
As can be seen from the two figures below (Figure 10 & 11), the revenues and expenses of Eimskip provide, to a certain degree, a natural currency hedge.

Figure 10 - Eimskip's revenues 2017 divided into currencies. Source: Eimskip's annual report 2017

Figure 11 - Eimskip's expenses 2017 divided into currencies. Source: Eimskip's annual report 2017

Figures 10 and 11 show how Eimskip's revenues and expenses are divided into currencies. Eimskip's obligation is 112.7 million EUR or 52.4% of the company’s total liabilities. In addition to that, Eimskip’s annual report is denominated in EUR.

Eimskip is exposed to all three types of exchange rate risk. The translation exposure can be illustrated in Eimskip’s annual reports. Due to currency fluctuations, it can be difficult to compare annual reports between years without adjusting for these fluctuations. Eimskip does
that by adding a currency gain/loss factor to the income statement. Since Eimskip has around 73% of its cost and 28% of its debt denominated in foreign currency, the company must transfer and receive money from abroad. This results in a transaction exposure because Eimskip has to transfer or receive a fixed amount of foreign currency, but that fixed amount can fluctuate in ISK terms. Eimskip can hedge away this exposure by entering a forward contract, locking in a fixed exchange rate. These contracts are however limited and most of them only last for a period of 12 months. Eimskip has 88% of its revenues in foreign currencies, which means that the company’s cash flow depends on the exchange rates of those currencies.

This is the operating exposure because if the ISK depreciates, then Eimskip’s revenues in domestic terms increase because Eimskip can buy more ISK for each unit of foreign currency.

Chi and Cheng (2016) studied the effects of exchange rate volatility and income on Australia’s maritime export flows to Asia. Their findings suggest that exchange rate volatility appears to be an important factor affecting maritime export volume in the long run. The study also found that the effects of exchange rate volatility varies between countries.

Akatsuka and Leggate (2005) examined in the chapter Perceptions of foreign exchange rate risk in the shipping industry the relationship between exchange rate movements and share price returns in Norway and Japan. The results show that the risk is significant in the determination of performance and that the exposure of the company plays a very important role. In Norway, where exposure is high at 50%, the impact on returns is felt more immediately, whereas in Japan, where the exposure level is much lower, the impact on share price returns is less marked. The results showed that the degree of impact is clearly related to the level of exposure.
When further analyzing the natural hedging of Eimskip during the period of capital control, it is clear that at least on an annual basis, the revenues and the expenses are highly correlated with the ISK Index. This is illustrated in Figure 12.

Figure 12 - Eimskip's annual % change of revenues and expenses, compared to % change in average annual ISK Index exchange rates. Source: Datamarket and CBI

As Figure 12 shows, both revenues and expenses are correlated with the average annual ISK Index exchange rate. The correlation between the revenues and the exchange rate is 0.48 and the correlation between the expenses and the exchange rate is 0.57 and the correlation between the revenues and the expenses is 0.99.
Figure 13 shows Eimskip’s net foreign currency exchange loss/gain from 2014 to 2017. As expected, Eimskip’s currency exchange gain/loss and the ISK Index rate are highly correlated. The two components in Figure 13 have a correlation of 0.87.

3.1.2 Icelandair

Icelandair Group is a company in the tourism industry that can trace its roots back to the year 1937. The company has offices in 13 countries, including Iceland and has 3,900 employees according to the company’s 2017 annual report. The company owns 9 subsidiaries. They are Icelandair, Icelandair Hotels, Iceland Travel, Air Iceland Connect, Icelandair Cargo, Loftleiðir Icelandic, IGS, Feria and Fjárvakur. Icelandair Group’s proportion of total income that comes from transportation with airline companies is 72.8% according to Icelandair’s 2017 annual report. Since such a high proportion of the company’s revenues comes from transporting, it is worth analyzing the airline industry further.
Airlines are international businesses in nature and are therefore exposed to currency fluctuation risk. Most airlines have revenues and cost in several currencies and that means that the companies have to convert these cash flows to domestic currency, this forms the foreign exchange risk (Oxley & Buecking, 2015). This in fact is true when analyzing Icelandair, even though the company does not indicate how the revenues and expenses are divided down to currencies, they indicate their next 12 months’ currency exposure, as can be seen in Figure 14.

Figure 14 - Net 12 months currency exposure 2016 and 2017 in thousands of USD. Source: Icelandair's annual report 2017

Figure 14 shows the transaction exposure that Icelandair faces. The same argument that was used for Eimskip can be used on Icelandair to argue that Icelandair faces all three types of currency exposures. The currency exposure of airlines is mainly because of the purchasing of key items that are usually purchased with USD such as fuel, maintenance, overhaul costs, aircraft purchase and lease payments (Oxley & Buecking, 2015).

Even though around 20% of Icelandair Group’s total operating expenses comes from fuel, a recent study about financial risk exposures of the companies Cathay Pacific Airways and China Airlines found that a shock in exchange rate has more impact on company’s stock prices compared to a shock in fuel prices (Yashodha, Hamid & Habibullah, 2016).

Icelandair is however aware of the risks that they face and explain these risks well in their annual reports. The company has an active Risk Management Committee that deals with
these risks. In Icelandair’s 2017 annual report, their plan to manage foreign currency risk is stated as follows:

The Group seeks to reduce its foreign exchange exposure arising from its business dealings in diverse currencies through a policy of matching receipts and payments in each individual currency to the extent possible. Any mismatch is dealt with using currency trades within the Group before turning to outside parties. Historically, the biggest currency mismatch has been a USD deficit, where the annual USD cash inflow falls short of the USD outflow, mainly due to investment, maintenance, fuel costs, and funding-related payments, which are to a large extent denominated in USD. This mismatch is expected to disappear in 2018 due to USD revenue growth and stronger USD inflows resulting from an increased number of US destinations and US sales. In recent years, an ISK deficit has emerged and expanded from being trivial to becoming a significant and growing ISK shortfall since 2009. This trend stems from the revenue growth in foreign markets, whilst the consequential added operations are domestic and need to be covered by ISK. This shortage is financed by a surplus of European currencies, most importantly the EUR and Scandinavian currencies, and the CAD. The Group follows a policy of hedging 50–80% of the net currency exposure 9–12 months forward. In addition to the impact on cash flow, risk exposure of this nature affects the balance sheet. The Risk Management Committee monitors the net balance sheet currency mismatch on a monthly basis and mitigates the exposure through short-term management of assets and loans to the extent feasible and within the scope of the cash flow objectives. (Icelandair, 2017, p.38)

Oxley and Buecking (2015) concluded that large exchange rate movements have an impact on airlines through three main channels: customer demand, the supply of the airline company and other financial impacts. Consumer demand can be affected in the way that if the ISK appreciates against other currencies, it becomes more expensive for tourists to visit Iceland which results in loss of revenues for Icelandair.

Forsyth and Dwyer (2010) studied the effects of exchange rates on international airlines. The results were that exchange rates can impact international airlines in several ways, for example they will have an impact on flows on inbound and outbound traffic and they will also have an impact on the values of debt and assets in domestic and international terms. This is yet another example of the translation exposure that Icelandair faces.
Even though a large proportion of Icelandair’s operating income in 2017 came from airline transportation, around 7.2% of the income came from sales at airports and hotels and around 8.6% came from tourism. These factors are highly dependable on number of tourists. This is illustrated in Figure 15. The figure shows how the sales at airports and hotel and revenues from tourism correlate with the number of tourists each year in Iceland. The correlation was 0.94.

*Figure 15 - Sales at airport and hotel + tourism revenues in thousands of USD (left axis) compared to the number of tourists that passed through Keflavík airport each year (right axis). Source: Icelandair’s annual report 2017 and Ferðamálastofa*
Figure 16 shows that neither Icelandair’s revenues nor their expenses correlate at all with the ISK Index with the correlation coefficient only being 0.02 between the revenues and the index and -0.06 between the expenses and the index. The revenues and the expenses have a correlation of 0.82 between them.

![Figure 16 - Icelandair’s annual % change of revenues and expenses, compared to % change in average annual ISK Index exchange rate. Source: Datamarket and CBI](image)

The correlation coefficient between Icelandair’s revenues, expenses and the ISK Index are annual changes, they could differ a lot from more frequent stock price movements of Icelandair and the ISK Index or any of the currencies that Icelandair is exposed to for that matter.

In February 2017, Icelandair experienced a 24% fall in their stock price and since April 2016, their stock price has declined by 58%. According to the announcement from Icelandair, the main explanation for this is increased competition as well as appreciation of the ISK and a rise in oil price. The expected EBITDA was $210 million but turned out to be $140-150 million in 2017. In addition, currency trends did not favor the company as about 22% of the company’s revenues are in ISK, compared to 42% of its expenses according to their annual report. Operating income amounted to USD 1,419.5 million in 2017, a 10.5% increase from 2016. Operating expenses amounted to USD 1,249.3 million in 2017, as compared to USD 1,166.4 million in 2016, an increase of 17.2% between years. Salaries and other personnel expenses increased by 26% and aircraft fuel expenses increased by 10%. According to Icelandair’s
financial statement, salaries and other personnel expenses amounted to USD 445.2 million, increasing by USD 90.9 million, or 26%, from 2016. The reasons for the increase are the expanded scope of the company’s business, contractual wage increases and the strengthening of the ISK against the USD over the comparison period, as most of the company’s wage costs are in ISK.

3.1.3 Marel

Marel is a leading global provider of advanced food processing systems and services. Around 5,100 employees work within Marel corporation in 30 countries. The company provides service to the poultry, meat and fish industries.

Marston (2001) points out that all companies are exposed to exchange rate risk either directly or indirectly, despite whether they have their cost and revenues in foreign or domestic currency. Marel is aware of foreign exchange risk as stated in the foreign exchange risk chapter in the 2017 annual report:

The Group operates internationally and is exposed to currency risk arising from mainly the USD and ISK, primarily with respect to the EUR, as the EUR is the Group’s reporting currency. Generally, Marel maintains a good natural hedge in its operations with a good match between revenue and cost in most currencies although only a fraction of a percentage of revenues is denominated in ISK, while around 8.50% (2016: 7.64%) of costs is in ISK. Financial exposure is hedged in accordance with the Group’s general policy and within set limits. The Group monitors foreign exchange risk arising from commercial transactions, recognized assets and liabilities (transaction risk) that are determined in a currency other than the entity’s functional currency. Derivative hedging is applied if the exposure is outside of the risk tolerance band on a consolidated basis. Currently all exposures are within risk tolerance and the Group has no FX derivatives in place. Currency exposure arising from net assets of the Group’s major foreign operations is managed primarily through borrowings denominated in the relevant foreign currencies as the policy is to apply natural exchange rate hedging where possible. Economic risk is defined as the extent to which currency fluctuations can alter a company’s future operating cash flows, that is future revenues and costs. Economic risk is not hedged. The following table details the Group’s sensitivity of transaction and translation risk to a 10% increase and decrease in the EUR against the relevant foreign currencies. 10% is the sensitivity rate used when reporting foreign currency risk internally to key management and represents management's assessment of the reasonably possible change in foreign exchange rates. The sensitivity analysis includes only outstanding foreign currency denominated
monetary items and adjusts their translation at the period end for a 10% change in foreign currency rates. (Marel, 2017, p. 148)

The same argument that was used for Eimskip and Icelandair can be used to argue that Marel faces all three types of currency exposures.

Around 70% of the Marel’s revenues are in euro and 29% in US dollar, the rest, or 1% is revenue from Iceland (Narfi Þorsteinn Snorrason, manager of strategy and corporate development at Marel, verbal citation, interview, March 14th, 2018). Narfi’s statement agrees with Marel’s foreign risk exposure chapter that the company is primarily exposed to foreign exchange risk to the EUR/USD and EUR/ISK on the cost side. This is quite different from Eimskip and Icelandair, as they have their revenues and expenses in more currencies.

Marel is the largest company in Iceland measured by market value and weighs currently 32.5% of the OMX total market value as Table 1 shows. Marel’s market value increased because of the company’s very rapid growth, for example their revenues increased from 662 million EUR in 2013 to 1,038 million EUR in 2017.

![Figure 17 - Marel's revenues in millions of EUR (left axis) compared to average annual EUR/ISK exchange rate (right axis). Source: Marel's annual report 2017 and Landsbankinn](image)

Figure 17 shows how Marel’s revenues have increased by 57% from 2013 to 2017. What is interesting about the graph is when the ISK depreciated rapidly against the EUR in 2008, Marel’s revenues increased by 86.4%, however when the ISK started to appreciate in
2015, it seems like Marel’s revenues were not affected at all, the revenues kept on growing like in 2008.

By looking at Figure 17, it seems like the ISK fluctuations does not negatively affect Marel’s revenues. This could be because of, as mentioned above, Marel’s rapid growth in international sales.

![Figure 18 - Marel’s annual % change of revenues and expenses, compared to % change in average annual EUR/ISK exchange rate. Source: Datamarket and CBI](image)

Figure 18 compares Marel’s annual change in revenues and expenses with the average annual EUR/ISK exchange rate. It seems like Marel has a good natural hedging with the revenues and expenses correlating by 0.94. The correlation between the revenues and EUR/ISK is -0.76 and the correlation between the expenses and EUR/ISK is -0.68. This does not come as a total surprise, since 70% of Marel’s revenues are in EUR according to Narfi so when the EUR appreciated against the ISK, Marel’s revenues should increase.
4 Limitations

It is important to highlight the limitations of this study, as they could have an impact on the results. The main limitations are the capital controls, market inefficiency and limitations on individual companies.

4.1 Capital controls

The capital controls that were introduced in November 2008 could have had a domino effect on a few factors that affected the results of this study. The factors that likely affect our study are pension funds, market participants and CBI interventions.

4.2 The pension fund effect

All legal employees in Iceland save at least 4% of their monthly salary in pension funds for consumption after retirement and the employers pay a matching fee of 8% (Lífeyrismál, n.d.). This is a minimum of 12% of an employee’s salary that is being saved with the pension funds. The pension funds try to yield a 3.5% real return per annum on those savings by investing (Harðarson, Hlynsson, Jónsson and Finnbogadóttir, 2011).

![Figure 19 - Market value of equity owned by the Icelandic pension funds at the end of each month in millions of ISK. Source: CBI](image)

The investment opportunities for the pension funds have been limited to Iceland ever since the capital controls were introduced in 2008. Figure 19 shows how much money the pension funds have allocated to stocks by the end of each month from February 2009 to
February 2018. The amount increased from around 473 billion ISK to around 1,468 billion ISK.

Table 3 - Ownership of Icelandic pension funds in each OMX company (April 29th, 2018).

Table 3 shows how much the pension funds in Iceland own combined in each of the OMX companies. They own a large chunk of stocks in all OMX companies, including Icelandair, Eimskip and Marel. This could perhaps be explained because of cumulative investments in the companies because of inflow of savings from employees each month and the fact that the pension funds have been limited to Iceland by the capital controls.

Alda (2017) concluded that higher pension funds investment in equities positively influences stock market development in general, however the results of the study were different between countries.

These abnormal investments from the pension funds may have resulted in unusually high stock prices. To illustrate this, during the period from January 4th, 2010 to December 30th, 2016 the stock price of Icelandair increased by 532.9% while the pension funds increased their ownership from 2.07% to 50.07% in Icelandair.

### 4.3 Behavioral bias of market participants

The capital controls stabilized the ISK as the volatility of the EUR/ISK exchange rate had an average annual volatility of 5.1% while other currencies had higher volatilities for example 10% (USD) and 8.8% (GBP) against the EUR. The effect of this might be that market participants give lower weight to the exchange rates in their valuation model, since the ISK is under capital controls and so when analyzing stock prices against currencies, the currency
effect could be minimized because of this. Gunnlaugsson (2018) concluded that some trading strategies beat the market and market participants behave in a similar way. Furthermore, that the market is very small and there are few market participants and the market is therefore inefficient. This could also create bias when stock prices are analyzed against currencies because if everyone that is investing in stocks and following the big market participants such as the pension funds behaves in the same way, then stock prices could be inflated and again, this would result in currency effects being minimized.

**4.4 CBI interventions**

Patro, Wald & Wu (2014) studied the impact of foreign exchange markets on the stock market. The empirical analysis implicated that currency devaluation have significant negative returns on the stock market. Their findings indicate that stock returns are notably lower if the devaluation is greater and if the country is a developing nation. Furthermore, as reserves are lower, real exchange rate depreciation over past years, decrease in capital account or rise of current account deficits, stock prices tend to decline more. This is consistent to the situation in Iceland before and during the crisis in 2008. The ISK depreciated by more than 50% and the current account deficit went from 4.8% in 2003 to 17.5% of GDP in 2008 (Zoega, 2016). Fatum and Yamamoto (2014) found that large interventions by the central bank can have a significant influence on the exchange rate whereas small interventions do not have detectable effect on the exchange rate, such as during the period between 2002 and 2008 in Iceland.

As mentioned earlier in the study, the CBI bought foreign currency to build up a strong currency reserve (CBI, 2011).
Figure 7 shows the monthly trading interventions of the CBI from December 1999 to March 2018. Between December 1999 and December 2008, the CBI purchased a net amount of foreign currency for 44.6 billion ISK compared to 886 billion ISK between January 2009 and March 2018. The purchases between January 2009 and March 2018 are likely to have more impact on the exchange rate (Fatum & Yamamoto, 2014).

4.5 Market inefficiency

Chapter 3 introduced the Efficient Market Theory and Chapter 3.1. mentioned that the Icelandic stock market is small and has few market participants.

Graham, Peltomäki and Sturludóttir (2015) studied the effects of capital controls on stock market efficiency in Iceland between 1993 and 2014. The results were that stock market does not show more efficiency when the market is deregulated. The results suggest that the stock market was relatively more efficient during the periods of capital control relative to periods with free flow of capital. Furthermore, the study also found that the Icelandic stock market has a weak-form market efficiency.

Schrey and Hafdisarson (2017) studied whether the Icelandic stock market has semi-strong efficiency. The results show that before the CBI interest rates announcements, market participants try to predict whether there will be a change in interest rate or unchanged interest rates. If the market incorrectly anticipates the announcement, there will be an announcement
effect as market participants incorporate the new information to their pricing models, suggesting a semi-strong form of market efficiency.

The study by (Gunnlaugsson, 2018), which was mentioned in chapter 4.1.2., concluded that the Icelandic stock market was not efficient.

When a company’s stock is being evaluated, one has to take into account all available and necessary information about the stock. For example, if and then by what degree exchange rate fluctuations impacts the company in terms of cost, revenue and more. If one fails to incorporate all necessary information in the valuation, the valuation could be wrong and therefore the stock could be mispriced. Mispriced stock could create a statistical bias when studying the relationship between exchange rate fluctuations and stock prices. This is because the effect of the exchange rate change impacts a stock by a certain degree but if the market participants fail to incorporate the movement into their valuation, the stock price will not represent that movement. However, the movement is not being registered into the stock price and perhaps a certain explanation power that would have been observed is lost.

4.6 Limitations on individual companies

Other than capital control, market participants and market inefficiency, other factors affect individual companies. For example, as mentioned earlier in the study, Marel’s growth, which has been very rapid in recent years as the company’s revenues increased a lot on the research period. Marel weighs around 32.5% of the total market value of the OMXI companies. This rapid growth of Marel could minimize currency effects when analyzing the company’s stock price against currencies.

Icelandair’s stock price could also have been affected by WOW air’s market entry and therefore, decreasing the currency effect on Icelandair’s stock price.
5 Methodology

In this chapter, the methods used to examine the effects of exchange rate movements on the stock prices of Eimskip, Icelandair and Marel are considered. Both Baranidharan (2016) and Jalbert (2014) use, among other tests, simple linear regression to examine the effects of exchange rates movements on stock indexes with the dependent variable being the index price and the independent variables being exchange rates. In addition to linear regression, Baranidharan (2016) also shows a correlation table. The study conducted by Kattering (2009) only presents correlation tables in results and therefore, we will also include simple correlation tables when presenting our results.

We do not study the OMXI8 stock index as previous studies have done. There are a few valid reasons to do so. They include:

1. Companies within the index could be differently correlated with the exchange rate movements because of their exposure. Some companies might benefit from a strong ISK and others might lose from a strong ISK. The currency fluctuations effects on different companies might therefore be cancelled out when looking at the OMXI8 index.

2. Only 8 companies form the OMXI8 index.

3. Frequent changes of companies in the index.

4. Newly listed companies in the index during the research period.

5.1 Data

All data that is used to examine the effects of exchange rates movements on the stock prices of the three companies was gathered from Thompson Reuters Eikon DataStream. For each company, the closing price of the stock each week is compared to the weekly exchange rates of the currencies that the company is exposed to or has any relation to.

5.1.1 Eimskip

The analyzed period of Eimskip starts November 16th, 2012 and ends February 30th 2018 containing a total of 281 weekly observations. The beginning of the study period corresponds to Eimskip's date of its IPO after its restructuring process. The first 226 of the observations are during the period of capital controls and the remaining 55 are after the capital controls.

As discussed in chapter 3.1.1., Eimskip is exposed to the following currencies: EUR, DKK, USD, GBP and NOK. The weekly changes of these currencies and the weekly changes of Eimskip's stock price will be analyzed with a linear regression model. The DKK will
however not be analyzed because the currency is tied to the EUR and are therefore highly correlated.

5.1.2 Icelandair
The analyzed period of Icelandair starts November 5th, 2010 and ends March 3rd 2018 containing in total 387 weekly observations. Icelandair’s date of IPO was December 14th 2006. The reason for not examining the data since its IPO because of the crisis that started in 2008 where Icelandair’s stock fell by a total of 94% and went through a period of restructuring. The date November 5th, 2010 is therefore used after the restructuring of the company, which ended February 10th 2010. The first 332 of the observations are during the period of capital controls and the remaining 55 are after the capital controls.

As discussed in chapter 3.1.2., Icelandair is exposed to the following currencies: EUR, GBP, DKK, SEK and CAD and so the weekly changes of these currencies and the weekly changes of Icelandair’s stock price will be analyzed with a linear regression model. The DKK will not be analyzed for the same reasons as Eimskip. The USD will be analyzed because the USD is Icelandair’s reporting currency.

5.1.3 Marel
The analyzed period for Marel starts January 1st, 2010 and ends February 30th 2018 containing in total 431 weekly observations. The date January 1st, 2010 is a date that was chosen for Marel to correspond data after the dust of the financial crisis of 2008 has settled. The first 376 of the observations are during the period of capital controls and the remaining 55 are after the capital controls.

As discussed in chapter 3.1.3., Marel is exposed to the EUR (EUR/ISK) rate and EUR/USD exchange rate. The weekly changes of these currencies and the weekly changes of Marel’s stock price will be analyzed with a linear regression model. Marel was also tested against other currencies to see if they are associated with the following currencies: USD, GBP, CAD, NOK and SEK.

5.2 Linear regression analysis
In order to run a linear regression of a company’s stock price and a currency, the weekly movements of the two were calculated with the formula:

$$\ln\left(\frac{p_t}{p_{t-1}}\right)$$

Where:
\( p \) is the stock price or exchange rate
\( t \) is the period (weeks in this study)

After this calculation, it is clear that the number of observations drops by 1 week so Eimskip will be analyzed with 280 observations, Icelandair with 386 and Marel with 430. The analysis was conducted with the use of SPSS.

The following linear regression model is used to find the effects of the weekly exchange range movements on the weekly stock price movements:

\[
Y = \beta_0 + \beta_1 X + \varepsilon
\]

Where:
\( Y \) is the dependent variable (weekly stock price movement)
\( X \) is the independent variable (weekly exchange rate movement)
\( \beta_0 \) is the \( Y \)-intercept (constant)
\( \beta_1 \) is the slope or the coefficient of weekly exchange rate movements and
\( \varepsilon \) is the random error term.

This model follows four assumptions in order to be estimated correctly:

1. The \( Y \)'s are linear functions of \( X \) plus a random error term.
2. The \( x \) values are fixed numbers, or they are realizations of random variable \( X \) that are independent of the error terms, \( \varepsilon_i (i = 1, ..., n) \). In the latter case, inference is carried out conditionally on the observed values of \( x_i (i = 1, ..., n) \).
3. The error terms are random variables, \( \varepsilon_i (i = 1, ..., n) \), which have a mean of 0 and variance \( \sigma^2 \). This property is called homoscedasticity, or uniform variance:
\[
E[\varepsilon_i] = 0 \text{ and } E[\varepsilon_i^2] = \sigma^2 \text{ for } (i = 1, ..., n)
\]
4. The random error terms, \( \varepsilon_i \), are not correlated with one another, so that
\[
E[\varepsilon_i, \varepsilon_j] = 0 \text{ for all } i \neq j
\]

From the SPSS results, the following values will be reported in a table for each company:
the constant - \( \beta_0 \), the slope of the model - \( \beta_1 \), standard error of coefficients, t-Statistic of the coefficients, \( R^2 \) of the model, the Durbin-Watson Statistic of the model and the \( p \)-value of the coefficient.

The standard error of coefficients is the standard error of the least squares slope. It is the measure of the variation in the slope of regression lines from different possible samples.
The t-Statistic of the coefficients is an SPSS output, which is used to determine whether the coefficient $\beta_1$ is significant or not.

The $R^2$ is the coefficient of determination and is perhaps the most important output from the SPSS analysis because it determines how much of the weekly stock movements is explained by the weekly change in a certain exchange rate, so how much of the model is explained by the independent variable. Since the model only includes one independent variable, it is expected that each model will have a low $R^2$, which is a value between 0 and 1 and is calculated with the formula:

$$R^2 = \frac{\text{regression sum of squares}}{\text{total sum of squares}}$$

The Durbin-Watson Statistic is an SPSS output that determines whether or not the error terms are correlated with each other (autocorrelation). A Durbin-Watson Statistic of around 2 means that the error terms are not correlated with each other, hence fulfilling assumption 4.

The p-value is the lowest possible significance level at which a coefficient can be significant, however a high p-value is not considered to be good, we want as low p-values as possible so that we can conclude a significance at high levels, for example 90%, 95% or 99% significance.

A correlation table will also be presented of a company's weekly stock movements and weekly exchange rate movements. The correlation formula is:

$$R = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \sum(y - \bar{y})^2}}$$

Where:

$x$ is the observed independent value

$\bar{x}$ is the mean of all observed independent values

$y$ is the observed dependent value

$\bar{y}$ is the mean of all observed dependent values.

Correlation between stock price movements and exchange rate movements can only range between -1 and 1.
6 Results

The results of the regression analysis between the weekly stock price movements of the companies and weekly exchange rate movements are presented in this chapter. The main limitations of the analysis are also presented.

6.1 Eimskip

*Table 4 - Pearson correlation of Eimskip’s weekly stock return and the weekly changes of EUR, USD, GBP and NOK against the ISK. The correlations are not significant.*

<table>
<thead>
<tr>
<th></th>
<th>EUR</th>
<th>USD</th>
<th>GBP</th>
<th>NOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eimskip</td>
<td>-0.026</td>
<td>0.048</td>
<td>-0.001</td>
<td>0.017</td>
</tr>
</tbody>
</table>

Table 4 presents the correlation between Eimskip and EUR/ISK, USD/ISK, GBP/ISK and NOK/ISK. The table shows that Eimskip is very little correlated with any of the currencies that the company is exposed to. The correlation coefficients are however not significant, even at the level of 0.1.

*Table 5 - Regression analysis of Eimskip’s weekly stock return and the weekly changes of EUR, USD, GBP and NOK against the ISK. The table shows the Unstandardized Coefficient (B), Standard Error or Coefficient (Std. Error), t-Statistics (t), number of observations (N), R² and the Durbin-Watson statistic (DW) and the lowest significance level (p-value). The coefficients are not significant.*

<table>
<thead>
<tr>
<th></th>
<th>Constant</th>
<th>B</th>
<th>Std. Error</th>
<th>t</th>
<th>N</th>
<th>R-squared</th>
<th>DW</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUR</td>
<td>0.000</td>
<td>-0.073</td>
<td>0.169</td>
<td>-0.431</td>
<td>280</td>
<td>0.001</td>
<td>2.046</td>
<td>0.667</td>
</tr>
<tr>
<td>USD</td>
<td>0.000</td>
<td>0.092</td>
<td>0.116</td>
<td>0.796</td>
<td>280</td>
<td>0.002</td>
<td>2.029</td>
<td>0.427</td>
</tr>
<tr>
<td>GBP</td>
<td>0.000</td>
<td>-0.002</td>
<td>0.112</td>
<td>-0.022</td>
<td>280</td>
<td>0.000</td>
<td>2.037</td>
<td>0.983</td>
</tr>
<tr>
<td>NOK</td>
<td>0.000</td>
<td>0.033</td>
<td>0.113</td>
<td>0.29</td>
<td>280</td>
<td>0.000</td>
<td>2.029</td>
<td>0.772</td>
</tr>
</tbody>
</table>

Table 5 presents the results of the regression analysis between the weekly changes of Eimskip’s stock price and the weekly changes of the exchange rates EUR/ISK, USD/ISK, GBP/ISK and NOK/ISK. According to table 5, weekly movements in the exchange rates EUR/ISK, USD/ISK, GBP/ISK and NOK/ISK explain very little of weekly movements in Eimskip's stock price. The reason for this is that the R-squared is near 0 for all four models. The coefficients are not significant for any of the four models that were tested but the Durbin-Watson statistic showed no correlation between the error terms. The statistics were 2.046 for
the EUR, 2.029 for the USD, 2.037 for the GBP and 2.029 for the NOK. The coefficients of EUR, USD, GBP and NOK are rather low and the lowest possible level for them to become significant are at unacceptably high levels. The USD has the lowest p-value of 0.427, which again is very high.

6.2 Icelandair

Table 6 - Pearson correlation of Icelandair’s weekly stock return and the weekly changes of EUR, USD, GBP, CAD, NOK and SEK against the ISK. * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

<table>
<thead>
<tr>
<th></th>
<th>Icelandair</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUR</td>
<td>0.125*</td>
</tr>
<tr>
<td>USD</td>
<td>0.124*</td>
</tr>
<tr>
<td>GBP</td>
<td>0.148**</td>
</tr>
<tr>
<td>CAD</td>
<td>0.08</td>
</tr>
<tr>
<td>NOK</td>
<td>0.018</td>
</tr>
<tr>
<td>SEK</td>
<td>0.135**</td>
</tr>
</tbody>
</table>

Table 6 presents the correlation between Icelandair and EUR/ISK, USD/ISK, GBP/ISK and NOK/ISK. The table shows clearly that Icelandair is also very little correlated with the currencies that the company is exposed to.

Table 7 - Regression analysis of Icelandair’s weekly stock return and the weekly changes of EUR, USD, GBP, CAD, NOK and SEK against the ISK. The table shows the Unstandardized Coefficient (B), Standard Error or Coefficient (Std. Error), t-Statistics (t), number of observations (N), R² and the Durbin-Watson statistic (DW) and the lowest significance level (p-value). * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

<table>
<thead>
<tr>
<th></th>
<th>Constant</th>
<th>B</th>
<th>Std. Error</th>
<th>t</th>
<th>N</th>
<th>R-squared</th>
<th>DW</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUR</td>
<td>0.004</td>
<td>0.53*</td>
<td>0.215</td>
<td>2.462</td>
<td>386</td>
<td>0.016</td>
<td>1.959</td>
<td>0.014</td>
</tr>
<tr>
<td>USD</td>
<td>0.004</td>
<td>0.365*</td>
<td>0.149</td>
<td>2.448</td>
<td>386</td>
<td>0.015</td>
<td>1.964</td>
<td>0.015</td>
</tr>
<tr>
<td>GBP</td>
<td>0.004</td>
<td>0.443**</td>
<td>0.151</td>
<td>2.938</td>
<td>386</td>
<td>0.022</td>
<td>1.977</td>
<td>0.003</td>
</tr>
<tr>
<td>CAD</td>
<td>0.004</td>
<td>0.225</td>
<td>0.144</td>
<td>1.565</td>
<td>386</td>
<td>0.006</td>
<td>1.966</td>
<td>0.119</td>
</tr>
<tr>
<td>NOK</td>
<td>0.004</td>
<td>0.052</td>
<td>0.15</td>
<td>0.343</td>
<td>386</td>
<td>0.000</td>
<td>1.972</td>
<td>0.732</td>
</tr>
<tr>
<td>SEK</td>
<td>0.004</td>
<td>0.434**</td>
<td>0.163</td>
<td>2.671</td>
<td>386</td>
<td>0.018</td>
<td>1.977</td>
<td>0.008</td>
</tr>
</tbody>
</table>

Table 7 presents the results of the regression analysis between the weekly changes of Icelandair’s stock price and the weekly changes of the exchange rates EUR/ISK, USD/ISK, GBP/ISK, CAD/ISK, NOK/ISK and SEK/ISK. Similar to Eimskip, the weekly movements in
the exchange rates that Icelandair is exposed to, explain very little of weekly movements of Icelandair stock price. The reason for this is that the R-squared is near 0. Even with the EUR and USD being significant at the level of 5% and the GBP and the SEK being significant at the level of 1%, Eimskip’s stock movements are left unexplained after the analysis and this is in contrast to our expectations as we expected a higher R-squared. The Durbin-Watson statistic shows no autocorrelation, as the statistics were 1.959 for the EUR, 1.964 for the USD, 1.977 for the GBP, 1.966 for the CAD, 1.972 for the NOK and 1.977 for the SEK.

The coefficient of the EUR implies that when the EUR strengthens against the ISK by 1% in a week, then Icelandair’s share price will increase by 0.534%. The same applies to all other significant currencies so when the USD, the GBP or the SEK strengthen by 1% against the ISK in a week, then Icelandair’s share price will increase by 0.369%, 0.447% and 0.438%, respectively. The coefficients for the EUR, USD, GBP and the SEK are rather significant as they have very low p-values. The EUR/ISK exchange rates becomes significant at 0.014 and the USD at 0.015 and the GBP and the SEK are very significant as they become significant at very low levels of 0.003 and 0.008, respectively.

6.3 Marel

Table 8 - Pearson correlation of Marel’s weekly stock return and the weekly changes of EUR, USD, GBP, CAD, NOK and SEK against the ISK and EUR against the USD (EUR2). *Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

<table>
<thead>
<tr>
<th></th>
<th>Marel</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUR</td>
<td>-0.31</td>
</tr>
<tr>
<td>EUR2</td>
<td>-0.018</td>
</tr>
<tr>
<td>USD</td>
<td>0.051</td>
</tr>
<tr>
<td>GBP</td>
<td>0.102*</td>
</tr>
<tr>
<td>CAD</td>
<td>0.144**</td>
</tr>
<tr>
<td>NOK</td>
<td>0.143**</td>
</tr>
<tr>
<td>SEK</td>
<td>0.139**</td>
</tr>
</tbody>
</table>

Table 8 presents the correlation between Marel and EUR/ISK, EUR/USD, GBP/ISK, CAD/ISK, NOK/ISK and SEK/ISK. The table shows that Marel is not much correlated with any of the currencies that we tested against, however it is to some degree correlated to the GBP, CAD, NOK and SEK, however Marel’s exposure does not lie in these currencies.
Table 9 - Regression analysis of Marel's weekly stock return and the weekly changes of EUR, USD, GBP, CAD, NOK and SEK against the ISK and EUR against the USD (EUR2). The table shows the Unstandardized Coefficient (B), Standard Error or Coefficient (Std. Error), t-Statistics (t), number of observations (N), $R^2$ and the Durbin-Watson statistic (DW) and the lowest significance level (p-value). * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

<table>
<thead>
<tr>
<th></th>
<th>Constant</th>
<th>B</th>
<th>Std. Error</th>
<th>t</th>
<th>N</th>
<th>R-squared</th>
<th>DW</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUR</td>
<td>0.004</td>
<td>0.192</td>
<td>0.166</td>
<td>1.158</td>
<td>431</td>
<td>0.003</td>
<td>2.134</td>
<td>0.248</td>
</tr>
<tr>
<td>EUR2</td>
<td>0.004</td>
<td>-0.045</td>
<td>0.119</td>
<td>-0.38</td>
<td>431</td>
<td>0.000</td>
<td>2.124</td>
<td>0.704</td>
</tr>
<tr>
<td>USD</td>
<td>0.004</td>
<td>0.121</td>
<td>0.115</td>
<td>1.054</td>
<td>431</td>
<td>0.003</td>
<td>2.118</td>
<td>0.292</td>
</tr>
<tr>
<td>GBP</td>
<td>0.004</td>
<td>0.249*</td>
<td>0.117</td>
<td>2.134</td>
<td>431</td>
<td>0.011</td>
<td>2.123</td>
<td>0.033</td>
</tr>
<tr>
<td>CAD</td>
<td>0.004</td>
<td>0.317**</td>
<td>0.105</td>
<td>3.015</td>
<td>431</td>
<td>0.021</td>
<td>2.114</td>
<td>0.003</td>
</tr>
<tr>
<td>NOK</td>
<td>0.005</td>
<td>0.334**</td>
<td>0.112</td>
<td>2.982</td>
<td>431</td>
<td>0.020</td>
<td>2.103</td>
<td>0.003</td>
</tr>
<tr>
<td>SEK</td>
<td>0.005</td>
<td>0.358**</td>
<td>0.123</td>
<td>2.907</td>
<td>431</td>
<td>0.019</td>
<td>2.135</td>
<td>0.004</td>
</tr>
</tbody>
</table>

Table 9 presents the results of the regression analysis between the weekly changes of Marel's stock price and the weekly changes of the exchange rates EUR/ISK, EUR/USD, USD/ISK, GBP/ISK, CAD/ISK, NOK/ISK and SEK/ISK. Similar to the cases of Eimskip and Icelandair, the movements in the exchange rates explain almost nothing of Marel's movements and in the case of EUR/USD exchange rate, it does not explain anything at all, with the $R^2$-squared being 0. Even with the GBP, CAD, NOK and SEK being highly significant, Eimskip's stock movements are left unexplained after the analysis.

The Durbin-Watson statistic shows no autocorrelation, as the statistics were 2.134 for the EUR, 2.124 for the EUR2, 2.118 for the USD, 2.123 for the GBP, 2.113 for the CAD, 2.103 the the NOK and 2.135 for the SEK.

The coefficient of the GBP implies that when the GBP strengthens against the ISK by 1% in a week, Marel's share price will increase by 0.253%. The same applies to all other significant currencies. Furthermore, when the CAD, NOK or SEK strengthen by 1% against the ISK in a week, then Marel's share price will increase by 0.321%, 0.339% and 0.363%, respectively. The GBP, CAD, NOK and the SEK exchange rates are very significant for Marel as they become significant at very low levels. The GBP becomes significant at the highest level of the four, at 0.33%, while the CAD and NOK become significant at the level 0.3% and the SEK becomes significant at 0.4%.
6.4 Limitations of the analysis

Limitations discussed in chapter 4 included the capital controls, market inefficiency and limitations on individual companies. These limitations could very well be the reason why all of our models have such low $R^2$.

The models that were conducted in the study are simple linear regression models which only included one independent variable. Few variables can result in omitted variable bias. When significant predictor variables are omitted from the model, the least squares estimates of coefficients included in the model are usually biased. We cannot know which variables are significant without having more variables, but let’s imagine that there is a variable, $z$, that is omitted from our model but would contribute if included, by not including $z$, the influence of the variable is then left unexplained and is absorbed by the error term. Our analysis definitely suffers from this bias because of very low $R^2$ in all models. It is important to mention that this study analyzed a sample of data for Icelandair and Marel and so the results for these two companies can only be applied for a short time period. The data for Eimskip included all available observations for the company and so the results are more general for Eimskip.
7 Discussion and conclusions

In this research, the effects of exchange rates movements on the stock prices of Eimskip, Marel and Icelandair Group have been examined. Our study uses a similar approach as other studies that examined similar subjects (Baranidharan, 2016; Jalbert, 2014; Kattering, 2009). While we studied the effects of individual currencies on individual companies, Baranidharan studied the effects of the EUR, GBP, USD and JPY on the stock index BSE Sensex. Jalbert studied the effects of the Dollar Index on 8 stock indexes and Kattering studied the effects of 8 exchange rates on the stock indexes S&P 500 and Dow Jones Industrial Average. In addition to different study subjects, the other studies also used different methods. Jalbert not only conducted regression analysis, but other methods as well. Katterning, however, only analyzed the correlations. The other studies used a much longer research period such as Baranidharan studied the period from 2002 to 2016, Jalbert’s research period was from 2001 to 2013 and Kattering’s period was from 1999 to 2006. This study is however limited to a shorter period of 7-9 years varied between companies. Although the results are significant, they can only be applied for the company and the research period. The researchers are therefore cautious to draw any conclusion about the effect of exchange rate changes on Icelandic listed stock prices.

During the study, no similar studies were found that examined the effects of exchange rate movements on individual companies or under similar circumstances. Furthermore, no researches that studied similar subjects like the three studies above were conducted during the period of capital controls. Although the results of this study supports previous findings to some degree, there are some critical differences that are likely to have an impact on the results.

We hypothesized that the stock prices of Eimskip, Icelandair and Marel would be affected by movements in the exchange rates of the currencies, where an appreciation of a currency that a company is exposed to would lead to an increase in the stock price of the company.

The weekly movements of the exchange rates EUR/ISK, USD/ISK, GBP/ISK and NOK/ISK were tested against the weekly movements of Eimskip’s stock price. The results showed that the four models did not explain anything of the stock price movements of Eimskip, as the GDP had the highest $R^2$ of 0.002. The coefficients of the models were not significant until at very high levels, with the lowest level being $p = 0.427$ for the USD/ISK exchange rate. These results are in contrast to our hypothesis, that the stock price of Eimskip is greatly affected by movements in the exchange rate and comes as a big surprise because as we mentioned earlier in the study, the revenues and the expenses of Eimskip are highly correlated with movements
in the ISK Index. This implies that while the effects of exchange rate movements are realized on an annual basis, these effects are not realized on a weekly basis. The results confirm to a degree the findings of Chi and Cheng (2016), that the effects of exchange rates’ volatility on maritime companies varies between countries. Eimskip’s results support previous findings of Akatsuka and Leggate (2005), which showed that exchange rate movements are felt more immediately as the currency risk exposure gets higher. Since Eimskip has a good natural hedge of both revenues and expenses, this indicates that Eimskip is not highly exposed to currency risk. This could explain that high annual correlation was found between Eimskip’s revenues and expenses and the ISK Index but low correlation and low R² when examining weekly stock price movements and weekly exchange rate movements.

The weekly movements of exchange rates EUR/ISK, USD/ISK, GBP/ISK, CAD/ISK, NOK/ISK and SEK/ISK did not explain anything of the stock price movements of Icelandair with the highest R² being 0.022 (GBP). The coefficients of four models proved to be very statistically significant as the EUR and the USD both had p-values < 0.05 and the GBP and the SEK both had p-values < 0.01. The results showed that when these four currencies appreciate by 1% against the ISK in a week, then the stock price of Icelandair increases by 0.53% (EUR), 0.365% (USD), 0.443% (GBP) and 0.434% (SEK). These results support our hypothesis, that when the currencies that Icelandair is exposed to appreciate, then the stock price of Icelandair will increase, we however expected higher R². These results are in contrast to the correlation analysis conducted on Icelandair’s revenues and expenses. This is interesting because it implies that while the effects are realized on a weekly basis, the effects are not realized on an annual basis. These results confirm the study of Forsyth and Dwyer (2010) to some degree, that exchange rate can impact international airline companies in several ways. (Oxley and Buecking (2015) also discussed that exchange rates can impact airline companies financially as well as impacting supply.

The weekly movements of EUR/ISK, EUR/USD, USD/ISK, GBP/ISK, CAD/ISK, NOK/ISK and SEK/ISK did not explain anything of the stock price movements of Marel with the highest R² being 0.021(CAD). The coefficients of four models proved to be very statistically significant as the GBP has a p-value < 0.05 and the CAD, the NOK and the SEK all have p-values < 0.01. The results showed that when these four currencies appreciate by 1% against the ISK in a week, then the stock price of Marel increases by 0.249% (GBP), 0.317% (CAD), 0.334% (NOK) and 0.358% (SEK). These results are in contrast to what was hypothesized. The hypothesis was that the currencies that Marel is exposed to (EUR/ISK and EUR/USD) would affect the stock price of Marel. However, the results show that these
currencies not affect Marel, but furthermore the p-values of the EUR/ISK and EUR/USD exchange rates are 0.248 and 0.704, respectively. This means that exchange rates are not even close to being significant at decent levels 90%, 95% or 99%. What perhaps is more interesting about Marel's results is that Marel's revenues and expenses were highly negatively correlated with the EUR/ISK on an annual basis but positively correlated with the GBP/ISK, CAD/ISK, NOK/ISK and SEK/ISK exchange rates on a weekly basis. However, the correlations and therefore the $R^2$ were not high. In the interview with Narfi Þorsteinn Snorrason, the manager of strategy and corporate development at Marel, he mentioned that he expected a very high correlation between the stock price of Marel and the EUR/ISK exchange rate. He said that when the ISK depreciates against the EUR, then Marel's stock price should increase. This does not agree with our findings.

The main findings of this study are that the companies Eimskip, Icelandair and Marel are not affected greatly by movements in foreign exchange rate that the companies are exposed to. This can be illustrated with a very low $R^2$ statistic of every model that was conducted, even though some coefficients are significant for Icelandair and Marel. The results of this study are therefore only consistent with the findings of Kattering (2009), that stock indexes are currency insensitive, or in the case of our study, that the stock prices of the three companies are currency insensitive.

The study also found that correlation between the revenues and expenses of the companies and the ISK Index does not necessarily imply correlation between the stock price of companies and individual currencies. This might suggest that market participants do not interpret foreign exchange movements frequently or to a very little degree, hence mispricing securities which means an inefficient market. An inefficient market agrees with the studies of Gunnlaugsson (2018) and Graham, Peltomäki and Sturludóttir (2015).

The main limitations of this study are the capital controls, market inefficiency and limitations on individual companies. As discussed in chapter 4, these three factors are likely to have an impact on the stock prices of the companies, thus creating a limitation for our analysis. These factors could therefore be an explanation as to why the $R^2$ of our model is so low.

It would be interesting to study the effects of foreign exchange rate movements on these companies over a longer period, a period without capital controls. A longer period could also mean that data could be gathered from different stages of the economic cycle, not only a period of expansion. Furthermore, it would be interesting to find out whether other variables would add more explanatory power to the stock price movements of the companies.
8 References


