



**UNIVERSITY OF GOTHENBURG**  
**SCHOOL OF BUSINESS, ECONOMICS AND LAW**

*Managing Venture Capital in times  
of Uncertainty*

*Fund managers perspective*

Industrial and Financial Management  
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## **Abstract**

This study aims to investigate the fundraising and investment process of Venture Capital funds and how the managers act during times of increased rates and times of uncertainties. Due to the uncertain times of high inflation and increasing interest rates, pressure has been put on financial markets. Previous research has shown how the demand and supply of Venture Capital services relate to the change in interest rates through quantitative methods. This study takes a qualitative approach to find out how and why managers act the way they do. The findings show that Venture Capital fund managers do not seem as sensitive to increased interest rates as previous research has shown. Venture Capital managers, in general, seem to act slightly differently due to these recent changes in the macroeconomic landscape. These findings are contradictory to the previous research that this study was based on. The study finds that perhaps it is the change in interest rates and the business cycles that are of concern for Venture Capital managers rather than the level of interest rate.

**Keywords:** VC; Private Equity; Interest Rates; Supply & Demand; Familiarity Bias; Natural Rate of Interest.

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# 1. Introduction

Venture Capital (VC)<sup>1</sup> has been a driving factor for innovation and entrepreneurial business development. It has been an alternative investment to reach markets and businesses that have previously not been accessible to either institutional investors or the public. VC has become a way to diversify the portfolio and reach greater growth and return potential than other, more conventional investments. However, as the economic landscape has taken a turn for the worse with a potential global recession around the corner VC firms are facing challenges in the presence of increased interest rates.

Since the financial crisis in 2008, Sweden has experienced low-interest rates, due to expansive monetary policies. Ever since 2012, after the sub-prime crisis in the United States, the Swedish Central banks have lowered the policy rates. The interest rates on the 3M treasury bill have even been negative from 2015 until March 2022 (See Figures 1 & 2), (Riksbanken, 2022).<sup>2</sup> As a matter of fact, since 1998, the trend of interest rates has been decreasing.

This interest rate trend has been a driving force for economic prosperity as it enables entrepreneurs and innovative ideas to thrive with access to favorable financial solutions. Innovation and entrepreneurship are considered major factors in an economy's capacity for wealth, competitiveness, and job growth (Hochberg, Ljungqvist & Lu, 2010). One way of funding innovative firms that have particularly gained success is VC (SVCA, 2022). The VC market has improved year after year for the last decade reaching a peak high in 2021 (Statista, 2022). Due to external shocks the macroeconomic landscape has changed<sup>3</sup>. This has caused spikes in energy prices and commodities, and the rate of inflation being at the all-time since 1991 in Sweden. Central banks around the world try to regulate the external shocks and handle inflation through monetary policy such as increasing the policy rate. Interest rates increase to reduce the monetary velocity and stabilize the economy (IMF, 2022). As the interest rates increase, funding becomes increasingly more expensive and harder to attract making the work

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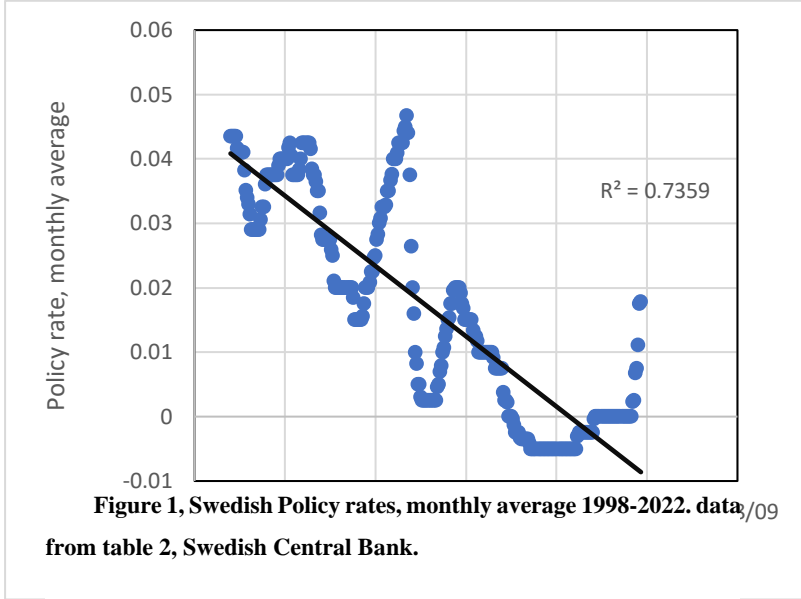
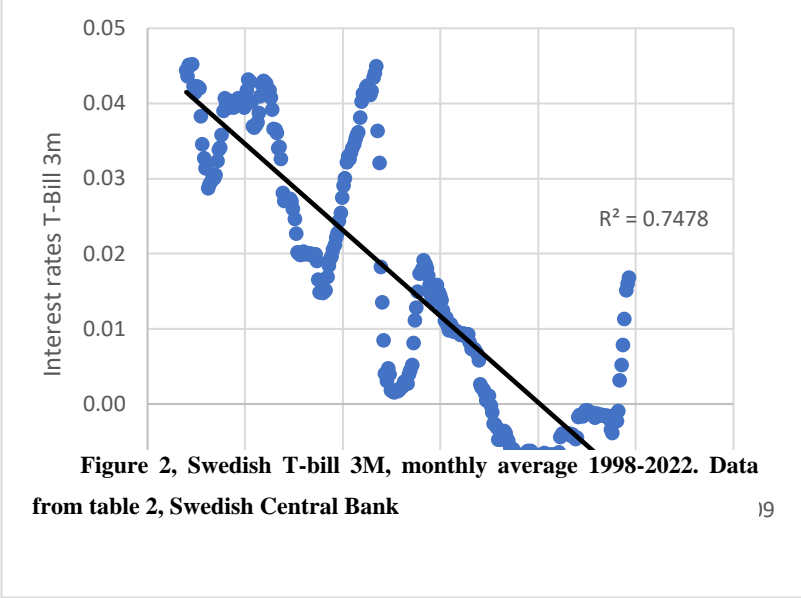
<sup>1</sup> Venture Capital (VC) is a financing method for entrepreneurial businesses. VC provides capital to start-ups and small firms that are believed to grow in the future (Zider, 1998).

<sup>2</sup> The three-month treasury bill is a financial instrument which is essentially lending to the government. It's among the safest investments to be made and can be considered as the risk-free rate (Bodie, 2021)

<sup>3</sup> External shocks like COVID-19 Pandemic, logistical incidents (blocking of the Suez Canal), intra-European war, and the invasion of Ukraine,

for VC managers more challenging. The effect of the raised interest rates decreases the supply of VC funds but the demand for VC from entrepreneurs increases (Bellavitis, Matanova, 2017), making the supply and demand for VC shift out of equilibrium. So, what happens if VC funds dry out? How will VC fund managers deal with these uncertainties.

Figures 1 & 2, showing the change in policy rates and the 3-month treasury bill from 1998 to 2022 will not be critical for the analysis of the study but descriptive of the conditions which the VC market operates within. The applied trend line shows the negative trend over the years illustrating how the monetary policy in Sweden has been conducted. The correlation between the policy rates and the T-bill is 0,9948, which is almost perfectly correlated (see figure 11 and table 3, 4 & 5). Meaning that the policy rate directly affects the interest rate which banks and corporations lend to finance their operations. Since the Policy rate and T-bill are closely correlated, this can be interpreted as the risk-free rate which will affect the investment models VC firms use to evaluate portfolio companies and financial operators take considerations of.





## **1.1 Background**

The first modern Venture Capital (VC) firm, American Research and Development Corporation (ARDC) was founded in 1946 in the United States of America. However, it was first in the late 1970s that VC gained success in the US (Gompers & Lerner, 2001). The 1970s and 1980s brought investors to the venture capital market and this process created some of the largest companies such as Microsoft, Apple, Electronic Arts, and FedEx (Venture Forward, 2018).

With the success that venture capital gained in the US market, it started developing in other markets. VCs' arrival in Europe for example dates to the 1980s. The institutional and legal work had to adapt to this new financial solution, and it was in the 1990s that it took off in Europe. (Dubocage & Rivaud-Danset 2001). With the rampage of the internet in the early 1990s, a new wave of innovation and new firms arose. These innovative ideas needed funding and VC firms turned out to be a convenient way of financing growth. VC continued to grow consistently through the 2000s with capital moving into the market year after year (Goldfarb et al, 2007). The 2008 financial crisis was a major setback for venture capital. The economy worldwide was in a recession and the VC market did not deviate from the overall effects. This resulted in a shortage of funds as investors pulled away from riskier investments. It also led to a decrease in the valuation of both the VC firms and the firms that they financed. (Block et al, 2010). As economies recovered, so did investors' interest in venture capital. The low-interest rates in the 2010s (See figures 1 & 2 for example in the Swedish market) meant that investors entered with additional capital to the VC market to generate higher returns on their portfolios. Venture capital had a record-breaking year in 2021. The international overall VC investment went from \$347 billion across 31,623 deals in 2020 to a record \$671 billion across 38,644 deals in 2021 (KPMG, 2021).

## **1.2 Financial Markets and Interest Rates**

Functional financial markets are crucial for the VC market to thrive, as it has done in the last couple of years. As of 2019, the financial sector represented roughly 3,8% of Sweden's GDP as well as having employed 2% of the labour force in Sweden (SCB, 2019). Comparatively, the real estate sector represented 8% of Sweden's GDP in 2020 and the financial sector represented 4% respectively (Swedish Statistical Bureau, 2022). Effective financial markets are crucial for the welfare and growth of the Swedish economy (Swedish Bankers' Association, 2020).

To regulate these markets and the economy, central banks are established. The Swedish Central Bank is an independent operation assigned by the Swedish parliament. Its work is to regulate inflation according to a set inflation goal by implementing the monetary political means necessary (Swedish Central bank, 2022). Since 1992, Sweden has had a floating exchange rate meaning monetary policy has come to play an important role. The policy rate is the interest rate at which banks can deposit and borrow money from the central bank (Sveriges Riksbanken, 2022). If the policy rate is raised, it will lead to banks' interest rates being raised as well. For over a decade, the Swedish central bank has conducted expansive monetary policy resulting in low policy rates and T-bill rates (see Figures 1& 2). This has made it relatively “cheap” to borrow money and made investors more likely to take on more projects. In open economies with a floating exchange rate, there is a significant correlation between inflation and policy rates (Gottfries, 2013). As the policy rate, set by the central bank, has come to affect the rate of inflation more efficiently than that of fiscal policy (Gottfries, 2013).

Inflation is measured as the consumer price index (CPI), which is defined as the change in the price of a standardized basket of products that most, if not all the population, consumes (Official Statistics of Sweden, 2022). As demand increases for the basket, so does the CPI. This can be a result of an increase in population or an increase in disposable income. The demand for the products is increasing faster than the supply, meaning prices increase. To dampen this effect (CPI inflation), central banks will increase policy rates and treasury bills to increase the rate at which is possible to borrow money, which will decrease the demand in the market. This increase in interest rates will decrease the demand for lending and will lower the inflation till it reaches the target inflation, cooling the economy. In an open economy with a floating exchange rate, the monetary policy revolves around the determination of interest rates. Depending on what type of economic situation is desired the central bank can either decrease policy rates for expansive monetary policy or increase it for contractive monetary policy (Sveriges Riksbanken, 2022). This will affect society as consumption will change and inflation rates will do as well.

Real interest will be the determinant factor in the economy. The definition of real interest is approximately the difference between the nominal interest rate and inflation:  $R_r = R_i - p$ . However, for monetary policy to be effective in any expansive or restrictive way it's dependent on the natural rates of interest. The natural rate of interest is a rate determined by the equilibrium between saving and investment and where there is aggregate price stability in an economy. It's a long-term equilibrium rate that depends on different factors. Such as households' willingness

to substitute consumption across time, and external shocks that affect household savings decisions. Expected increases in productivity can also raise the natural rate of interest. Expected increases in productivity cause households to expect more income later and therefore start consuming more today. The interest rates will therefore have to go up to incentivize savings and a level of consumption that fits the production today and not the expected one in the future (Amato, 2005). The monetary policy revolves around the natural rates and incentives for the expansion or restriction of an economy due to the real rates being smaller or larger than the natural rate (Amato, 2005). Building a model around the concept of the requirement for monetary policy to be restrictive is if the difference between the real rate ( $R_r$ ) and the natural rate ( $R^*$ ) to be larger than 0.  $R_r - R^* > 0$ . This is true for the opposite meaning  $R_r - R^* < 0$  for expansive. The natural rate of interest is therefore the benchmarking factor deciding if the monetary policy will be effective and to which rate this will be. This will also determine how banks, corporations, and entrepreneurs will finance their businesses and which financial solutions will be attractive.

### **1.3 Venture Capital**

Venture Capital (VC) is a financing method for entrepreneurial businesses. VC provides capital to start-ups and small firms that are believed to grow in the future (Zider, 1998). VC doesn't only come in the financial form but can also come in expertise and counselling (Isaksson, 2006). Venture capital is defined as an alternative investment (Cumming & Zhang, 2016). This is a classification for large institutional investors, i.e., pension funds, to name other investments to classify their different investment areas to reach a level of diversification (Andra AP-fonden, 2022). A venture capital investment is by its nature risky. It takes place before a company has gone public and is in the early stage of development. This means that there are few records and performance tracks to find (Proksch et al., 2016). Investors engage in VC potential because the above-normal returns are attractive (Zider, 1998)

The main actors involved in the VC market are summarized in the figure,

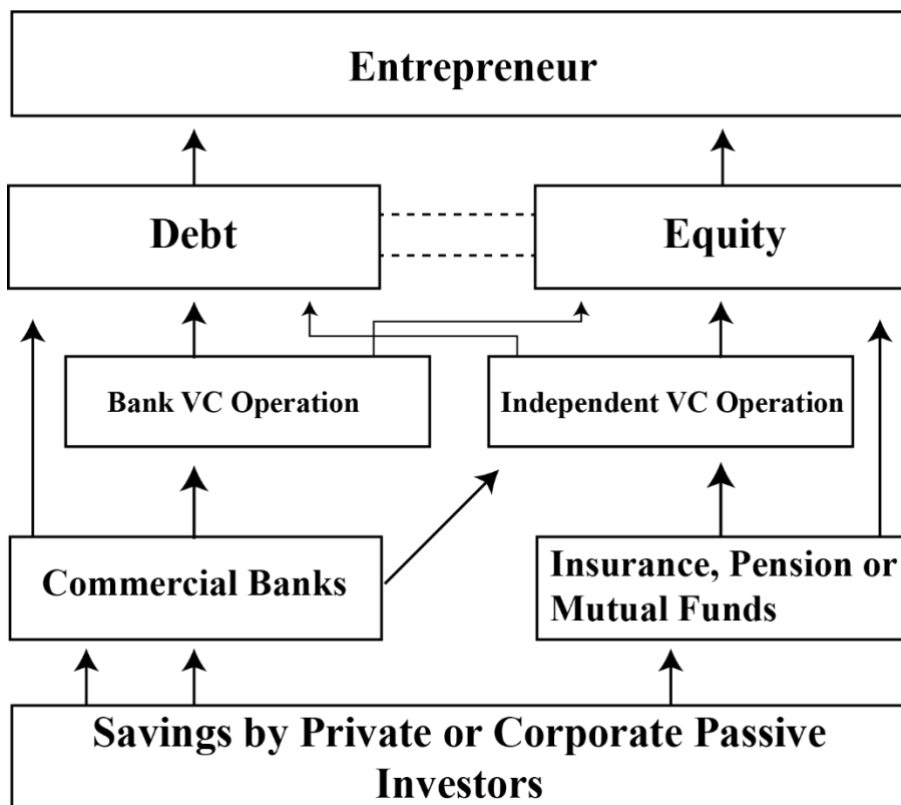


Figure 3- Actors in the VC market. Hull, 2015

The figure above (figure 3.0) describes the actors in the venture capital market. The figure has been complemented by that of Hulls' (2015) version, with the addition of which party will receive equity or take on debt and that is the entrepreneur. The figure shows how realized savings from society get invested into debt or equity in the financial market. The savings from private- and corporate investors will be placed with commercial banks or institutional investors like pension funds. This will then be redistributed into VC funds who will invest in portfolio companies and entrepreneurs with innovative ideas. The portfolio companies will be offered alternatives of debt, equity, or a mix of these two from the VC funds. Note that this does not include all possible actors in the market, just the ones that are relevant to the study.

Despite having more risk, VC is a major economic actor that generates job growth, creates new business models, and promotes innovation and scalability (Samila & Sorenson, 2011). Venture Capital financing enables the growth of small businesses and is therefore an important contributor to the future economic growth of a country. As new businesses sometimes take decades to generate benefits, VC firms play an important role in providing finance from a long-

time perspective (Gompers, 1994). This enables new firms to develop effective product development (Gompers, 1994). As stated, " *Venture Capital is the fuel for high potential growth firms* " - Cummings (2010). This further demonstrates the impact of VC on the economy and society. VC helps entrepreneurs and by extension innovation. Gompers (1994) argues that past, present, and future globally leading firms had been, are, and will be financed by venture capital. This further demonstrates the essential contribution of VC in developing and creating opportunities for economic growth.

Venture capital firms contribute in different ways. The main roles of VCs are to increase business activities, improve the business potential, help gain bank trust, provide background for optimal strategies, and enhance rentability (Alpha JWC Ventures, 2022). Furthermore, venture capital plays an intermediary role between investors and entrepreneurs that know little about one another (Jeng & Wells, 2000). Because of this, venture capital firms are experts at solving problems of asymmetric information. VC firms are an essential part of the development of many industries by giving opportunities to entrepreneurs. VC generates economic prosperity by financing newly founded, high-growth firms and providing value-adding activities (Sorensen, 2007). Venture capital funding is particularly helpful for innovative firms. Pradhan et. al., (2019) connect the emergence and growth of start-ups to a booming VC. VC firms fill the blank of the funding gap for start-ups since other funding sources such as banks prefer reducing their risks through their risk management strategies (Zider, 1998). In Sweden, VC firms have been able to invest capital in several future growth sectors that had been neglected by other financing sources such as government financing or regular banking financing (Dahlstrand & Cetindamar, 2000).

#### **1.4 Problem discussion**

Venture capital has gained success by providing capital to innovative young growing firms (Sorensen, 2007). It has been a successful financial tool for the innovative sector historically but especially since 2012 with low-interest rates (SVCA, 2022). With low-interest rates, investors engage in riskier investments to obtain higher returns (Gompers & Lerner, 1998). This means an appreciation for alternative investments such as VC, thus resulting in capital flowing into the VC market. Moreover, with a booming VC market and low-interest rates, entrepreneurs have lots of different financing options available and can choose their best fits. Pradhan et al., (2019) describe that a thriving VC industry is beneficial on a societal basis as it guarantees sustainable economic growth. With the low interest rates for the last decade, VC firms have

been in a good position for their operations. However, previous research has shown a negative correlation between interest rates and VC. Bellavitis and Matanova (2017) show that a 1% increase in interest rates decreases the amount VC fundraises in a year by 3,2%.

How will Venture capital firms fare when recent events have caused the economy to enter a recession and interest rates have risen? One direct consequence is that the raised interest rates lower the attractiveness of alternative investments and investors modify the allocation of their portfolios resulting in less capital available (Gompers & Lerner, 1998). This raises challenges for VC managers to raise sufficient funds and invest them efficiently. Investments that before seemed sound now might seem too risky due to higher costs and amortization requirements. Will the VC managers change their investing preferences and if so, why? These challenges VC firms face impact the innovative sector. Considering the positive effects innovation has on economic growth, understanding how VC firms cope with the raised interest rates is important due to the impact Private Equity (PE) and VC market have on the Swedish Economy. The PE and VC market represents 4,7% of Swedish GDP as of 2021 and represents almost 250000 opportunities of occupation (SVCA, 2023). This makes the VC market highly relevant for the Swedish economy, which would not benefit by a similar dry out like that of 2008. There is a similar velocity of interest rate increase as the subprime crisis. To ensure continued innovation and sustainable economic growth, a well-functioning venture capital market is beneficial. While previous research has shown the correlation between interest rates and VC demand and supply, information about how VC firms react to raised interest rates is scarce.

## **1.5 Purpose**

The purpose of the study is to determine how Venture Capital firms are impacted and how they react in the fundraising and investment process in times of higher interest rates. The study also wants to explore the possible biases that might arise as well as the awareness of VC fund managers regarding the theory of Natural Rates, and how their work if at all relates to this theoretical framework. The success of VC investment has a direct effect on society, as innovation drives economic growth and the fuel for innovation is in part the investments from VC firms (Agmon & Sjögren, 2016). VC investments are only possible if VC funds have sufficient capital to operate and make relevant decisions. To be able to fulfil the purpose of the study the following research questions will be set out to be answered.

## **Research questions:**

- ❖ *What kind of challenges do Venture Capitalists face when interest rates increase regarding fundraising?*
  - How do Venture Capital fund managers consider the Natural Rate when proposing fundraising and investing in portfolio companies? Is there any optimal interest rate level for VC operations?
- ❖ How will the increased interest rates impact the investment process of Swedish Venture Capital firms?
  - Is there any familiarity or home bias in Venture Capital portfolio composition when interest rates increase?

## **1.6 Delimitations**

Delimitations will be made to concretize the research. This paper will focus on the Swedish VC market. The study will focus on the fundraising and investment part of VC activity and will be centered around the VC firm's perspective. Consequently, the portfolio companies' perspective will be beyond the scope of the research. The delimitation enables for isolation of the different actors to that of the variable parameter, in this example the interest rates.

## **2. Theory**

The following section will illustrate the theories used to answer the research questions. The law of supply and demand is contextualized to show the relationship between supply and demand in the VC market. Familiarity bias will be studied to see if venture capital managers show a stronger tendency for bias in a situation with raised interest rates. The concept of natural rates concerning VC based on Wicksell's work and the neo-Keynesian approach will be explored. The Mundell-Fleming model will be used to exemplify the macroeconomic landscape. Previous empirical work highlights the connection between the law of supply and demand and interest rates with VC. Lastly, the working process of venture capital regarding the VC process, VC fundraising and VC investments, and the venue of VC in Sweden will be explained.

## **2.1 Theoretical Framework**

With the success of venture capital worldwide, literature and theoretical work have grown. There has been a multitude of research work done to explain this phenomenon through different perspectives. During the span of research on venture capital, there has been a rich history of fluctuations. There have been economic crises (Dot-Com, Subprime) but also times with economic prosperity and this has given input to different studies at different periods. This allows researchers to get a better grip on the topic. Authors have been able to find trends and patterns depending on what state the economy is in. They have also been able to link several parameters to VC activity and understand the underlining problems. For instance, how macroeconomic parameters such as interest rates impact the VC market. This permits the different actors to anticipate situations based on theoretical work. As time goes by, so does the knowledge in this research field grow (Siegel, 2020).

## **2.2 Law of supply and demand**

The supply-demand theory describes the basic economic relationship in a market between buyers and sellers of goods and services. The relationship can be quantified with monetary terms or quantities. The model can be manipulated in different ways to apply to what industry, market, or relevant product. This study will focus on the demand and supply for VC firms.

The model is based on two factors, the law of demand and the law of supply. The demand will be a function of the negative relationship between the quantity demanded given a specific price. Conversely – the higher the price for the goods and services, the lower quantity demanded of the same goods and services. The law of supply is the positive relationship between the price and goods and services. This means the higher the price one can charge for certain types of goods and services, the higher the price will be. If prices for goods and services decrease, so will the supplied amount decrease. This relationship between supply and demand will determine the quantity and the price of the market. When the quantity supplied and demanded are equal the market will be in equilibrium, the price that the parties have come to agree upon is the equilibrium price. This can be shown in the figure below, showing where the function for



demand and supply tangent is the equilibrium quantity and price (Perloff, 2022).

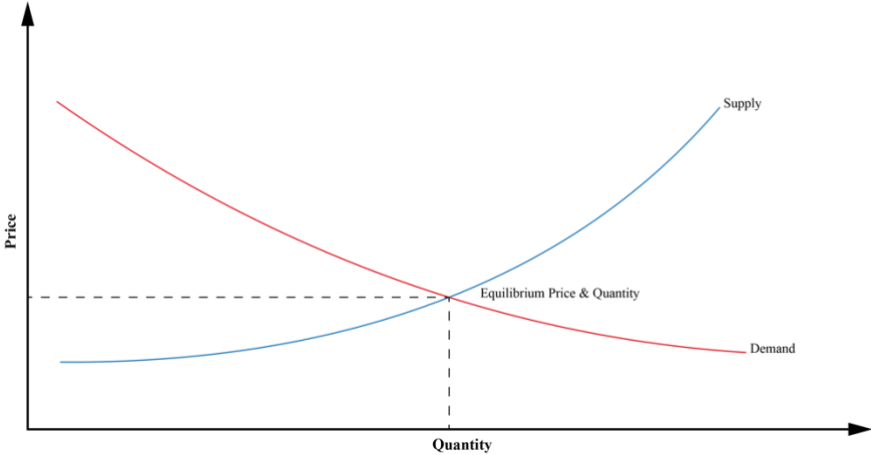


Figure 4 - Demand and Supply. Perloff, 2022.

Figure (4) shows the relationship between the supply and demand of goods and services. When there’s an external shock of one or the other, the curves will shift. This will result in an excess of either supply or demand depending on which factor experience the shock (Perloff, 2022). This will in time regulate itself by demand matching the supply by price changes, and a new equilibrium will take place.

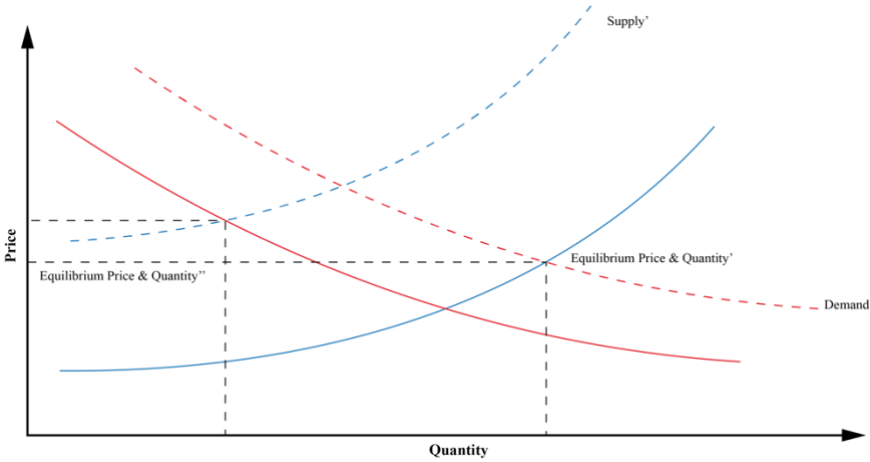


Figure 5 - Supply & Demand, external shock. Perloff, 2022.

In the case for VC firms, the goods and services are harder to quantify. VC are a middle hand for institutional investors to diversify the portfolio and for the portfolio companies to supply capital and knowledge to growing business ideas and entrepreneurs. Implementing the supply-demand model for the study, the definition for the demanding party of capital is the VC firm. While setting up the fund and the supplier of capital are, for example, institutional investors or banks (See figure 3). However, the duality to this relationship is that VC firms are

not only demanding capital but also a supplier of it to the portfolio companies and entrepreneurs. This makes them a middleman in the VC/ private equity market.

Previous research has implemented different standings in the field of the demand and supply for VC and private equity investments and services. Jeng and Wells (2000) imply that its Initial Public Offerings (IPO's) that is a significant driving force for VC firms' investments as it is a long-term exit plan to realize the profits. This will however be affected by the corporate tax in the country the firms are operating in as it will hinder the availability of entry and exit (Cullen & Gordon, 2002). VC markets are noticeably affected by government policies (Jeng & Wells, 2000). The legal measurements taken to promote the capital and financial markets as well as to promote investor protection will have a positive impact on the VC activity and success (Cumming, Fleming, & Schwienbacher, 2006; Groh, Leiser, & Liechtenstein von, 2010). These previous conclusions are backed by later research by Dias & Macedo (2016). Since the demand and supply for VC and private equity increase when investor protection and beneficial legal regulations are put in place (Dias & Da Silva Macedo, 2016) which makes for better predictability and stability in the VC market.

Dias & Macedo's (2016) further findings prove that the demand for VC and private equity are not significant with the macroeconomic factors like GDP growth. However, at a 10% interval the supply for VC is significant due to the same variable. Other macroeconomic factors are shown to be of interest in Bellavitis & Matanova's (2016) findings. They propose that when the interest rates increase by 1% the average fundraising for VC funds decreases by 3,2% and the average demand for VC increase by 2,52%. The interest rates that large banks and corporations can borrow to (T-Bill) closely follow that of the policy rates (Figure 1, 2 & 11). Which determines the monetary policy and will influence the output of the economy. Whether the policy is expansive or retractive will influence GDP growth.

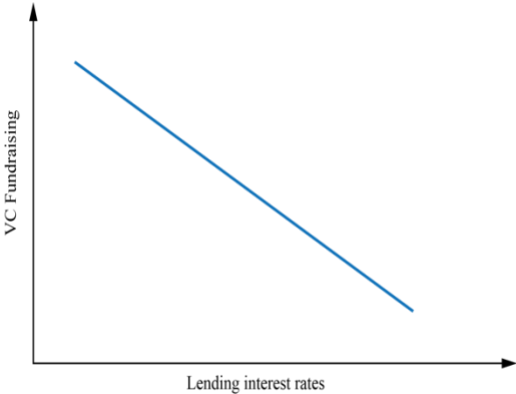


Figure 7 - Supply VC. Bellavitis Matanova 2017

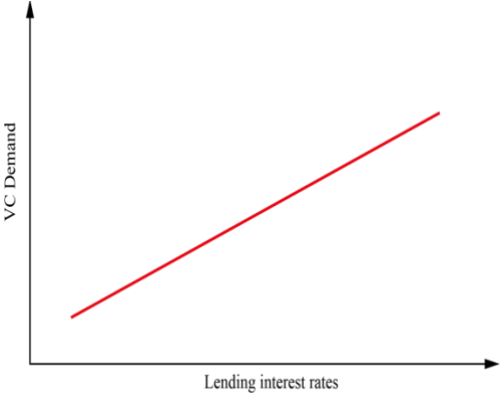


Figure 6 - Demand VC. Bellavitis Matanova, 2017.

By building a model through Bellavitis & Matanova's finding (2017) instead of the price on the Y-axe, they apply the interest rate. And instead of goods and services, they put the number of investments made in VC. The following Figure (8) shows the relationship between interest rates, VC supply, VC-Demand, and VC investments.

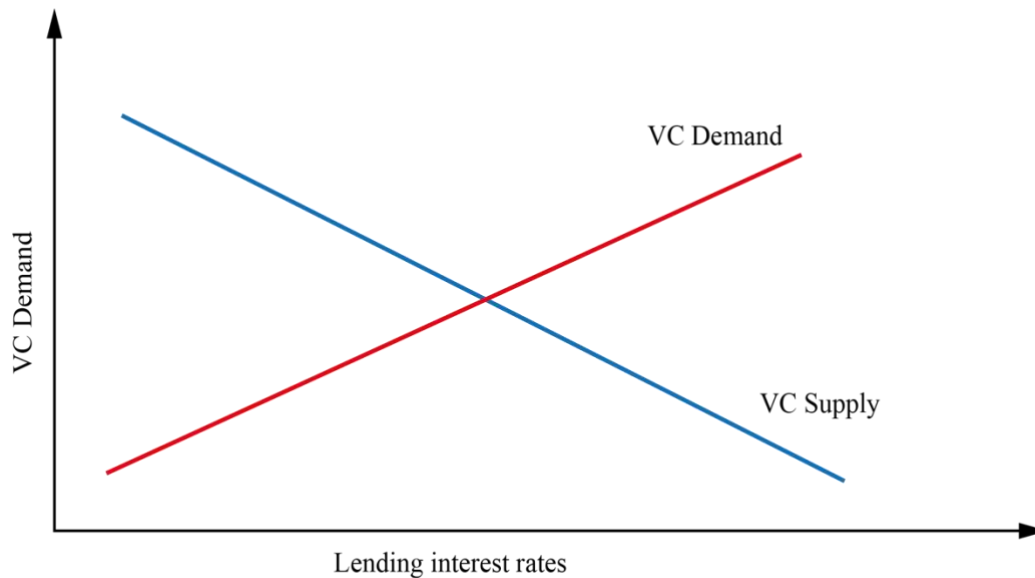


Figure 8 - Supply & Demand, VC's. Bellavitis Matanova, 2017.

These graphs (Figures 6, 7 & 8) show the opposite of the traditional, generic law of supply and demand where the interest rate (substituted for price) increases, the demand for VC increases but the supply for VC funds decreases. This is due to substituting ways of financial options (products) becoming more interesting for the supply side and less interesting for the demanding entrepreneurs. Regular business loans with a bank for example will increase in supply with increasing interest rates, but the demand for the loan will decrease as its price (interest) has increased. This will make entrepreneurs search for substituting financial options such as VC. Which mostly requires equity in the company but also might provide relevant business information and skills which can be crucial to scaling the operations of the entrepreneur.

### 2.3 Familiarity Bias

It is no secret that people are wary of change and the unknown. Unfamiliarity, especially in times of uncertainty, is often a cause for biases in financial and economic decision-making (Cao, et al. 2007). In finance, this can be applied in the form of familiarity bias where investors show a preference for investing in familiar investment objects. Thus, being unwilling to

diversify leads to ultimately having suboptimal portfolio outcomes. In a domestic setting, the familiarity bias is called a local bias and in an international setting, it's referred to as a home bias (Agrawal, 2012). The reasons for home bias, while many, can be divided into two groups: bias because of national or governmental friction or bias related to frictions associated with distance. The friction associated with distance is exemplified by having easier access to information about local firms, being able to interact with local employees and managers, and possibly having ties with the firm. There can also be psychological reasons for the desire to invest more locally, whether it be a sense of community or simply that it feels more comfortable to do so (Coval & Moskowitz, 1999). In a venture capital firm setting, a familiarity bias can manifest as a reluctance to invest in potential portfolio companies outside of the industry that the firm focuses on because of its unfamiliarity. It can also be shown on the investor's side as they might be more cautious as to what firms they choose to invest in. Whether familiarity bias has increased with the raised interest rates and how it can manifest will be explored in the study.

## **2.4 Natural Rate of interest**

*This section will discuss the phenomenon of the Natural rate of interest and how this can be derived from the real rate which will affect Venture Capital fundraising and investments.*

### **2.4.1 Wicksell / Cumulative process theory**

The natural rate is an economic theoretical framework of Knut Wicksell. Wicksell based his work on the quantitative theory of money which was conventionally used at this time. The quantitative theory of money, referred to as the Fischerian theory, is defined as the level of money supply that determines the price levels and inflation in the long run (Humphrey, 1997). This means that an increase in the money supply will increase inflation. To provide a more precise analysis and the relationship between money supply and inflation Wicksell added the concept of natural rate and developed the cumulative process theory.

Wicksell's definition of the natural rate can be regrouped into three major points. He defined the natural rate as the rate of interest that equates saving with investment, the marginal productivity of capital, and the rate of interest that is consistent with aggregate price stability (Amato, 2005). Even though it does not explicitly link all three points together, it does not exclude that they coincide either. It is important to note also that according to Wicksell, the natural rate corresponds to the equilibrium rate of an economy, that it is characterized by a long-

run perspective, and that it is not fixed so it reacts with and follows the overall economy (Amato, 2005).

### **2.4.2 Neo-Keynesian model**

The Neo-Keynesian model or as Woodford (1997) refers to as the Neo-Wicksellian model builds on Knut Wicksell's work of the cumulative process theory. This model uses some assumptions to get a deeper understanding and to determine the natural rate. For instance, according to the Neo-Keynesian model, prices are sticky, meaning prices do not react perfectly to a change in market demand. This is also known as price elasticity.

According to the Neo-Keynesian model, the natural rate is defined as the real interest rate obtained in a flexible-price, rational expectations equilibrium. Since agents are presumed to form rational expectations (Amato, 2005). Three characteristics are important to note regarding the Neo-Keynesians' definition of the natural rate. Firstly, the natural rate is a one-period interest rate. Secondly, the natural rate is an equilibrium real interest rate that is defined period per period. Thirdly, it is bound to vary between the short and long-time perspectives. In this definition, the natural rate is a long-term equilibrium rate. Furthermore, Wicksell and the cumulative process theory connect the concept of natural rate and investments. Stating that if loan and deposit rates set by banks are below the natural rate, then there is an excess demand for funds by firms to finance investment projects. (Amato, 2005).

### **2.4.3 Mundell-Flemming Model**

There have been previous attempts to derive the actual natural rate through different methods. This study won't try to derive the actual level of the natural rate of interest but rather explain what factors it takes related to and how it will affect the economy in which VC firms are active. To be able to do this the Mundell-Fleming model is a comprehensive way of describing different factors of the economy and how they interact with each other. This is the way that the Federal Reserve attempted to derive the Natural rate of interest, and this will be a simplified version of that (Federal Reserve System, 2020).

The Mundell-Fleming model can be derived in different ways depending on how the economy is constructed. In this example, examining the Swedish VC market, it's an open economy with a floating exchange rate a market for goods and services, and a monetary market. It deals with inflation and unemployment within its workforce and a policy rate set by the

independent Swedish central bank to keep inflation at the targeted level. Through these four functions can the Swedish macroeconomic landscape be explained.

**Production market:** Equation 1 – IS Function, Gottfries, 2013

$$Y = C(Y - T, Y^e - T^e, i - \pi^e, A) + I(i^e - \pi^e, Y^e, K) + G + NX\left(\frac{e^P}{P^*}, Y^*, Y\right)$$

**Monetary market:** Equation 2 – LM Function, Gottfries, 2013

$$\frac{M}{P} = \frac{Y}{V(i)}$$

Relationship between foreign interest rates, domestic interest rates and the exchange rate.

**Interest rate parity (IP):** Equation 3 – IP Function, Gottfries, 2013

$$1 + i^* = (1 + i) \frac{e^e}{e}, e = \frac{1+i}{1+i^*} e^e$$

The relationship between inflation, output, and cost-push shocks.

**Philips model (PC):** Equation 4 – PC Function, Gottfries, 2013

$$\pi = \pi^e + \beta \hat{Y} + z$$

(See equation 1-4 in appendix for explanation of each variable in the functions.)

These functions will then be able to explain the macroeconomic landscape and be able to derive different scenarios of monetary or fiscal policy within the economy considering different factors that will determine the economy. Since this study focuses on the Swedish market, the economy will be considered an open economy, with a floating exchange rate with a targeted rate of inflation of 2% (Riksbanken, 2022).

Figure (9) shows how the interest rates would need to change if there were an external shock to the production which would increase the production (shift of IS-curve). If the output would increase, then the inflation would rise above the targeted rate of inflation ( $\pi^* < \pi'$ ). This would require an increase in the interest rate to bring the production to its natural level ( $Y = \hat{Y}$ ). As interest rates increase so does the exchange rate, which in turn attracts capital to the said economy.

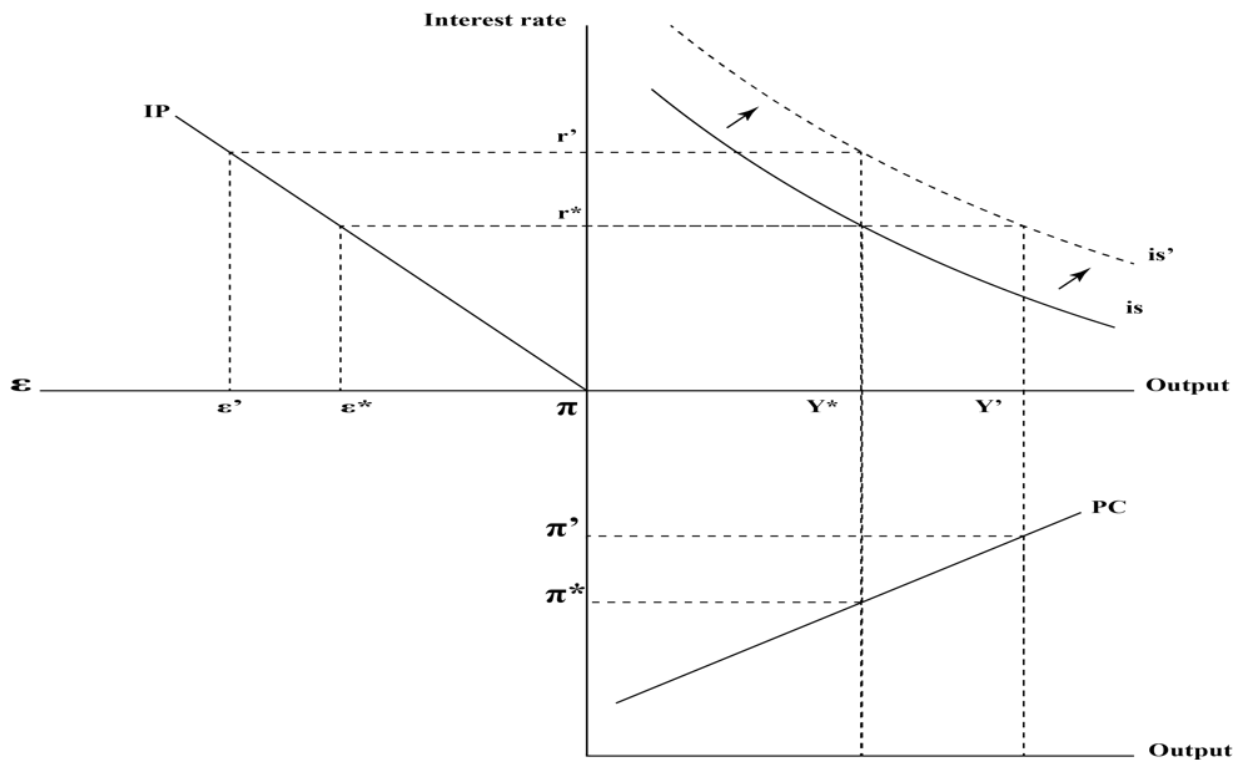


Figure 9 - Monetary Policy in an open economy, floating exchange rate. Gottfries, 2013.

## 2.5 Previous Empirical work

There has been previous research that explores the relationship between VC and a change in interest rates. Gompers and Lerner (1998) show that investors have different preferences regarding investment choices at different interest rate levels. They mean that when interest rates rise the attractiveness of investing in venture capital funds decreases due to the expected return in VC concerning other possible investments. Bellavitis and Matanova (2017) construct a model based on the findings of Gompers and Lerner (1998) to determine the relationship between interest rates and VC activity (fundraising, demand, and investments).

Bellavitis and Matanova's (2017) paper is a quantitative study that explores how VC activity is linked to VC supply and VC demand regarding interest rates. Their findings show a correlation with a 1% increase in interest rates which results in a 3,2% reduction in the average amount of funds raised in a year and an increase of 2,53% in VC demand the following year. In other words, an increase in interest rates results in less capital available for the VC firms but a higher demand from the portfolio companies to be financed by VC. With the groundwork from Gompers and Lerner (1998) and the correlation of interest rates and VC activity from Bellavitis and Matanova (2017), this study aims to identify the challenges that come from the changes in interest rates considering Bellavitis and Matanova's conclusions hold.

## **2.6 Venture Capital Process**

The venture capital process has been described in different ways by different authors. Isaksson (2006) merges two different approaches from Bygrave, Timmons (1992) and Tyebjee, Bruno (1984) in his paper. In this merged VC process Isaksson (2006) defines the VC process as consisting of five stages: establishing funds, deal flow, investment decision, value-adding, and lastly exiting. This study will examine how the raised interest rates affect the different stages of the VC process and the challenges it brings. Isaksson (2006) describes a tight relationship between each stage of the process. The different stages are linked and work hand in hand creating a learning process that enables the different stages to become more efficient since they have constant feedback loops to previous stages. The venture capital process is therefore dynamic by nature and not constant. It can be a complex process as it involves a wide range of stakeholders (Gompers & Lerner, 2002).

Through the VC process, VC firms provide capital to young innovative firms. VC firms, therefore, contribute to the inventive process. Agmon and Sjögren (2016) state that the inventive process is the most important driver of economic growth. VC firms consequently contribute to the future economic growth of a country. However, to provide capital to entrepreneurs, VC firms first need to raise capital for their funds.

## **2.7 Venture Capital Fundraising**

With capital, VC firms can invest in attracting investments and perform well (Gompers & Lerner, 2001). Therefore, fundraising is a crucial part of VC firms and one of the fundamental parts of the VC process. It is essential for VC firms to constantly attract investors and capital to be able to place investments in portfolio companies.

The fundraising level in VC is determined by the amount that investors want to invest in the market. This in turn is directly related to the level of interest rates according to Bellavitis and Matanova (2017) who describe that LPs prefer to invest in VC under low-interest rates since they are unable to earn high returns in other asset classes. However, other factors affect VC fundraising. Schoar (2005) demonstrates that a good reputation and previous well-performing funds tend to attract significantly more capital. More capital is also provided to VC firms that bring strategic/management expertise on top of the financial side (Cumming et al., 2005).



There are other factors affecting VC fundraising on a broader level like market cycles. Lerner et al (2008) argue that particularly hot public markets associated with positive performance have a strong effect on VC fundraising. Regulations also impact VC fundraising as they are tightly connected to changing behaviors. For instance, a reduction in the capital tax rate would promote investments and thus boost VC fundraising (Gompers & Lerner 1999). These parameters shift VC demand which impacts the fundraising of VC firms (Bellavitis & Matanova, 2017).

In the fundraising process, there are several contributors. These contributors in the VC funds are called limited partners (LP). In the European market, the major LPs are government agencies, pension funds, various endowments/foundations, corporate pension funds, insurance companies, family offices, and financial institutions (EVCA, 2015). These stakeholders represent roughly 90% of the fundraising of VC funds, and government agencies are the major investors. Most of the capital invested in VC funds comes from intermediaries that manage money for different types of beneficiaries (Agmon & Sjögren, 2016). The beneficiaries are, for example, the middle- or working class whose savings convert into investments through banks and pension funds. While the focus of the study when it comes to fundraising is the effect of the raised interest rates; it is also important to be aware of other factors that may affect the fundraising.

## **2.8 Venture Capital investment**

*The following section will present the components of investments in venture capital funds.*

### **2.8.1 Sources of investment/deal flow**

The term deal flow is used when it comes to the frequency of potential investment proposals available. Böhner (2007) defines it as - "*the process by which deals enter into consideration for VC, resulting in the flow of investment opportunities a VC can select from*". While it is beneficial for VC firms to have many potential portfolio companies with lots of different investment options available, the screening process resulting can be complex and brings costs. VC firms will therefore try to narrow down the deals based on where there is a high probability of investment. Depending on the quality of the deal flow, the quantity of the deals impacts VC investments accordingly. For instance, with lower deal-flow quality, there is a higher rejection rate, and thus a higher quantity is required. Conversely, with higher deal-flow quality, a lower quantity could be sufficient as more deals have the potential to become realized investments

(Böhner, 2007). Furthermore, institutional investors cite expected deal flow as one of the top criteria when it comes to financing VC firms (Groh & Liechtenstein, 2009). This would mean that VC firms with a higher deal flow or better quality of deal flow would attract more capital. The latter argument implies that deal flow also impacts the fundraising part of VC activity.

There are two fundamental approaches regarding the deal flow (Sweeting, 1991). The first approach is the proactive one. This means that the VC firms themselves actively seek opportunities by analyzing the market. This approach sets up the VC firms as the major actor in finding investment opportunities and involving in innovative environments. The other approach is the reactive one. This works in the opposite way where it is the entrepreneurs that find the VC firms and present their business models and growth plans. Notably, most deals occur through the ‘reactive approach’ (Sweeting, 1991). This is further studied by Engebretsen and Lundberg (2000). Their research included seven Swedish venture capitalists who responded on their main sources of investment proposals. The findings showed that the entrepreneurs themselves and the informal parties are the main sources. Moreover, the findings of Böhner (2007) suggest that VC firms prefer the proactive approach. The proactive approach enables VC firms to focus on finding and contacting the most relevant potential portfolio companies thus raising the quality of the deal flow while minimizing costs.

The research on deal-flow intensity regarding the market cycles does not seem to be pronounced. Based on the economic prosperity and the production of a country along with the theoretical framework of supply and demand, the deal flow follows the business cycles. As the economy is expanding, the deal-flow increases due to portfolio companies demanding more capital. Contrarily, during a recession, the deal flow is lower due to less capital available in the market. However, Chicktay & Barnard (2018) argue that times of economic downturn can spur the entrepreneurial drive because of job losses, and in that respect deal flow is counter-cyclical to the market. The latter argument would coincide with Bellavitis’ and Matanova’s (2017) study which implies that VC demand has a positive relation to increasing interest rates.

### **2.8.2 Investment Decision**

The investment decision can be divided into 4 main parts: investment evaluation, valuation, contracting, and financial structuring (Isaksson, 2006). The investment evaluation is the center of VC firms’ work. This process is known as screening. The main idea is that VC firms analyze and select the best investment options based on several criteria (Lai, 2006). These criteria can

range from rational and measurable data such as the internal rate of return to subjective criteria such as the experienced quality of management or the quality of the business model. The burn rate is also a frequently used measure in the screening process. The burn rate describes the rate at which a portfolio company spends its venture capital to generate future positive cash flows (SVB, 2022). To further understand the importance of the screening process in the work of the VC firms' Tybjee and Bruno (1981) add that venture capitalists spend almost 50% of their time screening and evaluating.

Along with the screening process goes the valuation. This relates to the idea of finding a fair price for the deal. One common way of determining the firm value is by using the free cash flow valuation (Berk, DeMarzo, 2019). The valuation process can be complex and is based on forecasts and expectations. Some important parts that shape the valuation besides the expected future cash flows are for example the profitability or the growth forecasts (Damodaran, 2002). However, estimations need to be made and this raises some problems with the reliability and validity of the valuation process, and this creates negotiations.

Through negotiations, contracts are made to secure the best possible outcome and minimize moral hazard, where each party won't behave correspondingly to the other. "The term moral hazard refers to the idea that individuals will change their behavior if they are not fully exposed to the consequences" (Berk, DeMarzo, 2019). In the case of VC, this can result in risky actions by the entrepreneurs without the presence of contracting. The presence of contracts between VC firms and entrepreneurs can be described as a basis for successful cooperation (Barney et al., 1994). It creates a mutual understanding of roles and holds the parties legally accountable for the deal.

The fourth part of the investment decision is financial structuring. As the main role of a VC firm is to transfer both capital and knowledge to the portfolio company, financial structuring refers to the capital-transferring part (Isaksson, 2006). However, all capital is not provided at once to the portfolio companies but rather in a multi-stage process (Kiholm & Smith, 2000). The investment made by VC firms can take different forms (Isaksson, 2006). The most common form is through equity capital where the investor provides capital and gets equity in the portfolio company in return. Another common form is convertible debt (regular debt loan that can be converted into equity later). According to Isaksson's survey in 2000 equity capital represents 63% and convertible debt represents 20% of the deals on the Swedish VC market.

Jeng and Wells (2000) find that IPOs are the driving power of VC investments. They argue that the main risk for VC firms regarding investments is not getting their money back. Therefore, the exit plan is crucial for them and will impact the level of investments. A viable exiting tool generates effective solutions for VC firms to get compensated for their investments. Since equity capital is the most common source of financing on the VC market, this means that when the portfolio companies go public e.g., through IPOs, they permit an effective exit for VC firms. (Jeng & Wells 2000).

### **2.8.3 Investments in different stages**

The investments for VC firms vary depending on which of the stages that the potential portfolio companies are in. Agmon and Sjögren (2016) describe these different investment stages as the seed stage, early stage, expansion stage, and late stage. The seed stage is the earliest stage for portfolio companies where the underlining ideas are born. VC firms rarely engage in the seed stage. The early stage is where VC firms start to invest. Investing in the early stage is referred to as investing in “pure ideas”. VC firms also engage in investments in the expansion stage and the later stage. Investing in these stages is related to investing in development and commercialization (Agmon, Sjögren, 2016). In the US market in 2014, 2% of the deals were in the seed stage, 32% were in the early stage, 42% were in the expansion stage and 25% were in the late stage (NVCA, 2015).

## **2.9 Venue of Venture Capital in Sweden**

Isaksson (2006) describes the venue of venture capital in Sweden through three different phases. The first phase (the 1980s) consisted of the first deals made at a time when capital investments were discouraged because of a high capital tax system. To find solutions to this problem, inspiration was taken from the US market. Legislation adapts and it permits a more liquid market that gained in popularity. The second phase started in the mid-'90s and surfed on a booming economy with a favorable macroeconomic environment. This meant rapid growth for venture capital, enhanced by government initiatives along with the entering of, for instance, investment firms that brought capital. The end of the dot-com crisis meant the beginning of the third phase. With an overall market collapse, the venture capital market had to rebuild itself. This meant a renewal of the stakeholders involved as a lot of VC firms in Sweden did not survive. The crisis impacted investors' perceptions and choices regarding risks. A new wave of innovations brought along new investors, and this meant a regained trust that led the VC market to be back up and running and booming in the mid-2000s (SVCA, 2022). Following the

subprime crisis, one could argue that Sweden is going through a fourth phase. The market first went through a slowdown before performing all-time peaks both in deals and the amount invested in VC (SVCA, 2022).

### **3. Method**

*In the method chapter, the procedure of the study will be disclosed. It will present what, how, why and which methodological approach was selected to accomplish the purpose of the study and answer the research questions.*

#### **3.1 Methodological approach**

For the study's completeness on how Venture Capitalist fund managers choose to operate according to increasing interest rates, this study takes a qualitative approach. Previous studies are focusing on the correlation between the interest rates, and the supply and demand of funding in VC funds. The purpose of this paper is therefore to find out how fund managers choose to manage these circumstances and if this will affect the ways VC managers choose to construct their portfolios. As earlier studies have mainly focused on the quantitative qualities of the subjects regarding VC firms, this study purposes to find out the 'why's' and the 'how's' of the correlation between interest rates and VC funding. The research questions will therefore be answered through a qualitative interview study.

Analyzing the data and its use of it will however be subjective which also is a beneficial and negative factor for this method. As it's heavily dependent on the researcher or author, the analysis will be subjective to the author's point of view. The analysis of the data will be subjective to each observer. Which possibly can skew results. As well as it can help the study by having the freedom of interpretation that might aid the study to provide relevant results

#### **3.2 Choice of respondents**

The study objects and respondents were chosen in a non-probability, non-randomized manner. All the VC firms that were approached were chosen according to a couple of different criteria. They needed to be based in Sweden, or at least have a Swedish operation. This way homogeneity is ensured in the sampled group and there is relevant knowledge about other parts of the VC industry. The potential respondents were approached through email presenting the frame of the study, purpose, and ethical aspects of their cooperation. As 27 firms were

approached. 10 of these replied. Three of these declined, five accepted and two of these asked to interview in written form. The accepting firms approved to participate in one-to-one interviews with the authors through digital forms, in this case, the meetings were held over Zoom. The final respondents are listed below with the organization that they represent. The following information is found through interviews or secondary sources.

**Table 1 – VC Respondents Categorized by investment sector, No. Portfolio companies and which roles.**

Respondent	Organization	Investment Sector	No. Portfolio Companies	Respondent's role
A	Devotion Ventures	B2B SaaS	18	Co-founder and general partner
B	Pegroco-Invest	NAV	7	Analytics / Investment manager
C	Saminvest	VC funds	13	Head of direct investments
D	Zenith Ventures	Early-stage tech	17	Investor relations manager
E	SVCA	N/A	N/A	Head of public affairs and research

### 3.2.1 Background of the Respondents

The authors have interviewed respondents that actively work in the VC industry and have experience with the characteristics and principles that rule the VC market. The spread of respondents is larger than first intended, which gave room for a broader spectrum of answers than previously hypothesized. The respondents covered areas like VC fund managers, entrepreneurs, institutional investors, and investment managers. This variety of roles of the respondents made for interesting comparisons and opposing views on the VC market. The respondents, classified as respondents A, B, C, D, and E, did all represent a VC fund but also had roles in other organizations, and previous experiences within the VC market.

Devotion Ventures (respondent A) is the CO founder and general partner at Devotion Ventures. It's an unlisted Swedish Venture Capital firm with Total Net Assets of 7,7 million SEK (Devotion Ventures, 2022). Backing comes from Limited Partners in the form of private investors.

Pegroco Invest (respondent B), however, is a publicly listed investment firm that focuses mainly on small and mid-cap unlisted corporations in which they can buy at least the majority of voting shares. The firm is promoting a Swedish geographical area of operations; however, this is not forced. Pegroco Invest's portfolio is industry independent for a good spread of diversification. This is to ensure the best return on investment for the shareholders (Pegroco Invest, 2022).

Saminvest (respondent C) The head of direct investments for Saminvest, a corporate Venture Capital firm that focuses on not competing with the private firms and rather taking market shares. Their purpose is to complement the market.

Zenith Ventures (respondent D) is a private Swedish VC firm that focuses on small tech start-ups, located geographically in the Nordic area (Zenith Ventures, 2022). It's partly owned by Saminvest (Saminvest, 2023) and the co-founder of the VC firm (Zenith Ventures, 2023). Zenith is an active owner to help small firms grow. One of the funds, "Zenith Venture Capital I AB (publ)" consists of 14 portfolio companies with a Net Asset Value of approximately 403 million SEK (Zenith Venture, 2023).

Swedish Venture Capital Association (SVCA) (respondent E) is an industry association for the Swedish VC market. Its function within the market is to spread knowledge and fact about private equity and its role in the Swedish economy. Promote cooperation and entrepreneurship between stakeholders. Its other functions are to work for good conditions for the VC market and its members as well as to keep up with the latest legislative changes. The Association consists of inter alia, 24 VC firms, and four LPs among other actors in the PE market (SVCA, 2022).

### **3.3 Data collection**

This study relies on data collected in several different instances to be able to justify the purpose. Partly there's the data collected for the empirical work to build relevant theories and models to create an explanation for the thesis. This data was collected through the database of the University of Gothenburg as well as different economic journals reached through Google Scholar. Keywords searched were "Venture Capital", "Supply and Demand for Private Equity", and "Challenges for Venture Capital". Once an article made it through the authors' internal review, the articles reference list was used to find more articles regarding the subject. These

articles were then reviewed on which economic theories they were based which developed this study's theoretical framework.

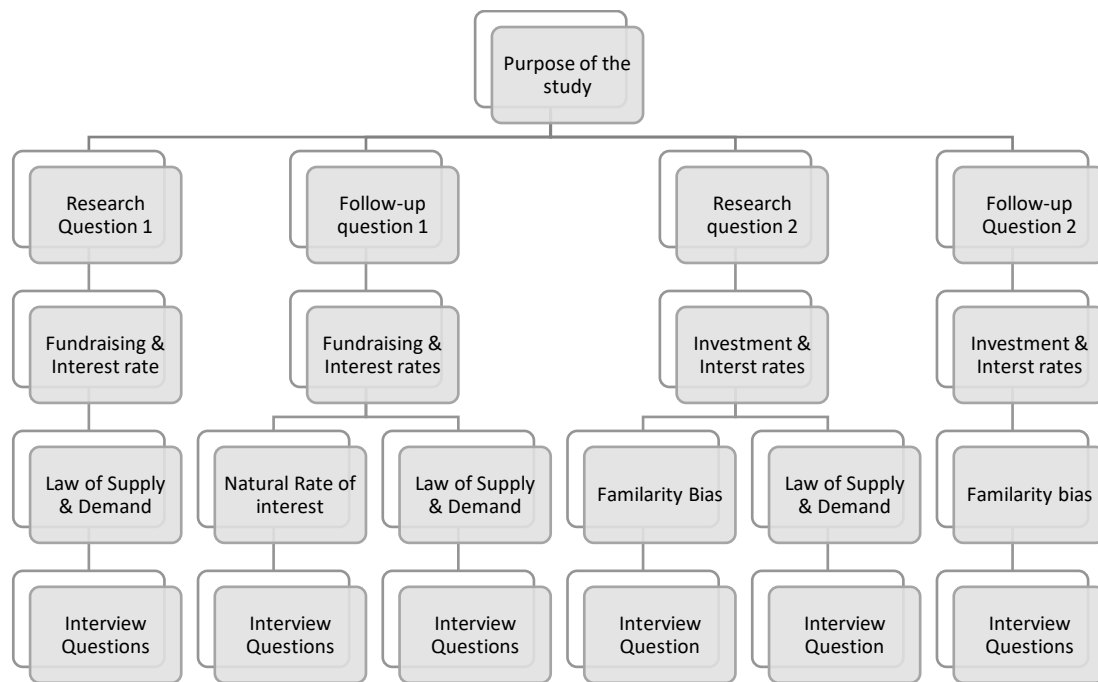
The statistical data which explains the interest rates in Sweden have been gathered from the Swedish central bank which the authors found to be the most reliable source for this type of information. It, along with the Swedish Statistical Bureau, was the two source of raw data that's been collected. Data from Refinitiv Eikon was also discussed to be included regarding the total net asset values of funds in Sweden but was not followed up on due to time restraints.

The primary data has been collected through a series of interviews with different roles in the VC industry located in Sweden. The Interview questions, which are providing the study, are based on previously stated theories. Meaning that the origin of each question is directly linked to an economic theory which in turn is linked to the research questions. The secondary data collected to further deepen the understanding of each respondent was collected through either their websites or through articles written about them. This data was to further complement the respondent's description.

### **3.3.1 Interview Guide**

The interview consists of mostly open-ended questions that give the respondent the freedom to answer in their way. When a relevant follow-up question is thought of, the authors have the freedom to ask; either to ensure that the respondent answers the question correctly or because an interesting bit of information that needs further elaboration comes up. The first draft of interview questions was discussed within the group, sent to a supervisor for evaluation, and then revised and discussed again.





**Figure 10 - Interview guide, categorization of interview questions**

The figure above is meant to illustrate the process of formulating relevant interview questions. The interview questions were written with the purpose of the study, research questions, and theories in mind. The reason for this is to have as many relevant questions as possible so that the answers given can be used to analyze the results with our chosen theories

### 3.3.2 Qualitative interviews

Due to time restraints for the respondents, five interviews were conducted that lasted approximately 30-50 minutes. Each of the respondents was presented with the background and the purpose of the study as well as an ethical disclaimer on which they had to reply as if to contribute to the study or not. No other information was given to the respondents with the hope of giving spontaneous, truthful answers to each question (Patel & Davidson, 2019). The interview guide (see appendix 7) consisted of questions categorized and derived from the research questions with the chosen theories applied to them.

- Respondent A: date of the interview was 12/12/2022. The interview lasted 30 minutes.
- Respondent B: date of the interview was 13/12/2022. The interview lasted 50 minutes.
- Respondent C: date of the interview was 15/12/2022. The interview lasted 45 minutes.
- Respondent D: date of the interview was 16/12/2022. The interview lasted 40 minutes.
- Respondent E: date of the interview was 5/12/2022. The interview lasted 30 minutes.

The interviews were conducted through a semi-structured method, by applying the open questions that were found most relevant for each respondent and follow-up questions based on each reply. The concept of natural rates was presented with a short description of the theory to give the respondents a better understanding of the questions following the concepts. This allowed the respondents to answer personally and freely to each their interpretation of the question (Bryman, 2016). By categorizing the interview guide concerning the purpose of the study, a structure was kept being able to analyze and compare the answers between each of the respondents. The approach was repeated during each interview starting with a short introduction of the study and presenting the purpose. The respondents were then asked whether they were okay with being recorded. The recordings were later discarded after transcription was made. All the authors participated during all the interviews, different roles were designated for each of the authors where one was predominantly asking the questions and following the interview guide while the others took notes. The follow-up questions were asked by whichever of the authors first came to mind keeping the interview interesting for the respondent and to gain as much knowledge and understanding of the respondents' answers as possible.

### **3.4 Data analysis**

Analyzing the data collected through the interviews starts with the transcription of all interview material. This material was collected through the interviews which were recorded in audio files which were later transcribed. Recording the interview helps the study analyze the interview and enhance the transcriptions. The transcriptions involve all available relevant data from the interview. The analysis is based on categories set by the authors to thematize the answers given. This way a theme or pattern in the data set can be identified. Concepts that may be reoccurring across different respondents may be identified this way and based on the frequency, conclusions may be made. In the same order as earlier in this paper, the analysis will be based on the theoretical framework in mind. The categories will not be pre-set before the analysis but will be cross-checked to the theoretical framework and purpose of the study. The categories that were agreed upon are the following:

- ❖ Fundraising
  - Perceived challenges of fundraising with raised interest rates
  - Changes in communication with investors
  - Reasons for reduced access to capital
- ❖ Investments

- Screening process
  - Deal-flow
  - Valuation process
  - Investment and familiarity bias
  - Involvement and value-adding activities
  - Investments and interest rates
- ❖ Natural Rates / Optimal rate

Fundraising, investments, and natural rates were categories decided pre-interview and are within the research questions. However, burn rates and growth were added post-interview since it is a term brought up by all respondents and therefore seemingly important.

❖ Burn Rates and Growth

With these categories and their respective sub-categories, the authors have created a template for the analysis, where the results are interpreted concerning the theories and the research questions. This benefits the study as it aims to make the analysis easier to follow.

### **3.4.1 Reliability and Validity**

In a qualitative study, reliability is crucial, while there is both external and internal reliability, in a qualitative setting only internal reliability is applicable (Bryman, 2016). Internal reliability is secured when the authors agree on the interpretations of the answers from the interviews. To ensure reliability all three authors have been present at every interview and the interviews have all been recorded with permission from the respondents. The participation of all authors and the recording is done to make sure the answers were perceived the same way by every author. If the authors notice that a respondent has misunderstood a question it is reworded and asked again to ensure a correct answer. Additionally, discussions were held post-interview to make sure the authors had similar thoughts on the answers from the respondent. This methodology is most suited to the study and to be able to answer the research questions. The method is constructed to find the qualitative data necessary to further deepen knowledge in the field of Venture Capital in the Swedish market. This method may also give nuances to previous quantitative research.

The deductive approach to the study gives validity to the interview questions as the purpose of each question relates to the purpose of the study. In turn, the analysis of the respondents will

either be confirmatory or discarded according to the theory. This choice is motivated because the more accurate the collection of data is, the less room for error in the analysis and application of the data to subjective interpretations.

**3.4.2 Ethical Considerations**

To preserve the integrity and the ethicality of the study, the respondents were presented with the framework of the study, the interview, and its purpose. The interviews were recorded with the explicit permission of each respondent. Each recording was later discarded after the transcriptions were made as to no sensitive information to be exploited. The respondents were given the possibility to review the citations before publishing to ensure misinterpretations by the authors are corrected and that no sensitive information about their organization is published. The respondents were also allowed to be completely anonymous if they liked however it was encouraged the authors to at least present the organization that the respondent represented. Only the authors had access to the collected data which were handled with care to make sure no unauthorized party could access it. Neither was the raw data shared with any other party. The final thesis was not shared with the respondents before publication.

**4. Results**

*In this chapter, the results of the interviews will be presented which were conducted with professionals in different roles within the industry of Venture Capital. The interviews will be presented in categorical sections which are derived from the research questions. Everything that was said during the interviews will not be presented. Only information that is relevant to the purpose of the study will be presented and analyzed. Other topics which were discovered during the study will be presented in the discussion.*

Devotion Ventures	Respondent A
Pegroco Invest	Respondent B
Saminvest	Respondent C
Zenith Ventures	Respondent D
SVCA	Respondent E

**Table 2 – Respondents of the interview study.**

## **4.1 Fundraising**

*The following section of the result aims to present the answers from the respondents regarding fundraising.*

### **4.1.1 Financing**

Respondent A's firm is solely financed by the VC firm's business partners. Instead of having a few large investors or institutional investors, they have many smaller business partners, comprised of 25 founders of other firms, who would pitch in with relatively low sums such as a million Swedish crowns. In the case of respondent B, their firm is financed by a mix of private equity and debt. Respondent C's firm is a state-owned company and is therefore publicly financed. D's firm is financed by a mix of family offices, high-network individuals, foundations, and governmental money.

### **4.1.2 Perceived challenges of fundraising with raised interest rates**

Respondent A says that the effects of the raised interest rates are not large for their firm. Since they have predefined commitments from their business partners, they do not need to ask for funds for each investment. If the business partners choose not to transfer the funds, they lose the value of their initial investments which is something respondent A means no one wishes to do. Respondent B says the raised rates have affected fundraising a little. To explain the answer, respondent B exemplifies it by taking a 5-year loan of 15 million Swedish crowns at a rate of 5,5% instead of 3,5% which the respondent could do before. The respondent explains that it is not the rate of 5,5% that affects them the most, it is the instalments of 20%. As of now the respondent has not been hit with new amortization rules or requirements but mentions that he prefers loans where the amortization is done over a longer period.

One thing all respondents agreed upon was that it has become more difficult and time-consuming to raise capital. Respondents A and B say that their specific firms are not affected due to how they are financed but that they have heard about the difficulties in the VC market from business acquaintances. Respondents C and D say it is too early to draw a parallel to whether it is the interest rate in and of itself or the economic downturn which is the reason for the raised difficulty in raising capital. Respondent D says that while the raised interest rates are a factor it is not an easy question to answer. Respondent D adds that it depends on what one would compare it to. The last decade has seen unusually low-interest rates where one could raise a fund in 6 months and see that as normal. The respondent continues by saying that perhaps the situation before the financial crisis of 2008 was more of a normal situation regarding interest

rates. During that time, it could take 1-2 years for a fund to raise capital which seems to be the direction firms are going towards today.

#### **4.1.3 Changes in communication with investors**

Respondent A says that their communication with their business partners (LPs) has not changed due to the raised interest rates, except for the occasional remark from LPs such as ‘‘be careful with how you use the money now, make sure it is enough’’. Respondent B mentions how banks are now more careful about the cases they give a green light on. The respondent has had to supplement with some more details on the potential investment objects since banks have become more meticulous in what it invests in. Respondent D says that there is no change in communication with their existing investors as they have a relationship with mutual trust. However, the building of new relationships and connections has become more difficult according to respondent D. In times of uncertainty where raised interest rates are a part, the building of new bridges becomes difficult. Respondent D also puts a lot of weight on the importance of such connections in the business as it is more relational (between investors, firms, and entrepreneurs) than rational than one would think.

#### **4.1.4 Reasons for reduced access to capital**

Respondent B explains how the raised rates, the inflation, and the downturn in the economy have tightened access to capital. The respondent continues by saying that one or two years ago people could raise money for anything on hysterical valuations but that it is now harder as people will hold on to their money. Respondents C and D mention the allocation of institutional investors and how that impacts the venture capitalists' access to capital. Big investors are very meticulous as to how they allocate their funds. If, for example, the value of public markets drops, that means the allocation will be skewed to other parts of the portfolio, such as alternative investments. If the investors then see that their portfolio is overallocated on alternatives, which is where VC fits in, new investments into VC will not be made. Respondent D calls this a sort of ripple effect of the uncertainty of which the raised interest rates are a part. Respondent C also mentions that when the stock market goes down, the capital funds tend to go down as well which in turn leads to less capital available to invest.

## **4.2 Investment**

*The following section of the result aims to present the answers from the respondents regarding investments*

### **4.2.1 Screening process**

According to respondents A (Devotion Ventures) and B (Pegroco Invest), the fundamentals of the screening process have not particularly changed with the higher interest rates. Respondent A adds that more focus is now on the key performance indicators and sustainable growth for the potential investment objects. Respondent B describes that its firm always has had strong requirements on both rentability and cash flows thus impacting the attractiveness of some “cases” (investment opportunities). Respondent B describes that the expected quality and knowledge of the entrepreneur are taken into consideration in the screening process. The only slight difference is that before some cases could be investigated based on growth potential whereas now the rentability requirements dominate. The screening process is now to some extent different according to respondent D (Zenith Ventures). There is an increased importance on sustainable business models and less on growth. Respondents A, B, and D mention the concept of burn rate in the screening process. Respondent B defines the burn rate as the rate of money that the portfolio companies use to generate future positive cash flows. This concept is crucial in the daily work for VC firms according to respondents A, B, and D. Respondent D notes the importance of reducing the burn rates, thus being self-sustainable. Growth at all costs is no longer the case with the higher cost of capital.

### **4.2.2 Deal-flow**

Respondents A, B, and D describe that both reactive and proactive work is done in the deal flow process. All three respondents add that their best investment objects were found with the proactive method. Respondent A describes that because the firm is relatively small, with a small team and a limited time, the proactive approach is better to make sure that they get in touch with good entrepreneurs that they are interested in. Respondent A describes that when start-ups approach them, it would take time to sort the interesting investment objects from the rest. Respondent B describes that cases are developed both proactively and with commercial banks giving propositions to the firm. Respondent D describes that the proactive approach is at the core ideas of the firm. They work actively with different scenario analyses for the industry sectors, and sub-sectors that potentially will have strong secular growth tailwinds based on the analysis. Respondent D adds that most of the cases they receive are from the reactive approach but the ones that they invest in are mostly from the proactive approach. Respondent C (Saminvest) describes a proactive approach when looking for a VC fund. This is because of the

fundamental role that is to stimulate private capital within areas of different industries and business sectors where, at the time of the investment, private capital is sufficiently lacking.

### **4.2.3 Valuation process**

According to respondents A, B, D, and E, the valuation process is affected by the higher interest levels. This is the most affected parameter by the higher interest rates according to them. The portfolio companies are worth less under high-interest rates (E). This in turn shifts the weights in investors' portfolios. Respondent A states that a valuation you would not have reacted to before, perhaps you think now that it is valued too high. According to respondent B, there are some discrepancies in the valuation between the entrepreneurs that look at past and historical data and the VC firms that look at the future. Respondent D describes that his firm has become more disciplined in the negotiations with the entrepreneurs regarding the valuation process and that it has become more of a buyers' market now.

“In 2021 when interest rates were lower and the VC market booming, you could not discuss or debate too much about valuation because that would mean missing out on an investment opportunity. However, now it has become more relevant to discuss and challenge a too high valuation.” - Respondent D

Respondent D adds that during the first half of 2022 there was a large discrepancy between entrepreneurs and investors on the valuation levels. Entrepreneurs tended to compare the proposed valuations to the valuation levels of previous years which lead to fewer deals being closed. As the year progressed the entrepreneurs slowly came to the realization that the 2021 valuation levels were no longer achievable in the current macroeconomic setting and started to accept lower valuation multiples.

### **4.2.4 Investment and familiarity bias**

Regarding the possible familiarity bias for the investments, respondent E describes that VC firms are usually bonded through so-called LPAs (limited partnership agreements) to their investors. Respondent E adds that this means that already at the fundraising stage, investors know in what market sector their capital will be invested. This agreement can vary but usually describes the exact market specificity, geography, and firm stage. This leaves little to no room depending on the agreement to invest elsewhere even though an interesting investment opportunity arises. Respondent C describes that the LPAs are an important tool to make sure that the investment agreements are followed. Respondent C adds that they actively work to



support the establishment of new management teams so that the Swedish VC ecosystem can grow and develop. Respondent C describes that its main investment interest is in VC funds specialized in innovation that are underinvested by the market, typically owning 25-30% of the fund. The target sectors are those where the private capital is not sufficient like for example life science or early tech where it is hard to attract all privately backed VC funds. The focus is on completing the flaws in the market rather than on a specific market sector. Respondent D describes the investment strategy to be in unlisted Nordic early-stage tech firms to be the main investment interest. Respondent D describes that its firm's investments are obliged to be within the agreements in the LPAs. Some precise parameters need to match the agreements to finalize the investment. The main reason why the Nordic early tech firms are the investment strategy is that the founders of the VC firm have previous experience in this market sector and there are possibilities for high returns. Geographic proximity to the portfolio companies is also important, to be able to assist the portfolio companies in the best possible way.

Respondents A and B are not attached to LPAs, and they describe that they have more freedom regarding their investments. Respondent A adds that the different firm stages in the literature are a subjective approach and that his firm prefers to focus on figures. Respondent A describes his firm to invest merely in Nordic business-to-business SAAS companies in various sectors having 1-10 million Swedish kronor (SEK) in revenues per year. The investments are not restricted to the Nordic region with portfolio companies in Estonia and Portugal. Respondent B contrasts the freedom regarding its firm investments to the overall Swedish VC firms. VC(B) invests primarily in Nordic firms with a value of 20-300 million SEK. The focus is on “roll-up” cases, and NAV firms. The main interest is to find growing firms that grow even faster than its booming sector. There has been more focus on the higher interest rates on B2Bs rather than B2Cs even though it depends on the exact nature of the cases.

#### **4.2.5 Involvement and Value-adding activities**

Respondent A describes that the involvement in the portfolio companies varies from case to case but that the overall effect of the higher interest rates would be to get a bit more involved. Respondent A adds that the current situation encouraged VC firms to further develop their existing portfolio companies rather than engage in new ones. Respondents B and D describe their firm to be more of a helping shoulder that involves when needed. Respondent B describes that when providing capital in exchange for equity its VC firm gets a share of the company to compensate them for providing funds. Respondent B describes that this in turn means that in

most of its portfolio companies, one or several board members are from the VC firm or its network. Respondent B describes that this means its firm can influence the strategic decisions of the portfolio companies. Respondent B adds that its firm is equally involved in the daily work of the portfolio companies regardless of the macroeconomic situation and focuses on providing knowledge on topics where the entrepreneurs may lack it. Respondent D is usually a minority holder in its portfolio companies. They put a person (rarely more than one) on the portfolio company's board in cases where it makes sense. Respondent D states that all their portfolio companies don't necessarily need more help in tougher economic times so the involvement depends on case to case. The involvement typically takes the form of counselling based on their experience and network.

#### **4.2.6 Investments and interest rates**

Respondent A describes the overall macroeconomic situation with the valuation of the investment objects going down to be like a discount on attractive investments. There are also fewer investors in the VC market, so it becomes easier to make good deals with entrepreneurs. Respondent B describes that the current macroeconomic situation means fewer overall cases and this in turn means higher competition for the existing cases. Respondent D describes the current situation to put pressure on finding precise valuation and being able to boost the entrepreneurs' incitements even when the market is not as "hot" as in recent years. Respondent C states that it is perhaps a bit too early to jump to conclusions regarding the consequences of the macroeconomic situation.

#### **4.3 Natural rate of interest**

When asked about the natural rates all respondents answered in unison. Neither of them had awareness of the concept or theory of natural rates. After a short explanation for all the respondents neither could point out how natural rates affect their line of work. Respondent D further chose to elaborate that the "meta effect", or "ripple effect" of the macroeconomic situation rather than the interest rate itself.

*"I would not say it's the interest rates that's the crucial part of our work, it's too unprecise given our investment strategy. It is rather the macroeconomic situation that matter where increased interest rates is solely one dimension". – Respondent D*

The quote from respondent D is the answer to how the respondent thinks the interest rates, and the natural rate of interest, affect their workflow and what they think is the cause- and effect on the VC market. Respondent C explains that as their operations aren't financed through any type of debt, due to it being publicly financed, their operations are not heavily dependent on interest rates. Respondent C adds that it might be more the business cycles that are of interest, rather than the natural rate of interest. Neither did the increased interest rates increase the required return on equity for respondent C. Respondent A is not aware of the concept of the natural rate of interest either. When explaining the concept of theory, respondent A states that the lower the interest rate the better for the Venture Capitalists as well as their LPs. Respondent A states that the current increasing interest rates make LPs hold onto capital instead of investing in the funds. However, any further data on the natural rate interest could not be transcribed from the interview. The same was the answer for the remaining respondents. Natural rates are not common knowledge for the respondents without any further elaborations on how this affects their fundraising or what proposal for potential investments in portfolio companies.

Opening the question broader and looking past the theories of Knut Wicksell and Natural rate of interest, when being presented with the question “are there any levels of interest that the respondents would prefer “, the answers had a larger spread. Respondent B would like to see net zero interest rates in its line of work, or rather even negative rates.

*“Zero, or maybe negative rates would be preferred!” – Respondent B.*

Respondent B further elaborated that economic models are constantly changing and investment models likewise. As an example, the respondent mentions that theoretically in the line of work, the natural rates will affect the risk-free rates in a discount cash-flow model (DCF) which will inherently affect the weighted average cost of capital (WACC). The previous argument can be supported by Respondent A who states that the lower the interest rate the better for the Venture Capitalists as well as their LPs. Respondent A states that the current increasing interest rates make LPs hold onto capital instead of investing in the funds. However, to which extent the actual interest rate level is crucial or not to the respondents is arguable. Respondent D emphasizes that their strategy is to invest in early-stage tech companies. The entrepreneur and the business idea are crucial for a successful investment. They continue to point out that some of their portfolio companies thrive during times of economic distress, so if the interest rate is 2,7% or 10% is not of importance to respondent D.

When looking at the historical perspective, most of the respondents (A, D & E) believe that the interest rates (Policy rates) are not particularly high (expensive) as of the date of the interview. At the date of the interview with respondent D (15-12-22), the policy rate was presented as 2,7% (Riksbanken, 2022). Respondent D points out that during his career within VC, this is the highest interest rate condition he's operated with. Compared to his colleagues who've been active for longer in the VC market, however, this is still low in comparison to 20 years ago (see Figures 1 & 2).

*" I think the comparison will be skewed if we only compare it to the last 10 years where we've seen 0% interest rates. What is supposed to be normal? Or are the extremely low interest rates the outlier and now we're back at the normal level? A lot of people have only worked within a booming economy with low interest rates. When I speak to my older colleagues, this is something they've seen happen before." – Respondent D*

This citation can be compared to:

*"Well, the interest rates are not particularly high. It's rather normal now compared to a year ago when it's been extremely low." – Respondent A*

These two quotes both state the comparison between interest rates today respectively 10 years ago and before that. Whereas the interest rates for respondents A and D presumably return to normal levels, neither of the respondents is worried about their way of operations slowing down revenue or success rate by any substantial amount.

## **5. Analysis**

*The results presented in the earlier chapter are categorized and analyzed through chosen theories and previous research. The respondent's answers will be compared and interpreted. This part will also conclude the results and present evidence that answers the research questions which fulfils the purpose of the study.*

### **5.1 Fundraising**

*The following section of the analysis aims to analyze the results from the interview regarding fundraising with the theories.*

### **5.1.1 Perceived challenges of fundraising with raised interest rates**

There was a consensus regarding fundraising across all respondents' that raising capital is more complex and takes more time overall on the market. However, the firms were affected differently by this change. Respondent A acknowledged the overall difficulty in raising capital on the market during these times but was clear in saying that his firm is not affected due to how they are financed through its business partners. Respondent B described a similar attitude towards the fundraising for his firm as it did not result in a high enough cost to be a problem when financing their investments; the banks however were more cautious about what to invest in. Respondent D described the fundraising to be longer and more complex but not implying there to be less capital available for his firm. While there has not been a stop in capital from the banks to venture capital, it can be argued that the supply has dwindled and become more selective. According to Bellavitis and Matanova (2017), higher interest rates are supposed to lower VC supply. Based on these results the study gets a more nuanced perspective on the matter. While no respondent wishes to deny the impact of the raised interest rates and that it has become more difficult to raise capital, they all point out that one cannot forget other factors such as inflation, the recession, and the war in Europe.

### **5.1.2 Changes in communication with investors**

Respondent A mentions comments with some worry from their investors and respondent B says that banks are more meticulous with their screening and ask for more details. Other than that, there is a consensus that communication between the VC firm and their existing investors has not changed. The difference is seen with new investors. According to respondent D, it is the building of new relations with investors which has become difficult due to uncertainty where the raised interest rates are a part. This goes along with the theory of familiarity bias which claims that people tend to choose the familiar, especially when faced with uncertainty (Cao, et al., 2007). While relations with existing investors where there is mutual trust might not change drastically, finding new potential investors can prove difficult due to the familiarity bias present in uncertain times. This aligns with Schoar (2005) who demonstrates that VC firms with a good reputation and a good track record have an easier time attracting funds as they have built good relations.

### **5.1.3 Reasons for reduced access to capital**

The claim that LPs prefer to invest in VC under low interest rates because the returns are not high enough in other asset classes by Bellavitis and Matanova (2017) did not get a pronounced answer from the respondents. No one wished to rule out other factors such as inflation, economic recession, and the Russian/Ukrainian war for example. The reduced access to capital was not argued, only the reasons for it. Respondent C's words about the poorly performing stock market reducing the amount of capital in the funds align with Lerner and Scharfstein (2008), who argue that well-performing public markets have a strong effect on VC fundraising. Changes in public markets can also lead to under- or over-allocation in institutional investors' portfolios which respondents C and D mean change their future investments in for example VC.

## **5.2 Investment**

*The following section of the analysis aims to analyze the results from the interview regarding investments with the theories.*

### **5.2.1 Screening process**

The screening process has, according to our respondents, slightly changed with the higher interest rates. They describe that there is more focus on rentability than growth now. Growth used to be the commonly used instrument to analyze the attractiveness of an investment object whereas now with the higher interest rates it has switched more to pure rentability calculations with the burn rate being one key tool. Respondents A, B, and D note that they get more cautious about how much money is invested and look more deeply into the ways of turning the invested capital into positive future cash flows. "Growth at all costs" is not in place under the current macroeconomic conditions according to respondent D. We can observe that some of our findings go along with those of Marvin Lai (2006). There are a vast number of parameters considered in the screening process that are both objective and subjective. The objective parameters are based on calculations and measurable data whereas the subjective parameters are attached to the point of view and experience of the VC managers. For instance, respondent B describes how the quality of the entrepreneur plays an important role in the firm investment choice. Respondent D describes that its firm is looking into how the entrepreneurs deal with adversity, for example now under higher interest rates when the market is less "hot".

### **5.2.2 Deal-flow**

Respondents A, B, and D describe how the proactive approach permits finding the most attractive investments. Respondents A and D invest almost exclusively in the proactive approach by noting the net advantages. The advantages are resource and time efficiency for respondent A. Respondent D describes how the scenario analysis permits them to determine the interesting firms and therefore the proactive approach suits them best. Respondent B also describes how investment banks play an important role by advising rising sectors and presenting interesting investment objects to them. This would to some extent be classified as a reactive approach. It is notable to observe that even though most of the deals arrive at the VC firms through the reactive approach (for example around 100 pitches a week for respondent D), the interviewed VC firms prefer to engage in the proactive approach. This implies that the quality of the proactive approach outperforms the quantity of the reactive approach. The latter argument goes along with the findings of Böhner (2007). Since the deal-flow process along with the screening process is costly, using the proactive approach is more efficient according to our respondents. Respondent A describes precisely: *“We are a little team having limited time; therefore, the proactive approach enables us to make sure we contact and meet only those potential portfolio companies we are interested in.”*

### **5.2.3 Valuation process**

According to our respondents, the direct effect of the high current rates is that the portfolio companies' valuation has dropped. This builds on the firm valuation theory where the sum of the future cash flows determines the firm value. With higher interest rates, the cost of capital rises and thus the discount factor in this valuation model. With different valuation than recent years, this changes positions in the negotiation process. As respondent D (Zenith Ventures) describes it to be more of a buyer's market now where VC firms can take on stronger positions in the negotiations. We can observe that respondent A (Devotion Ventures) gets the same impression by describing some cases to be “on discount”. The changes in the valuation have raised some potential issues as respondents B (Pegroco Invest) and D note. This builds on the idea that VC firms look at future data whereas entrepreneurs often use historical data as a benchmark. One other direct consequence of this valuation change could be that the investors change their portfolio allocations as respondent C (Saminvest) notes. Respondent E (SVCA) adds that investors' portfolios are unbalanced with a change in valuation. This in turn changes their involvement in alternative investments.

Interest rates impact the VC activity differently depending on the time perspective. The valuation process with the entrepreneurs is linked to the current rates. However, according to our respondents, future interest rates are to be taken into consideration in the investment process as the exciting part is in the future (5-10 years for our respondents). The investment is based on the valuation in  $T_0$  but the VC firms get compensated based on the valuation in  $T_{t+1}$  (in the case of equity financing). This implies that both the current and future rates play an important role in the valuation process and thus in the investment process. The VC firms are therefore sensitive to changes both in the current and future rates for the investment process.

#### **5.2.4 Investment and familiarity bias**

Based on the results, we find no direct familiarity bias in the VC firm that has LPAs. With the LPAs in place, there is little room for flexibility regarding investments. The LPAs also means that all parties know exactly the nature of the investments that will occur. This in turn would lower the familiarity bias since the investment choices are narrowed down through some specific parameters. One could argue however that there might exist familiarity bias in the creation of the VC fund because of the history and experience of the founders. Respondent D describes the founders as having worked for 30 years in the early-tech sector, giving them valuable knowledge regarding all the different parameters. This means that they can determine good investment opportunities and is one reason why the VC firm was created. Respondent A and respondent B are not attached to any LPAs thus having more freedom regarding their investment choices. They both have a monetary upper limit in cases to engage and don't engage early (seed stage) but besides that, they are free to invest in different sectors. Respondent A has a free "mandate" to invest in whatever sector even though preferring B2Bs. Respondent B is interested in developing sectors and has no sector preference if the performance figures are good, describing that the sector choices depend on what cases they get in the deal flow. We find that the investment choices of Respondent A and Respondent B vary with the market and the developing sectors. However, since the investment targets are in early-stage having economic records, Respondent A and Respondent B are not the first movers in a new sector that has not proven potential yet. There is no evidence pointing in the direction of a tendency to a familiar sector when interest rates rise.

Based on our results, we can observe that there are specific strategies in place regarding the firm size and the firm stage where the capital is invested. Overall, the VC firms interviewed stick to their investment strategies because it is where they have comparable advantages.



Respondents A, B, and D describe the specific characteristics needed to generate investments. The limitations set by the VC firms for their investments show that they want to compete in specific niches. Furthermore, we observe an overall interest amongst our respondents for Nordic firms and more particularly Swedish firms. This is not very surprising considering where the VC firms operate. The respondents, even though not openly refusing outside investments, described a preference for close geographic investments. This preference builds on the idea of being close and ready to help portfolio companies. Respondent D describes an intention to be in most cases “available all the time and being less than 2 hours away by plane”. Respondent B describes the intention of keeping investments close due to the deal flow. Respondents A, B, and D describe that their VC firms are based in Sweden, and their networks are mostly in the Nordic area meaning that they have the best possibilities to help entrepreneurs locally. The overall interest in Swedish firms amongst our respondents tends to indicate a form of geographic bias in the investment process. In the case of respondent C, this is because of the purpose and existence itself. It is a publicly funded actor with a mission to complete market failures. It goes along logically to invest locally.

### **5.2.5 Involvement and value-adding activities**

The current macroeconomic situation with higher interest rates means more involvement in the daily work of the portfolio companies for respondent A. This contrasts a bit with the responses of respondents B and D. According to respondent B, the firm is equally involved regardless of the overall macroeconomic situation. The involvement depends solely on the needs of the portfolio companies. Generally, this help takes the form of completing the entrepreneurs' work in fields where they might lack knowledge. Respondent D wants to present itself as more of a helping hand that involves when needed. According to respondent D, this involvement has not particularly changed with the higher interest rates and depends more on case to case. For example, some portfolio companies thrive in low conjunctures and don't need much help whereas others have tougher times needing more help. Considering that the entrepreneurs will generally have a tougher time during the current low conjunctures and that the VC firms want to present themselves as a supporting actor that helps when needed. One could argue that this in turn would mean that the VC firms would be a bit more involved and help.

### **5.2.6 Investments and interest rates**

Based on the results of the interviews it is possible to observe that there are discrepancies between the respondents regarding the perceived competition regarding the investment objects that the higher interest rates brought. Building on the Bellavitis and Matanova model (2017), where the increased interest rates would boost VC demand, we find some of these suggestions of results in our sample. Respondent A feels that because there are fewer investors on the market, there are fewer competitors overall for the cases and there are better possibilities to make good deals with the entrepreneurs. Conversely, respondent B describes it to be fewer interesting cases on the market resulting in stronger competition for the existing ones. Respondent D describes, however, a consistently high deal-flow receiving approximately 200 pitches from entrepreneurs a week. This suggests that the higher costs for borrowing money could result in a gained attractiveness for VC and thus a higher VC demand. Moreover, respondent D describes its overall perception of the VC market to have become more of a buyer's market implying that VC supply has a stronger position in the process. Besides the changed valuation this could be a result of a higher VC demand, meaning that more entrepreneurs are competing for the existing VC supply. These contrasted results underline that based on the supply-demand model there should be fewer cases during the economic downturn but that this effect can be balanced by a spur in entrepreneurial drive in difficult economic times according to Chicktay & Barnard (2018). Perhaps as respondent D suggests, the effects are difficult to determine precisely yet and require more time.

### **5.3 Natural rate of interest**

Looking into the answers of the respondents neither had any profound idea of the concept of natural rates. And when asked about the optimal rates to which they would like to work to finance their operations the spread of answers was divided more.

*“Zero, or maybe negative rates would be preferred!” – Respondent B.*

This reply of the respondent stands out as more distinguished than the other respondents. Respondents A, C, and D did not find the level of interest rates rather interesting.

*“If the interest rate is 2,7% or 10% isn't interesting.” – Respondent D,*

This citation shows the nuances of the respondent's attitude to the level of the interest rate telling the authors that there might be something else that is more of interest in their line of

work. Respondent C describes that the increasing interest rates are perhaps not what's important to the rising challenges in their line of work but rather the macroeconomic changes of the business cycles and that of the production in society. As respondent C says, business cycles are one of the main factors in how the policy rates are determined. If the production, which is the aggregate demand (AD), is under that of the normal  $Y < Y^n, \hat{Y} < 0$ ) then the policy rates will be decreased by the central banks to provide expansive monetary policy to bring AD to its normal level ( $Y = Y^n, \hat{Y} = 0$ ). This could imply that it's more interesting for respondent C to look at the production and its normal level and see the interest rate as a reactive variable. This way of looking at it is supported by respondent D who points to the ripple effect of macroeconomic factors. These factors are not certain what is the causality or effect and which of the parameters should be put most into consideration for the line of work when raising capital for VC funds.

The recent change in the pace of Venture Capital fundraising is not due to necessarily the increase in interest but rather the change in interest rate. This can be derived through the answers of respondents A, D, and E which all imply that it's rather to the sudden change in interest rates and market expectations rather than the realized increase. The expectations of the economic outcome can be seen in the Mundell-Fleming model where the expectations of future AD, inflation, and interest rates have a direct effect on the actual interest rates set by the central banks and the monetary policy. To analyze the data that the respondents give regarding the natural rate of interest and the macroeconomic approach, the Mundell-Fleming model can be used to explain what the respondents explain. The model will be applied through the functions, see Appendix 6 and equations 1-4 for explanations.

Respondents C and D both point towards the uncertainty of how much the interest rates influence their line of work but rather that of other macroeconomic effects such as the state of the business cycles. As previously stated, the determination of the type of business cycle depends on the output gap ( $Y$ ) and whether it is larger or smaller than 0. The data gives no indication of whether production is above or below the natural level. Since inflation has been increasing (Statistical Central Bureau, 2023), this tells us production might be above the natural level (see figure 9). The increase in inflation is due to increases in expectations of inflation, government expenditures, and expected output among other factors, such as excess demand and low supply of products. This increases the consumption and investments, henceforth the output,  $Y$ . As  $Y$  increases, or experiences a shock of demand, inflation increases, which in turn puts

pressure on the central banks to increase the interest rates (above the natural rate of interest) to reduce inflation to the targeted rate of inflation (See figure 9). Since the policy rate of interest is a reactive tool for the Central Bank to use to combat inflation, it's as stated a reaction to some other underlying macroeconomic factor. This shows the awareness of the respondents, at least respondents C & D, about the causality effect of the macroeconomic system. They display this through their reaction to interest rates not being the most important factor but rather the other factors such as expectations of the economy, government expenditures, or cost-push shocks.

Since inflation increases, meaning the price level ( $P$ ), will increase the velocity of the monetary base ( $V_i$ ) which is a positive function of the interest rate. This means that as interest increases, the demand for money increases, which in turn will make it more likely that foreign investments will flow to the country according to the interest parity condition (Gottfries, 2013). Foreign investments flowing into the country would be beneficial to the VC funds as an alternative investment for the foreign actors as it can help diversify their portfolios. This might be a reason why the respondents have yet to see any decline in any of their fundraising yet but only an increase in the time frame from initiating the fund to raising funds.

The change in interest rates over time can be derived as  $\Delta r$ . This analysis should give the indications that it isn't so much the interest level that's important to the VC managers but rather the predictability of the interest rates and the expectations from the market. If the expected inflation is equal to the central bank's inflation goal it will create a stable, and predictable economy. A predictable economy makes it stable, and the VC managers' key performance indicators (KPI) and investment models will be more viable, due to fewer prediction errors. Respondents A and B, who mention that they are heavily involved in their investment models and the KPIs, will highly benefit from predictable circumstances. Even though respondent B's answer was to have a net zero, or even negative interest rate. This could imply that it's not necessarily the level of interest or being able to have cheap funding that's important to the respondent but rather of stability and predictability. Therefore, making the change in interest rate as low as possible, preferably even 0, conversely  $\Delta r = 0$ . This would also make the expected interest rate equal to the real interest rate and therefore the expected inflation is equal to the central bank's inflation goal.

The natural rates are not especially apparent for any of the respondents even though they all seemed intrigued by the subject when presented with it. Neither was especially convinced whether it applied to their line of work. However, as the respondents are convinced that the

macroeconomic factors are of concern to them, this paper will argue that a deeper understanding of the concept could be beneficial for the respondents. It can benefit their long-term strategy of investments as they can build more accurate models if aware of how effective the changes of the policy rates will be on the aggregate demand in the economy and therefore the business cycles.

## **5.4 Discussion**

Fundraising has become more time-consuming with the raised rates among other factors. One thing that is clear from the respondents is that the rates are not particularly high, rather they have been very low for the past decade, and it is now returning to “normal” levels. While the low-interest rates spurred VC activity, it raises the question of whether it is all beneficial. One could argue that being able to raise money for anything on hysterical valuations as one could do two years ago is not sustainable. Sustainability, in this case, 'sustainable growth' where the focus has shifted from growth at all costs, where companies could have high burn rates and it would not be seen as a problem as it would lead to growth, to looking for more economically sound investments. With the raised interest rates, rentability/profitability has become a more interesting variable and growth in and of itself has lost some of its charms.

This could be an interesting continuation that this study did not purposefully set out to find out. How burn rate concerning the lending rates/interest rates will balance out for sustainable growth in start-ups? Building a model of how these factors relate to each other can help VC operations and entrepreneurs further understand their businesses and make rational decisions. This way extreme valuations may not be as much of a problem and the capital stock could stabilize. The stabilization of the economy would be beneficial for the VC firms as the respondents have confirmed that it's the change and volatility of the interest rates rather than the level of it that's crucial.

When examining the material collected through the interviews with respondents, a couple of key concepts keep appearing. The fact that three of the five respondents mention and expressively elaborate on the concept of 'Burn rates' and all the respondents mention that of 'economically sound (sustainable) growth'. These are findings made throughout the study, which were not set out to find in the beginning, and neither were considered in the forming of the hypothesis by the authors of the paper. Neither have the authors made any findings about

the importance of these concepts in the literature which this study will take its stance. However, as these concepts have reappeared throughout the interviews, the findings will be presented.

The burn rate has come to be important to the respondents. When interest rates increase, allocating capital becomes harder. Therefore, the wanted burn rate goes down as it's not sound for the VC firm to burn as much capital for a certain percentage increase in revenue if the cost for them in terms of amortizations and interest increases. As the demand for capital decreases due to the interest rates increasing and the burn rate goes down. This puts a higher requirement on the portfolio companies to grow organically without the help of VC firms to put in the mindset of "growth at all costs". This change of pace in the VC market and the start-up scene makes room for sound growth. Reducing the number of super-inflated companies which barely have any revenue streams, with huge costs and therefore losses that are only held up through external means from investors. These so-called zombie companies won't fit in a society where interest rates increase. This will cause entrepreneurs to develop sustainable business models which can be scaled up through private equity but won't need artificial life to keep thriving.

However, it is difficult to generalize any conclusion due to the qualitative nature of the study. The data collected and analyzed are all personal answers from each respondent based on each respondent's past experiences and knowledge. This makes it hard to make any predictions about the market, but some noticeable trends are appearing in the material.

#### **5.4.1 Critique of Method**

The method chosen for qualitative values was to answer the purpose of the study and the research questions. The method chosen was to conduct interviews with carefully chosen professional VC fund managers. These interviews became the foundations of the study and from which valuable information, data, and help were extracted. The assortment of potential respondents is rather small in Sweden where the Swedish venture capital organization has 27 members working with venture capital as its main business. This relatively small group of respondents will make it difficult with making any broader generalizations, but the quality of the material can still be of good validity. As the study only conducts five interviews, the assortment of any broader patterns can't be concluded as the room for error is too large. Any generalization can't be made as each respondent has a different role in a wide range of organizations. This makes it so that the study's reliability in studying the market is not particularly certain, however, the insight from the different perspectives is still interesting. This

is due to the contrast between the respondents and the un-agreeableness of their replies which leads to showing there is more work to be done and future studies to be made to fully understand the VC market and its actors.

Hardships of the chosen methodology also include the subjectiveness of interview studies where it's heavily dependent on the interpretations of the authors/researchers. This will bias the study to the knowledge, or lack thereof, of the authors. There are plenty of randomized errors that can be taken into consideration when doing interview studies as it can be the interpretation of tone, body language, or common misunderstandings. This will skew results and the analysis as to what the researcher interpreted and will, with most likeliness, be interpreted differently if the study is meant to be repeated.

## **6. Conclusion**

The purpose of the study is to answer the research questions regarding the challenges Venture Capital firms face in the fundraising process in times of higher interest rates, and the awareness of VC fund managers regarding the theory of natural rates of interest. It also aims to explore the impact of the raised interest rates on the investment process and if it will lead to any possible biases in the portfolio composition. The conclusions of this study hope to give insights as to how the VC market has changed and the possible challenges that VC fund managers must face regarding the raised interest rates.

VC Supply has decreased and is becoming more selective but the degree to which a company is affected can depend greatly on how it is financed. Fundraising has become a more time-consuming process that can shift VC firms' focus from other endeavors. The uncertainty present in the economy, where raised interest rates are a part, is a catalyst for familiarity bias in investors. The implication of this is an increased difficulty in creating new investor relations now that investors are keener to keep to the status quo. Relations between VC firms and investors that previously would have created fruitful returns might not be of interest today. The respondents did not believe the raised interest rate to be particularly high, they believe it is the change of circumstance rather than the circumstance itself that has led to the challenges. The VC firms need to readjust to the changes. The working process of VC firms might need to be changed regarding the increased time it takes to raise funds now, compared to before.

The natural rates are not of any interest to the VC managers who were participating in this study. As the natural rates in ways determine the expansive- or retractive economic conditions, this will determine the supply and demand for VC functions and services. As previously stated, when the economy is expanding deal flow increases, which in turn will give the VC firms more options to invest in. Since the participating VC managers preferred not a particular interest rate by which to operate but rather a very low change in interest rate. The lower the change, the more predictable the surroundings, making estimations more accurate as fewer prediction errors occur. This implies that there might be more relevance to studying the change in the interest rate and the velocity of this change. And connecting that to total net asset value flowing into the VC funds could give an interesting perspective to help figure out what might be the biggest challenge for venture capital managers.

According to our respondents, the biggest impact of the higher interest rates on the investment process is to lower the valuation of the portfolio companies. This in turn reshapes the VC market by giving a stronger position to the VC firms in the negotiations with the entrepreneurs. Moreover, the focus has switched from a growth perspective to a rentability perspective. Some key processes are impacted such as the screening process where some cases are not attractive only based on growth potential. A change in valuation and on the focus on growth can have positive implications. As previously discussed, this change can reduce the number of inflated zombie-companies and instead make VC firms focus on portfolio companies with sound growth. Our respondents describe that under the current macroeconomic situation, fewer overall cases mean a lower deal flow. However, this has different consequences according to our respondents; some describe it to be more competitive in each case whereas others find it less competitive because of fewer investors on the market. The involvement in the portfolio companies has changed for some of the VC firms where there is a bit more commitment to the daily work.

The LPAs constrain the VC firm to commit and invest based on the agreements with their LPs. This leaves no room for any biases in the investment process. However, we can note that the proposed investment choice when raising the funds tends to indicate an intention to choose a market sector where the managers of the VC firms have experience and knowledge. This implies some part of familiarity bias when starting the VC process, rather than the investment process itself. Moreover, VC firms that are not entitled to LPAs enjoy more freedom in the investment process. This enables them to choose interesting investment objects independently.



The familiarity bias present among the VC firms is not explicitly due to the raised interest rates but rather from the strategy of the VC firms to be geographically close to their portfolio companies. Since VC firms help their portfolio companies with knowledge, investing in an industry where one is experienced is also seen as advantageous for both the VC firm and the portfolio companies. While it is difficult to determine whether the raised interest rates have amplified these biases, it is very likely, since uncertainty is a catalyst for biases.

## **Future research**

This paper has set out to answer a set of research questions that were derived from previous research. The authors deemed the questions viable as there was sparing research within the field of VC operations in Sweden. As the research progressed issues and other, seemingly, unexplored areas of research were highlighted. For continuous research, there is a possibility to widen the research by including more respondents and reaching a higher hit rate of interviews. Thus, being able to make a larger comparison both between the group of respondents itself and comparisons between VC operations in different markets like the US for example. The US market is more mature in VC operations which could help make more reliable predictions of the future of Swedish VC firms.

The following research question would for example be

- How does the state of the business cycles impact deal flow to venture capital?
- What's the correlation between the change in interest rates and the Total Net Asset Value of Swedish funds?
- What burn rate is acceptable for sustainable growth?

These are suggestions for research questions that will be interesting for future studies

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## Appendix

### Appendix 1

Table 3 - Swedish Central Bank, collected 2022-12-12

Interest rates and exchange rates		Interest rates and exchange rates	
ADVANCED RESULT 01/01/1990 - 02/12/2022		ADVANCED RESULT 01/01/1990 - 02/12/2022	
Interest Rates 1998-2022 Monthly average		Interest Rates 1998-2022 Monthly average	
		Riksbanken key interest rates	Treasury Bills
Date	DATE	Policy rate	SE 3M
1998 January	1998-01	0,0435	0,04439
1998 February	1998-02	0,0435	0,04362
1998 March	1998-03	0,0435	0,045077
1998 April	1998-04	0,0435	0,045015
1998 May	1998-05	0,0435	0,045221
1998 June	1998-06	0,041625	0,04229
1998 July	1998-07	0,041	0,04137
1998 August	1998-08	0,041	0,042257
1998 September	1998-09	0,041	0,042159

<b>1998 October</b>	1998-10	0,041	0,041964
<b>1998 November</b>	1998-11	0,038262	0,038248
<b>1998 December</b>	1998-12	0,0351	0,03454
<b>1999 January</b>	1999-01	0,034	0,032713
<b>1999 February</b>	1999-02	0,033	0,031355
<b>1999 March</b>	1999-03	0,031391	0,031341
<b>1999 April</b>	1999-04	0,029	0,02869
<b>1999 May</b>	1999-05	0,029	0,029234
<b>1999 June</b>	1999-06	0,029	0,02969
<b>1999 July</b>	1999-07	0,029	0,03008
<b>1999 August</b>	1999-08	0,029	0,030016
<b>1999 September</b>	1999-09	0,029	0,030473
<b>1999 October</b>	1999-10	0,029	0,032319
<b>1999 November</b>	1999-11	0,030591	0,033825
<b>1999 December</b>	1999-12	0,0325	0,034076
<b>2000 January</b>	2000-01	0,0325	0,03574
<b>2000 February</b>	2000-02	0,036071	0,03899
<b>2000 March</b>	2000-03	0,0375	0,040648
<b>2000 April</b>	2000-04	0,0375	0,039861
<b>2000 May</b>	2000-05	0,0375	0,0396
<b>2000 June</b>	2000-06	0,0375	0,039416

<b>2000 July</b>	2000-07	0,0375	0,040274
<b>2000 August</b>	2000-08	0,0375	0,04002
<b>2000 September</b>	2000-09	0,0375	0,039448
<b>2000 October</b>	2000-10	0,0375	0,039877
<b>2000 November</b>	2000-11	0,0375	0,04
<b>2000 December</b>	2000-12	0,038947	0,040679
<b>2001 January</b>	2001-01	0,04	0,040668
<b>2001 February</b>	2001-02	0,04	0,040125
<b>2001 March</b>	2001-03	0,04	0,040609
<b>2001 April</b>	2001-04	0,04	0,039437
<b>2001 May</b>	2001-05	0,04	0,040071
<b>2001 June</b>	2001-06	0,04	0,041747
<b>2001 July</b>	2001-07	0,041705	0,043114
<b>2001 August</b>	2001-08	0,0425	0,042837
<b>2001 September</b>	2001-09	0,0405	0,040085
<b>2001 October</b>	2001-10	0,0375	0,036913
<b>2001 November</b>	2001-11	0,0375	0,036759
<b>2001 December</b>	2001-12	0,0375	0,037112
<b>2002 January</b>	2002-01	0,0375	0,037436
<b>2002 February</b>	2002-02	0,0375	0,038715
<b>2002 March</b>	2002-03	0,038375	0,040905

<b>2002 April</b>	2002-04	0,04	0,042531
<b>2002 May</b>	2002-05	0,0425	0,042929
<b>2002 June</b>	2002-06	0,0425	0,042753
<b>2002 July</b>	2002-07	0,0425	0,042596
<b>2002 August</b>	2002-08	0,0425	0,041936
<b>2002 September</b>	2002-09	0,0425	0,041733
<b>2002 October</b>	2002-10	0,0425	0,040733
<b>2002 November</b>	2002-11	0,041548	0,039133
<b>2002 December</b>	2002-12	0,038472	0,036589
<b>2003 January</b>	2003-01	0,0375	0,03651
<b>2003 February</b>	2003-02	0,0375	0,03607
<b>2003 March</b>	2003-03	0,036429	0,034029
<b>2003 April</b>	2003-04	0,035	0,034175
<b>2003 May</b>	2003-05	0,035	0,03256
<b>2003 June</b>	2003-06	0,031579	0,028024
<b>2003 July</b>	2003-07	0,028152	0,026965
<b>2003 August</b>	2003-08	0,0275	0,027048
<b>2003 September</b>	2003-09	0,0275	0,027068
<b>2003 October</b>	2003-10	0,0275	0,027291
<b>2003 November</b>	2003-11	0,0275	0,027273
<b>2003 December</b>	2003-12	0,0275	0,026926

<b>2004 January</b>	2004-01	0,0275	0,025955
<b>2004 February</b>	2004-02	0,025875	0,02456
<b>2004 March</b>	2004-03	0,025	0,022657
<b>2004 April</b>	2004-04	0,021	0,020173
<b>2004 May</b>	2004-05	0,02	0,019987
<b>2004 June</b>	2004-06	0,02	0,019844
<b>2004 July</b>	2004-07	0,02	0,019866
<b>2004 August</b>	2004-08	0,02	0,020218
<b>2004 September</b>	2004-09	0,02	0,020018
<b>2004 October</b>	2004-10	0,02	0,019929
<b>2004 November</b>	2004-11	0,02	0,019939
<b>2004 December</b>	2004-12	0,02	0,019945
<b>2005 January</b>	2005-01	0,02	0,01997
<b>2005 February</b>	2005-02	0,02	0,019748
<b>2005 March</b>	2005-03	0,02	0,01971
<b>2005 April</b>	2005-04	0,02	0,019857
<b>2005 May</b>	2005-05	0,02	0,019005
<b>2005 June</b>	2005-06	0,0185	0,016513
<b>2005 July</b>	2005-07	0,015	0,01479
<b>2005 August</b>	2005-08	0,015	0,014828
<b>2005 September</b>	2005-09	0,015	0,014736

<b>2005 October</b>	2005-10	0,015	0,014948
<b>2005 November</b>	2005-11	0,015	0,015109
<b>2005 December</b>	2005-12	0,015	0,016857
<b>2006 January</b>	2006-01	0,015595	0,018345
<b>2006 February</b>	2006-02	0,0175	0,019308
<b>2006 March</b>	2006-03	0,02	0,01963
<b>2006 April</b>	2006-04	0,02	0,020503
<b>2006 May</b>	2006-05	0,02	0,021114
<b>2006 June</b>	2006-06	0,020875	0,0221
<b>2006 July</b>	2006-07	0,0225	0,022774
<b>2006 August</b>	2006-08	0,0225	0,024287
<b>2006 September</b>	2006-09	0,024643	0,025351
<b>2006 October</b>	2006-10	0,025	0,027395
<b>2006 November</b>	2006-11	0,0275	0,029035
<b>2006 December</b>	2006-12	0,028289	0,029982
<b>2007 January</b>	2007-01	0,03	0,032145
<b>2007 February</b>	2007-02	0,03075	0,032925
<b>2007 March</b>	2007-03	0,0325	0,032591
<b>2007 April</b>	2007-04	0,0325	0,033369
<b>2007 May</b>	2007-05	0,0325	0,034037
<b>2007 June</b>	2007-06	0,032895	0,03453

<b>2007 July</b>	2007-07	0,035	0,035279
<b>2007 August</b>	2007-08	0,035	0,035754
<b>2007 September</b>	2007-09	0,036625	0,036154
<b>2007 October</b>	2007-10	0,037609	0,038104
<b>2007 November</b>	2007-11	0,04	0,040183
<b>2007 December</b>	2007-12	0,04	0,041241
<b>2008 January</b>	2008-01	0,04	0,041091
<b>2008 February</b>	2008-02	0,040952	0,04213
<b>2008 March</b>	2008-03	0,0425	0,042371
<b>2008 April</b>	2008-04	0,0425	0,041374
<b>2008 May</b>	2008-05	0,0425	0,041075
<b>2008 June</b>	2008-06	0,0425	0,041665
<b>2008 July</b>	2008-07	0,044348	0,043396
<b>2008 August</b>	2008-08	0,045	0,044006
<b>2008 September</b>	2008-09	0,046705	0,044872
<b>2008 October</b>	2008-10	0,044022	0,036301
<b>2008 November</b>	2008-11	0,0375	0,032025
<b>2008 December</b>	2008-12	0,026447	0,018169
<b>2009 January</b>	2009-01	0,02	0,013494
<b>2009 February</b>	2009-02	0,016	0,008481
<b>2009 March</b>	2009-03	0,01	0,00397

<b>2009 April</b>	2009-04	0,00825	0,00305
<b>2009 May</b>	2009-05	0,005	0,004742
<b>2009 June</b>	2009-06	0,005	0,003905
<b>2009 July</b>	2009-07	0,003043	0,001822
<b>2009 August</b>	2009-08	0,0025	0,001593
<b>2009 September</b>	2009-09	0,0025	0,001518
<b>2009 October</b>	2009-10	0,0025	0,001755
<b>2009 November</b>	2009-11	0,0025	0,001771
<b>2009 December</b>	2009-12	0,0025	0,001723
<b>2010 January</b>	2010-01	0,0025	0,001963
<b>2010 February</b>	2010-02	0,0025	0,00219
<b>2010 March</b>	2010-03	0,0025	0,002298
<b>2010 April</b>	2010-04	0,0025	0,00291
<b>2010 May</b>	2010-05	0,0025	0,002805
<b>2010 June</b>	2010-06	0,0025	0,002693
<b>2010 July</b>	2010-07	0,004545	0,003909
<b>2010 August</b>	2010-08	0,005	0,004473
<b>2010 September</b>	2010-09	0,006932	0,00518
<b>2010 October</b>	2010-10	0,007857	0,008121
<b>2010 November</b>	2010-11	0,01	0,011105
<b>2010 December</b>	2010-12	0,010714	0,012776



<b>2011 January</b>	2011-01	0,0125	0,01489
<b>2011 February</b>	2011-02	0,013625	0,01735
<b>2011 March</b>	2011-03	0,015	0,017374
<b>2011 April</b>	2011-04	0,015395	0,017974
<b>2011 May</b>	2011-05	0,0175	0,019077
<b>2011 June</b>	2011-06	0,0175	0,018542
<b>2011 July</b>	2011-07	0,019643	0,018043
<b>2011 August</b>	2011-08	0,02	0,017052
<b>2011 September</b>	2011-09	0,02	0,015818
<b>2011 October</b>	2011-10	0,02	0,014452
<b>2011 November</b>	2011-11	0,02	0,013795
<b>2011 December</b>	2011-12	0,019167	0,013645
<b>2012 January</b>	2012-01	0,0175	0,015607
<b>2012 February</b>	2012-02	0,016786	0,015854
<b>2012 March</b>	2012-03	0,015	0,014866
<b>2012 April</b>	2012-04	0,015	0,014403
<b>2012 May</b>	2012-05	0,015	0,01376
<b>2012 June</b>	2012-06	0,015	0,012397
<b>2012 July</b>	2012-07	0,015	0,011039
<b>2012 August</b>	2012-08	0,015	0,011465
<b>2012 September</b>	2012-09	0,013375	0,01039

<b>2012 October</b>	2012-10	0,0125	0,009813
<b>2012 November</b>	2012-11	0,0125	0,010559
<b>2012 December</b>	2012-12	0,011765	0,010135
<b>2013 January</b>	2013-01	0,01	0,009582
<b>2013 February</b>	2013-02	0,01	0,00981
<b>2013 March</b>	2013-03	0,01	0,009708
<b>2013 April</b>	2013-04	0,01	0,009471
<b>2013 May</b>	2013-05	0,01	0,009245
<b>2013 June</b>	2013-06	0,01	0,009119
<b>2013 July</b>	2013-07	0,01	0,009309
<b>2013 August</b>	2013-08	0,01	0,009292
<b>2013 September</b>	2013-09	0,01	0,008941
<b>2013 October</b>	2013-10	0,01	0,009244
<b>2013 November</b>	2013-11	0,01	0,009246
<b>2013 December</b>	2013-12	0,009167	0,008201
<b>2014 January</b>	2014-01	0,0075	0,007335
<b>2014 February</b>	2014-02	0,0075	0,007324
<b>2014 March</b>	2014-03	0,0075	0,007269
<b>2014 April</b>	2014-04	0,0075	0,007017
<b>2014 May</b>	2014-05	0,0075	0,006616
<b>2014 June</b>	2014-06	0,0075	0,005801

<b>2014 July</b>	2014-07	0,003804	0,002608
<b>2014 August</b>	2014-08	0,0025	0,002153
<b>2014 September</b>	2014-09	0,0025	0,001904
<b>2014 October</b>	2014-10	0,002174	0,001415
<b>2014 November</b>	2014-11	0	0,000463
<b>2014 December</b>	2014-12	0	0,000594
<b>2015 January</b>	2015-01	0	0,001102
<b>2015 February</b>	2015-02	-0,0004	-0,000207
<b>2015 March</b>	2015-03	-0,001341	-0,001141
<b>2015 April</b>	2015-04	-0,0025	-0,00264
<b>2015 May</b>	2015-05	-0,0025	-0,002701
<b>2015 June</b>	2015-06	-0,0025	-0,003211
<b>2015 July</b>	2015-07	-0,003283	-0,004802
<b>2015 August</b>	2015-08	-0,0035	-0,004585
<b>2015 September</b>	2015-09	-0,0035	-0,004751
<b>2015 October</b>	2015-10	-0,0035	-0,004448
<b>2015 November</b>	2015-11	-0,0035	-0,003606
<b>2015 December</b>	2015-12	-0,0035	-0,003846
<b>2016 January</b>	2016-01	-0,0035	-0,004583
<b>2016 February</b>	2016-02	-0,004143	-0,004979
<b>2016 March</b>	2016-03	-0,005	-0,00587

<b>2016 April</b>	2016-04	-0,005	-0,006033
<b>2016 May</b>	2016-05	-0,005	-0,005988
<b>2016 June</b>	2016-06	-0,005	-0,006259
<b>2016 July</b>	2016-07	-0,005	-0,006697
<b>2016 August</b>	2016-08	-0,005	-0,007397
<b>2016 September</b>	2016-09	-0,005	-0,007514
<b>2016 October</b>	2016-10	-0,005	-0,007501
<b>2016 November</b>	2016-11	-0,005	-0,007938
<b>2016 December</b>	2016-12	-0,005	-0,007911
<b>2017 January</b>	2017-01	-0,005	-0,007705
<b>2017 February</b>	2017-02	-0,005	-0,006877
<b>2017 March</b>	2017-03	-0,005	-0,00629
<b>2017 April</b>	2017-04	-0,005	-0,006289
<b>2017 May</b>	2017-05	-0,005	-0,006248
<b>2017 June</b>	2017-06	-0,005	-0,006727
<b>2017 July</b>	2017-07	-0,005	-0,007491
<b>2017 August</b>	2017-08	-0,005	-0,0073
<b>2017 September</b>	2017-09	-0,005	-0,00707
<b>2017 October</b>	2017-10	-0,005	-0,00681
<b>2017 November</b>	2017-11	-0,005	-0,007131
<b>2017 December</b>	2017-12	-0,005	-0,007502

<b>2018 January</b>	2018-01	-0,005	-0,0069
<b>2018 February</b>	2018-02	-0,005	-0,006584
<b>2018 March</b>	2018-03	-0,005	-0,006607
<b>2018 April</b>	2018-04	-0,005	-0,006984
<b>2018 May</b>	2018-05	-0,005	-0,006989
<b>2018 June</b>	2018-06	-0,005	-0,006941
<b>2018 July</b>	2018-07	-0,005	-0,006718
<b>2018 August</b>	2018-08	-0,005	-0,006825
<b>2018 September</b>	2018-09	-0,005	-0,00728
<b>2018 October</b>	2018-10	-0,005	-0,007003
<b>2018 November</b>	2018-11	-0,005	-0,007283
<b>2018 December</b>	2018-12	-0,005	-0,006502
<b>2019 January</b>	2019-01	-0,003068	-0,004445
<b>2019 February</b>	2019-02	-0,0025	-0,003994
<b>2019 March</b>	2019-03	-0,0025	-0,003993
<b>2019 April</b>	2019-04	-0,0025	-0,003995
<b>2019 May</b>	2019-05	-0,0025	-0,003995
<b>2019 June</b>	2019-06	-0,0025	-0,003994
<b>2019 July</b>	2019-07	-0,0025	-0,004
<b>2019 August</b>	2019-08	-0,0025	-0,004278
<b>2019 September</b>	2019-09	-0,0025	-0,004094

<b>2019 October</b>	2019-10	-0,0025	-0,004333
<b>2019 November</b>	2019-11	-0,0025	-0,004717
<b>2019 December</b>	2019-12	-0,0025	-0,00455
<b>2020 January</b>	2020-01	-0,000357	-0,001749
<b>2020 February</b>	2020-02	0,0000000	-0,001499
<b>2020 March</b>	2020-03	0	-0,001529
<b>2020 April</b>	2020-04	0	-0,001704
<b>2020 May</b>	2020-05	0	-0,001393
<b>2020 June</b>	2020-06	0	-0,000847
<b>2020 July</b>	2020-07	0	-0,000845
<b>2020 August</b>	2020-08	0	-0,001192
<b>2020 September</b>	2020-09	0	-0,001307
<b>2020 October</b>	2020-10	0	-0,001285
<b>2020 November</b>	2020-11	0	-0,001245
<b>2020 December</b>	2020-12	0	-0,001826
<b>2021 January</b>	2021-01	0	-0,001504
<b>2021 February</b>	2021-02	0	-0,001313
<b>2021 March</b>	2021-03	0	-0,001597
<b>2021 April</b>	2021-04	0	-0,001467
<b>2021 May</b>	2021-05	0	-0,001519
<b>2021 June</b>	2021-06	0	-0,001588

<b>2021 July</b>	2021-07	0	-0,001551
<b>2021 August</b>	2021-08	0	-0,001621
<b>2021 September</b>	2021-09	0	-0,001708
<b>2021 October</b>	2021-10	0	-0,002134
<b>2021 November</b>	2021-11	0	-0,003471
<b>2021 December</b>	2021-12	0	-0,003847
<b>2022 January</b>	2022-01	0	-0,001603
<b>2022 February</b>	2022-02	0	-0,001435
<b>2022 March</b>	2022-03	0	-0,002249
<b>2022 April</b>	2022-04	0	-0,000985
<b>2022 May</b>	2022-05	0,002262	0,003131
<b>2022 June</b>	2022-06	0,0025	0,005147
<b>2022 July</b>	2022-07	0,006786	0,007801
<b>2022 August</b>	2022-08	0,0075	0,011317
<b>2022 September</b>	2022-09	0,011136	0,015096
<b>2022 October</b>	2022-10	0,0175	0,016029
<b>2022 November</b>	2022-11	0,017841	0,016791
<b>Footnote</b>			
<b>Policy rate (02/01/1998 -)</b>			

<b>Policy rate</b>			
<b>Source: Sveriges Riksbank</b>			

## Appendix 2

Table 4 - Descriptive statistic Policy rates & T-bills – Data from table 1

Variance		Standard Deviation		Correlation	Covariance
Policy rate	T-Bill	Policy rate	T-Bill		
0,00028	0,00030	0,016727	0,01743	0,994897	0,00029
	4		8		



## Appendix 3

Table 5 - Variance, Covariance, Correlation Policy rates & T-bills – Data from table 1

Policy rate		Swedish treasury-bill 3M	
Average	0,016119	Average	0,015509
Standard Error	0,000967	Standard Error	0,001008
Median	0,015	Median	0,013795
Typical value	-0,005	Typical value	-0,00399
Standard Deviation	0,016727	Standard Deviation	0,017438
Variance	0,00028	Variance	0,000304
Kurtosis	-1,38061	Kurtosis	-1,3816
Obliqueness	0,264828	Obliqueness	0,254092
Range of Variation	0,051705	Range of Variation	0,053159
Minimum	-0,005	Minimum	-0,00794
Maximum	0,046705	Maximum	0,045221
Amount	4,819552	Amount	4,637257
Sample Size	299	Sample Size	299
Confidence level (95,0%)	0,001904	Confidence level (95,0%)	0,001985

## Appendix 4

Table 6 - Regression statistics. Data gathered from Table 2.

Regression analysis								
Regressions statistics								
Multiple-R	0,994896776							
R-squared	0,989819594							
adjusted R-squared	0,989785317							
Standard deviation	0,001690571							
Observations	299							
ANOVA								
	fg	KvS	MKv	F	p-value för F			
Regression	1	0,082530412	0,08253	28876,69	6,6149E-298			
Residual	297	0,000848835	2,86E-06					
Total	298	0,083379247						
	Coefficient	Standard error	t-quota	p-value	Lower 95%	Higher 95%	Lower 95,0%	Higher 95,0%
Policy rate	0,001317935	0,000130939	10,06528	1,07E-20	0,00106025	0,001575621	0,00106025	0,001575621
Treasury Bill	0,954333422	0,005615991	169,9314	6,6E-298	0,943281244	0,965385601	0,943281244	0,965385601

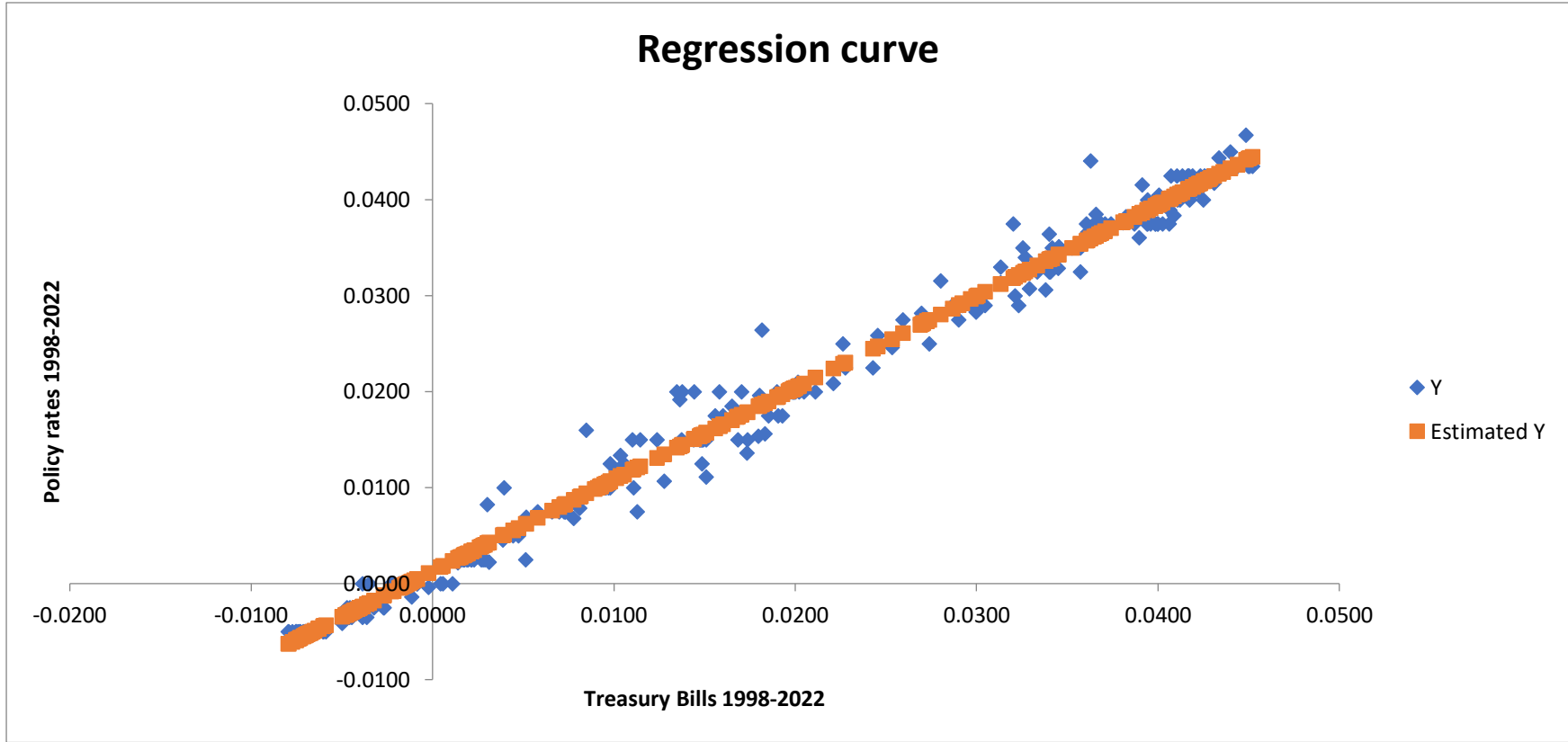


Figure 11 - Regression statistics, data collected from appendix 1

## Appendix 5

## Appendix 6

Mundell - Fleming model equations with explanations of variables. Gottfries, 2013.

Equation 1 – IS Function, Gottfries, 2013

$$Y = C(Y - T, Y^e - T^e, i - \pi^e, A) + I(i^e - \pi^e, Y^e, K) + G + NX\left(\frac{eP}{P^*}, Y^*, Y\right)$$

- ❖ C: Consumption
- ❖ Y: Production;  $Y^n$ : Natural production;  $Y^e$ : Expected production;  $Y^*$ : Foreign production
- ❖ T: Taxes;  $T^e$ : Expected taxes;  $T^*$ : Foreign taxes
- ❖ I: Interest rates;  $I^e$ : Expected interest rates;  $I^*$ : Foreign interest rates
- ❖  $\pi$ : Inflation;  $\pi^e$ : Expected inflation;  $\pi^*$ : Foreign inflation
- ❖ A: Assets
- ❖ K: Capital
- ❖ G: Public expenditures
- ❖ NX: Net export

Equation 2 – LM Function, Gottfries, 2013

$$\frac{M}{P} = \frac{Y}{V(i)}$$

- ❖ Y: Production
- ❖ M: Monetary Base
- ❖ P: Price level
- ❖  $V_i$ : Velocity of Money

Equation 3 – IP Function, Gottfries, 2013

$$e = \frac{1 + i}{1 + i^*} e^e$$

- ❖  $i$  : Domestic Interest rates;  $i^*$ : Foreign interest rates
- ❖ e: Exchange rate;  $e^e$ : Expected Exchange rate

Equation 4 – PC Function, Gottfries, 2013

$$\pi = \pi^e + \beta \hat{Y} + z$$

- ❖  $\hat{Y}$ : Output gap
- ❖  $\pi$ : Inflation;  $\pi^e$ : Expected inflation
- ❖ z: Cost – push shock

## Appendix 7 - Interview guide

Introductory questions:

- What do you work with?
- How would you describe your work
- What challenges do you face in your work?

Research questions (These will never be mentioned to the respondent):

❖ *What kind of challenges do Venture Capitalists face when interest rates increase regarding fundraising?*

Theories:

- Bellavitis Matanova (Supply & Demand)
- VC Process
- VC Fundraising
- VC Investment

Interview questions: (Fundraising)

- Who invests in your funds?
- Who is the largest investor in the funds?
- What does the investors share look like?
- In what ways has your correspondence with investors changed, if at all, with the raised interest rates?
- How do you find investors?
- How much of your work goes into finding new investors?
- Based on previous experience, what have you done as interest rates increased to attract capital/funding?
- How will you act now as interest rates increase?

Research questions:

- How does Venture Capital fund managers take the Natural Rate into consideration when proposing fundraising and invest in portfolio companies? Is there any optimal interest rate level for VC operations?

Theories:

- Bellavitis and Matanova (Supply & Demand)
- Wicksell and natural rates
- Neo-Keynesian Model
- Mundell-Fleming model

Interview questions:

- As interest rates have a negative correlation to investing in VC funds. What is your interpretation of the current market situation?
- Has your supply of funds decreased?
- What indications of this, or the opposite, have you seen?
- When you are searching for finances or looking to finance a portfolio company. What rates are you comfortable to loan and lend to?
- Are you aware of the term “Natural rates”?
- If you have, in what ways have you found this theory to be helpful in your work?
- Is there any optimal level of rates you have found to be true for your operations?
- How is this different from today’s interest rate levels?
- How has it changed?

Research questions:

- ❖ How will the increased interest rates impact the investment process of Swedish Venture Capital firms?

Theories:

- Bellavitis Matanova (Supply & Demand)
- VC Process
- VC Fundraising
- VC Investment

(Investment)

- Looking at the portfolio companies, do you have a more proactive or reactive approach to investing?

- What's it been like historically?
- What's it been like last year?
- What's been the criteria of investments previously? What's it like today?
- At what point do you invest in portfolio companies? Seed etc.

- If not early: why?

- What and which challenges have you faced regarding the higher interest rates?
- Through what means of finance do you use to invest in portfolio companies? I.e., is it through Equity, debt, or a hybrid method?
- How involved have you been in the portfolio companies?
- Are you as involved today? (Measured in time or effort)
- Is it dependent on which company it is? In case of yes, why?
- In which ways do you believe your time in the portfolio companies makes a difference?

Research questions:

- Is there any familiarity or home bias in Venture Capital portfolio composition when interest rates increase

Theories:

- Familiarity Bias Theory
- Bellavitis Matanova (Supply & Demand)

Interview questions:

- What does the screening process of portfolio companies look like?
- What companies are you interested in investing in?
- In which industries are they?
- What stage are you interested in investing in?
- Has the screening process changed? In what ways?
- Why has the screening process changed?