FI Analysis

Swedish risk premia and monetary policy

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Summary

Due to the low interest rates in recent years, investors have turned to riskier assets in order to achieve a higher return. This has contributed to low risk premia. Even if the situation regarding future interest rates is currently uncertain, they will probably at some point be higher than today's levels. In the event that interest rates should increase, this may have substantial impact on Swedish risk premia. We have therefore analysed how changes in both international interest rates and the Swedish policy rate could affect the term premium and the equity risk premium.

The term premium is a form of compensation that investors require to invest in bonds with longer terms. Our results show that the term premium is affected to a greater extent by international market rates than by an unexpected increase in the policy rate in Sweden. As a result, foreign macroeconomic events, for example a sudden increase in inflation, could lead to a greater risk for a sharp increase in Swedish term premia than changes in domestic monetary policy.

The equity risk premium reflects the difference between investors' expected return on the equity market and the risk-free rate. According to our results, the premium is not affected by changes in Swedish monetary policy. In Sweden, the equity risk premium does not appear compressed by the recent expansionary monetary policy. However, international market rates affect the equity risk premium in the short term.

Our analysis shows, therefore, that a disordered and abrupt increase in international market rates could lead to significantly higher term and equity risk premia.

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Introduction

Over the past few years, asset prices and risk-taking among investors have been high. Both the European Central Bank (ECB, 2018a) and the Federal Reserve (2018) have noted that risk-taking is high globally and that this has contributed to the downward pressure on risk premia in the global economy.

The prolonged period of low interest rates may have contributed to excessive risk-taking, as investors may have sought more risky assets to obtain higher returns. Several central banks are signalling that the policy rates in the mid-term may continue to be low or be lowered. There is also uncertainty among international organizations and authorities that a normalisation of the monetary policy – whenever this happens – can lead to a sharp fall in asset prices.

According to ECB (2018b), risk premia may increase sharply if monetary policy is tightened much faster than the market expects. The International Monetary Fund (IMF) has previously indicated that a sudden tightening of the U.S. monetary policy could impact European market rates (IMF 2018). Lately the market's expectations for future monetary policy in the USA and the rest of the world have shifted toward continued expansionary monetary policy. If this were to change, and the markets should instead suddenly expect a less expansionary monetary policy in the future, this could have an impact on the risk premia, according to IMF (2019).

The Riksbank is continuing to conduct an expansionary monetary policy even if the repo rate was increased for the first time in seven years in December 2018, from −0.5 per cent to −0.25 per cent (Riksbank 2018). The Riksbank intends to increase the policy rate at the end of 2019 or at the beginning of 2020 (Riksbank 2019). The transition from a low interest rate environment to an environment with higher interest rates could potentially have a major impact on Swedish risk premia. A small, open economy like that of Sweden is also sensitive to international trends. Therefore, Swedish risk premia may be impacted by both domestic and international factors.

FI's work aims to ensure that the Swedish financial system is sufficiently resilient in the event that disruptions occur in the financial markets. We therefore analysed how events, such as unexpected increases in the policy rate and sharp increases in international market rates, affect the Swedish risk premia. We also analysed if the expansionary monetary policy of recent years applied downward pressure on Swedish risk premia. The analysis focuses on the Swedish term premium and the equity risk premium as well as their historical development.

Term premium

The difference between interest rates with different maturities is often explained using the expectations hypothesis: If investors are risk neutral, the required return on an investment in a long-term bond will be the same as the expected return from investments in several short-term bonds for the same period. However, bonds with longer terms often contain a higher degree of uncertainty and risk compared to bonds with shorter terms. Higher inflation can reduce the real value of the bond, and the bond price can fall as a result of higher interest rates.

Risk-averse investors[1] therefore require compensation when they invest in bonds with longer maturity. When the return from investing in a long-term bond differs from the expected return from investing in shorter-term bonds, a term premium arises.[2]

Short-term market rates can rise before a bond matures. Investors thus take a risk if they lock in their long-term returns compared to investing in bonds with shorter maturities and reinvesting the liquidity when the bond matures. If market rates fall, an investor can benefit from locking in the return at a high level by investing in a long-term bond. Therefore, a positive term premium can be interpreted as investors having asymmetric risk aversion to rising market rates.

The academic literature contains multiple definitions of *term premium*. One common definition is that the term premium is expressed as a component of long-term interest rates:[3]

$$r_t^l = \frac{1}{l}\sum_{i=0}^{l-1} E\left(r_{t+i}^k\right) + term\ premium$$

Where r_t^l is the long-term rate with term l and $E(r_{t+i}^k)$ is the expected future short-term rates accumulated during term l. Long-term bond rates, in other words, consist of two components: average expected short-term bond rates plus the compensation required by an investor to invest capital over longer periods of time, i.e. the term premium. Since the two components are not directly observable, they must be estimated.

Equity risk premium

The equity risk premium reflects the difference between a share's expected return and the risk-free rate. One of its uses is for long-term investment decisions, for example to determine the allocation between shares, bonds and other asset classes. The equity risk premium is also used to determine whether a portfolio can generate sufficient returns to meet various future obligations, for example in analyses of an insurance company's financial position.

There is no general method for calculating the equity risk premium, but there are two different ways to measure it:

i) realised equity risk premium

ii) implicit equity risk premium.

To calculate the realised equity risk premium, we use the difference between the daily total return on a broad Swedish equity index with reinvested dividends (SIXRX) and a Swedish ten-year government bond. We base our calculation on historical data starting in 1998, and

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[1] A risk-averse investor prefers to avoid risk, and a risk-seeking investor can tolerate higher risk in the hunt for returns. But there are also investors who, due to regulatory requirements, invest in bonds with longer maturities.

[2] According to the expectations hypothesis, the return from investing in a two-year bond in Year 0 should be the same as the return from investing in a one-year bond Year 0 and the expected return (at Year 0) from a one-year bond in Year 1. This can also be expressed as follows: two-year bond rate = average one-year bond rate + term premium. The term premium is the rate difference between investing in a two-year bond compared to a rolling investment in two one-year bonds.

[3] See Kim & Orphanides (2007) for a more in-depth discussion on the definitions of *term premium*.

the analysis assumes that historical correlations will continue to apply in the future.

To calculate the implicit equity risk premium, we use a method developed by Cara (2014). This method takes the median of nine different models to calculate the implicit equity risk premium. The models can be divided into three categories:

i) dividend models (for example, Gordon Growth Model)

ii) profit-driven models (for example, the Federal Reserve model)

iii) residual income models (for example, the Discounted Cash Flow model).

The models measure the implicit equity risk premium by using expected and realised corporate profits and corporate dividends to estimate future expectations. For example, the Federal Reserve model uses the difference between companies' earnings yield[4] and their returns from long-term bonds.

How can monetary policy affect risk premia?

In theory, monetary policy can affect both the equity risk premium and the term premium through, for example, *the signalling channel* and *the premium channel*. However, actual changes in the risk premia can also be affected by factors other than these channels, such as market conditions.

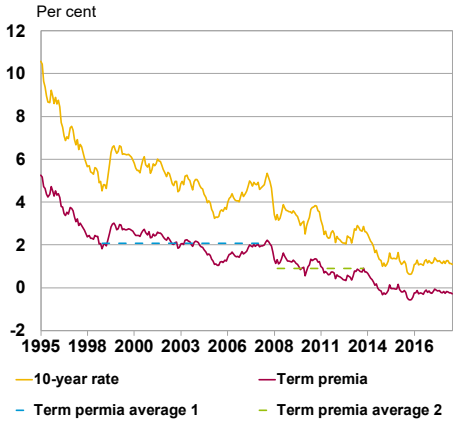
The signalling channel can affect long-term rates through both of its components: average expected short-term rates and the term premium. The central bank, by lowering the policy rate and changing the forecast for the future policy rate, can impact the market's expectations regarding future short-term rates. The central bank can also signal an expansionary monetary policy moving forward through the purchase of longer-term bonds, which can reduce the term premium. This mechanism has a negative impact on the expected return on secure assets since expectations for the future policy rate are lowered. When the return on secure assets falls, risky assets become more attractive. This leads in part to an increase in share prices, which applies downward pressure on the expected return and thus the equity risk premium.

Through *the premium channel*, the central bank's purchase of government bonds reduces the supply of bonds for other market participants. These purchases apply upward pressure to bond prices, which leads to a fall in the expected return. Government bonds are then less attractive as an investment. Instead, investors seek returns in riskier assets with a higher expected return, which reduces both the equity risk premium and the term premium.

The expected long-term inflation and the expected long-term real growth in the economy are also factors that affect long-term market rates. When investors expect higher inflation or higher real growth, they will expect higher interest rates in the future. Thus, investors will

[4] Earnings yield, or E/P ratio, is calculated by dividing companies' earnings per share by price per share. This is also called an inverse P/E ratio.

Diagram 1. Historical development of term premia in Sweden



Source: Thomson Reuters Eikon and FI's own calculations. Note: Data consists of monthly swap rates from the Swedish market with terms between 1 and 10 years as well as 1-month, 3-month and 6-month STIBOR during the period July 1995 to July 2019. Average 1 and 2 correspond to 2 and 1.3 per cent, respectively.

demand a higher return on longer-term bonds that they are buying today. The price for longer-term bonds therefore falls, and the term premium increases.

Development of risk premia in Sweden

This section presents the level of risk premia over time. We also analysed two periods during which the interest rate was increased, looking closely at what happened to the term premium prior to and following the first interest rate increase in these periods.

TERM PREMIUM

Our estimations of the term premium are based on a model developed by Adrian, Crump and Moench (2013). The Federal Reserve also uses this model in its analysis work. We used the model to break down Swedish ten-year swap rates into two components: expected future short-term rates and term premia.[5] The model assumes that there is no arbitrage, thus making it possible to use a discount factor to set asset prices.[6]

The ten-year term premium has fallen over the past twenty years (Diagram 1). The term premium has been negative since the policy rate was lowered to 0 per cent in October 2014. A negative term premium means that investors are not compensated for investments on long-term rates; they must carry the cost themselves for investments in longer-term assets.

TERM PREMIUM — A PEMIUM FOR INFLATION RISK AND REAL INTEREST RATE RISK

Nominal market rates can increase for many reasons. For example, if the inflation rate establishes itself above its target value for a longer period, it can lead to central banks raising the nominal policy rate, which in turn affects nominal market rates. Inflation risk can thus be expected to affect the term premium.

The fact that the term premium was strongly positive in the early 1990s can be viewed as the outcome of the marginal investor's[7] lack of confidence that the monetary policy at that time would be able to keep inflation low. The marginal investor demonstrated an asymmetric risk aversion to future scenarios with rising inflation and rising nominal rates and therefore required a premium to secure the return in the long term. Consequently, as the inflation target was established in Sweden during the second half of the 1990s, the term premium fell.

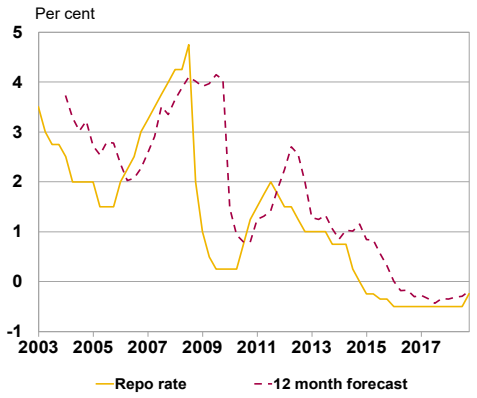
Given the above reasoning, a negative term premium can be interpreted as the marginal investor demonstrating an asymmetric risk

[5] Both swap rates and government bonds can be used to estimate the term premium (Alsterlind 2017). This analysis uses swap rates since the supply of data is better. The Swedish term premium historically has followed the same trajectory regardless of whether it is estimated from swap rates or government bonds (Alsterlind 2017). All else being equal, the term premium estimated from swap rates is expected to be higher than the term premium estimated from government bonds. This is because swap rates contain higher counterparty risk and liquidity risk than government bonds.

[6] See Adrian, Crump and Moench (2013) for technical details.

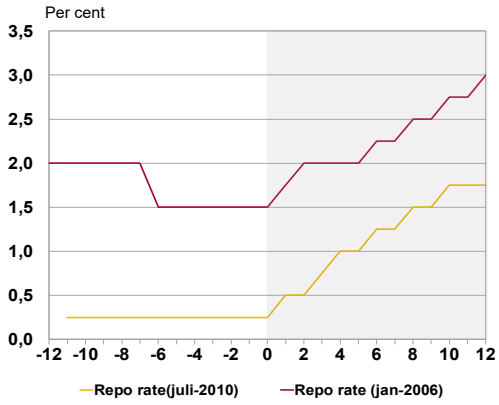
[7] A marginal investor is an investor who is well-diversified and only interested in the non-diversifiable risk in the investment decision.

Diagram 2. Historical data on the repo rate



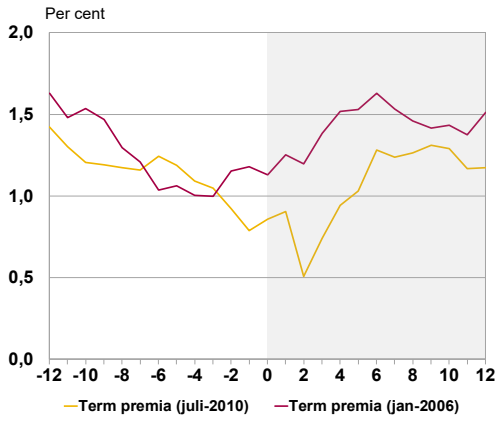
Source: Thomson Reuters Datastream and Prospera.
Note: The twelve-month forecast is shifted forward so the actual level can be compared to the market's expectations from twelve months ago for the future repo rate. Prospera is commissioned by the Riksbank to compile repo rate forecasts from a range of market participants.

Diagram 3. Historical data on repo rate increases



Source: The Riksbank and FI's calculations.

Diagram 4. Historical development of the term premium around periods of interest rate increases



Source: The Riksbank and FI's calculations.
Note: The diagram shows the term premium prior to and following the first interest rate increase by the Riksbank during two periods. The average is around 1.3 per cent for the red line and around 1.0 per cent for the yellow line.

aversion to future scenarios with low inflation and falling nominal rates. A future scenario with prolonged low inflation – or even deflation – creates risks that are difficult for investors to protect themselves against. Nominal government bonds with long maturities offer protection against deflation. Therefore, a negative term premium can be interpreted as marginal investors being willing to pay a premium (in the form of lower expected returns) to lock in the return from long-term investments, thus protecting themselves from a scenario with prolonged low inflation or deflation.

TERM PREMIUM DURING PERIODS OF INTEREST RATE INCREASES

One way to forecast how the term premium could behave when the monetary policy becomes less expansionary is to study how it has behaved historically. Sweden has had two periods of repo rate increases during the time span of our study. The first was between January 2006 and September 2008, and the second was between July 2010 and September 2011 (Diagrams 2 and 3).

It is important to note that the Riksbank did not purchase bonds prior to the periods of interest rate increases in 2006 and 2010. The quantitative easing that has occurred in recent years is unique in the Riksbank's history. The analysis of the study periods instead provides an indication of how the term premium might behave in the future if the Riksbank raises the repo rate and withdraws its quantitative easing in accordance with market expectations. In such a scenario, there should not be any significant impact on the Swedish term premium, but it is hard to verify this since it has never happened before.

During the periods of interest rate increases in 2006 and 2010, the term premium increased one year after the policy rates were first raised (Diagram 4). This increase can be explained by the difference between the market's forecast and the actual repo rate (Diagram 2). The fact that the forecast was below the actual repo rate indicates that the interest rate increases surprised the market. However, the change in the term premium is small when comparing the opening and closing value for the analysis period. The term premium decreased prior to the period of interest rate increases (Diagram 4). This indicates that there are factors other than the repo rate that affect the term premium.

EQUITY RISK PREMIUM

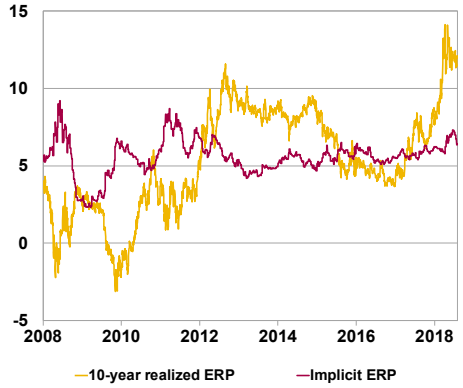
The implicit equity risk premium increased during the financial crisis when share prices fell sharply. Investors required a higher yield to invest in risky assets, but as the firms recovered, and risk aversion among investors fell, the equity risk premium decreased in late 2009. The repo rate has been negative since the beginning of 2015, and the implicit equity premium increased at the same time (Diagram 5). This indicates that investors continue to have a high-required return on the equity market in Sweden, which could indicate that the market has not fully included the negative policy rate Sweden has had since 2015 into its pricing mechanism.

How are risk premia affected?

This section studies how historical repo rate decisions and international market rates have affected the risk premia. We have used an event study to see how recent monetary policy decisions (2014–2018) have affected the term premium. We also conducted a scenario

Diagram 5. Realized and implicit equity risk premium (ERP)

Per cent

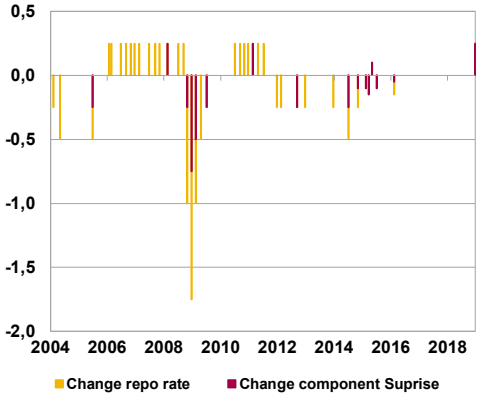


Source: Thomson Reuters Eikon.

Note: The realised equity risk premium consists of a rolling 10-year average.

Diagram 6. Changes in the repo rate and surprises

Per cent



Source: Bloomberg and FI's own calculations.

analysis to investigate how unexpected increases to the repo rate and sharp increases in international market rates can affect the term premium in Sweden.

In theory, the prices from a perfect and well-functioning market should reflect all available information and future events. Only new or unexpected information leads to an adjustment of prices and interest rates. Changes to the repo rate can therefore be broken down into two components: an expected component (*Expectation*) and an unexpected component (*Surprise*) (Diagram 6). These components are not observable and must therefore be estimated. In this analysis, we used a market survey[8] to estimate changes in the expectations for the repo rate in conjunction with the Riksbank communicating its interest rate announcement. The change in the repo rate can then be written as (where p is the time when the decision is announced):

$$\Delta Repo\ rate_p = Repo\ rate_p - Repo\ rate_{p-1}$$

$$= \underbrace{Repo\ rate_p - E\left(Repo\ rate_p\right)}_{Surprise_p} + \underbrace{E\left(Repo\ rate_p\right) - Repo\ rate_{p-1}}_{Expectation_p}$$

In order to analyse how the market reacts when there is a change in monetary policy and international market rates, we conducted a regression analysis. We looked at the relationship between the change in the repo rate and the various components that constitute long-term interest rates (the term premium and the expected future short-term rates) as well as the realised equity risk premium. To isolate the effect of changes to the repo rate, we used daily changes in the risk premia. Daily data is not available for the implicit equity risk premium. We instead used the realised equity risk premium in our regression analysis.

We chose to include international market rates in the regression to consider international factors because foreign inflation and real economy expectations can affect Swedish risk premia. According to Fransson and Tysklind (2016) and De Rezende (2017), Swedish market rates correlate to some extent with U.S. and German market rates.

The data underlying the regressions includes the interest rate announcements made by the Riksbank between August 2003 and December 2018. We used a regression model similar to that of Bernanke and Kuttner (2005) and Iversen and Tysklind (2017)[9].

$$\Delta R_p = \beta_0 + \beta_1\, Surprise_p + \beta_2 Expectation_p + \beta_3 \Delta EU_p + \beta_4 \Delta US_p + \varepsilon_p$$

We conducted three regressions with the same explanatory variables. ΔR in the regression are the daily changes of the three

[8] Bloomberg produced the market survey that was used. Prior to each interest rate announcement, Bloomberg calculates an average of the market's expectations for the repo rate. We constructed the surprise component by calculating the difference between the Riksbank's announcement and the average of the answers in Bloomberg's survey. If the surprise component has a value different than zero, this means that the repo rate announcement surprises the market. The higher the absolute value of the surprise component, the more unexpected the interest rate decisions is for the market.

[9] Iversen and Tysklind (2017) also include a control variable for international market movements that co-vary with the Swedish market. Our regression analysis uses German and U.S. bonds as two separate variables.

components included in the study: the term premium, expected future short-term rates and the equity risk premium. ΔEU_p and ΔUS_p are changes in interest rates for ten-year German and U.S. government bonds, respectively.

The regression results indicate that if the repo rate is unexpectedly increased by 100 basis points, the term premium will increase by 14 basis points and future expected short-term rates by 11 basis points. Overall, the Swedish ten-year interest rate increases by 25 basis points (Table 1). Hatzius, et al. (2018) finds similar results for U.S. interest rates.[10] German and U.S. interest rates get relatively large coefficients in the regression for the equity risk premium: 9.14 and 8.06, respectively (Table 1). One explanation for this is that the coefficients measure relative movement between the equity market and international interest rates. During our analysis period, the daily changes in the interest rates were small in comparison to the equity market. For example, the highest daily change during our analysis period in the variable *EU* is around 20 basis points, and the highest daily change in the variable *realised equity risk premium* is around 1,000 basis points. The difference is significant and shows that the equity market can be more volatile than international interest rates. A change of 20 basis points in the variable *EU* means a change of 180 basis points in the equity risk premium.[11]

Table 1. Relationship between interest rates and risk premia

	ΔTerm Premium (Component 1)	**ΔFuture short-term interest rates (Component 2)**	**Realised Equity Risk Premium[12]**
Intercept	– 0.00 (0.13)	– 0.00 (0.45)	0.00 (0.70)
Surprise	0.14*** (0.00)	0.11*** (0.00)	– 0.02 (0.99)
Expectation	0.02 (0.36)	– 0.02 (0.25)	0.10 (0.89)
ΔEU	0.33*** (0.00)	0.11*** (0.04)	9.14*** (0.01)
ΔUS	0.16*** (0.01)	0.16*** (0.00)	8.06*** (0.01)
R^2	0.63	0.42	0.27

Source: Bloomberg, Thomson Reuters Datastream and FI's own calculations.
Note: The value in the parentheses is the P-value. *, ** and *** show that the coefficients are significant at 10 per cent, 5 per cent, and 1 per cent.

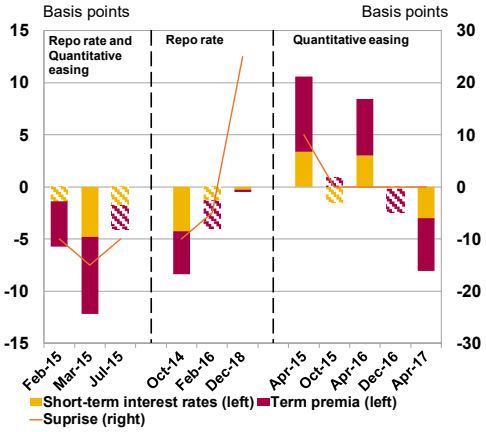
According to the regression results above, changes in the domestic policy rate do not have a significant impact on the Swedish equity risk premium, as opposed to the findings of Bernanke and Kuttner (2005) from the U.S. equity market. They showed that the equity market in the USA tends to follow a negative trajectory following unexpected interest rate increases in the U.S. policy rate. However, they analysed a different market during a different period of time, from 1973 and 1989 to 2002. Our results are in line with Iversen and Tysklind (2017).

[10] Hatzius et al. (2018) presents a rule-of-thumb that an unexpected increase in the U.S. policy rate of 100 basis points would lead to an increase in the U.S. 10-year interest rate of 30 basis points.

[11] 20 basis points * 9.14 ≈ 180 basis points.

[12] The realised equity risk premium is calculated as the difference between daily OMXSPI returns and 10-year Swedish government bonds.

Diagram 7. Statistical correlation between monetary policy decisions and the term premium and short-term rates



Source: Bloomberg and FI's calculations.

Note: The dashed bars show that the changes are not significantly significant at 10 per cent. We calculate daily changes in the components of the long-term rate between October 2014 and December 2018 (Table 2). The daily changes are then compared to the daily changes over a longer period of time. The monetary policy decisions are broken down into three groups: i) the decisions that change both the repo rate and the purchases of government bonds (Repo and quantitative easing); ii) the decisions that only change the repo rate (Only repo); iii) the decisions that only change the purchases of government bonds (Only quantitative easing).

They also did not find a statistically significant relationship between changes in the domestic policy rate and the Swedish equity market.

Our results show that international market rates have a greater impact on Swedish risk premia than unexpected changes in the repo rate. This indicates that a small, open economy like Sweden is sensitive to developments on foreign financial markets. Therefore, foreign macro events such as changes in long-term inflation expectations that affect long-term market rates and unexpected behaviour from foreign central banks, could impact the Swedish term premium and the equity risk premium more than Swedish monetary policy. De Rezende (2017) and Iversen and Tysklind (2017) have shown a similar effect on the Swedish fixed income market.[13]

HOW DO QUANTITATIVE EASING AND A NEGATIVE POLICY RATE AFFECT THE TERM PREMIUM IN SWEDEN?

In October 2014, the repo rate was lowered to 0 per cent, and in the spring of 2015 the repo rate became negative. At the same time, the Riksbank started to buy government bonds on the market. Both of these measures led Sweden's monetary policy into uncharted territory. If the unconventional monetary policy created noticeably different effects than "normal" changes to the policy rate, this could have an impact on the estimated effects in Table 1. We therefore conducted an event-based study to investigate how quantitative easing and negative policy rates affect the term premium in Sweden. This method has been previously used by De los Rios and Shamloo (2017) and Glick and Leduc (2012).

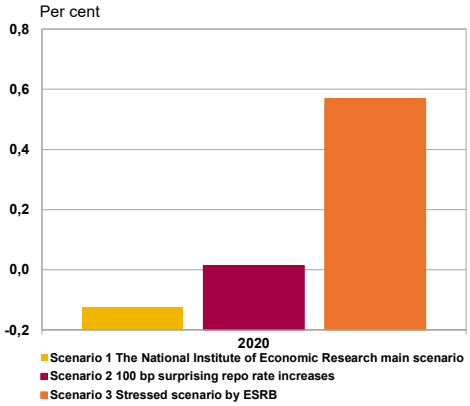
The results show that the term premium decreased when the Riksbank chose to simultaneously lower the policy rate and increase its purchases of government bonds. A similar effect was achieved by decisions that only lower the policy rate. However, the effect of decisions that only increase the purchases of government bonds was not as clear-cut. The purchases of government bonds on their own do not appear to have any noticeable and consistent effect on the term premium. Instead, it is the signals about the future monetary policy combined with an unexpected decision that affects the term premium (Diagram 7 and Appendix I). De los Rios and Shamloo (2017) also show that the Riksbank's government bond purchases on their own do not have any noticeable effect on the Swedish term premium. Gagnon et al. (2010) shows, on the other hand, that the Federal Reserve's purchases of bonds decreased the U.S. term premium.

HOW WILL THE SWEDISH TERM PREMIUM POTENTIALLY REACT?

To study the Swedish term premium's potential future trajectory, we used three hypothetical economic scenarios (Diagram 8). The results show that the Swedish term premium could increase to around 0.6 percentage points in the most comprehensive scenario. This means

[13] Instead of using German and U.S. bonds as separate explanatory factors, De Rezende (2017) builds a yield index using bonds from four different regions: EEA, USA, UK and Norway. The impact of the international index in De Rezende (2017) is statistically significant for long-term rates and the term premium but not for future short-term rates with a ten-year maturity. De Rezende (2017) uses a shorter period of historical data in the regression analysis, between 2003 and 2014.

Diagram 8. Scenario analysis of the term premium



Source: NIER and FI's calculations.

Note: Scenario 1 is based on NIER's main scenario for European and U.S. 10-year bond rates. Scenario 2 is based on Scenario 1, but adds unexpected increases in the repo rate of 100 basis points at the one-year mark in Sweden. Scenario 3 is based on the ESRB's stress test (2019). U.S. market rates are stressed by 165 basis points, and EU market rates are stressed by 93 basis points at the one-year mark. This is calculated by taking the stressed levels and applying them to the ten-year bond rate as at 2019-01-01. We use the relationship between unexpected repo rate announcements from Table 1 for Scenarios 2 and 3. We assume that the daily effects from Table 1 remain after they are implemented.

that the term premium would increase to the levels the market experienced around 2011–2012.

The three scenarios used in this analysis are based on forecasts and simulations from other organisations. Scenario 1 uses the National Institute of Economic Research's (2019) forecast of economic growth, where the global one-year market rates increase marginally[14]. Scenario 2 is based on Scenario 1, but adds unexpected increases in the repo rate of 100 basis points at the one-year mark in Sweden. Even though Scenario 2 includes unexpected interest rate increases, this did not have a major effect on the term premium. The term premium would increase to just above zero percentage points in Scenario 2, compared to around -0,1 percentage points in Scenario 1. Scenario 3 is the scenario used by the European Systemic Risk Board (ESRB) when it stress-tested European pension funds and money market funds in 2019 (ESRB 2019). Scenario 3 showed that an unstructured and abrupt increase in international market rates leads to a sharp increase in the Swedish term premium (Diagram 8).

TERM PREMIUM IN USA

In the USA, the term premium continues to be at historically low levels. The Federal Reserve chose to lower its policy rate in July 2019 after slowly raising it between 2015 and 2018. This illustrates that a normalisation of the monetary policy does not automatically result in an increase in the term premium. According to IMF (2018), the reason behind the USA's low term premium could be that the market is not reacting in the same way when central banks start to buy bonds compared as when they stop buying bonds. When a central bank buys large volumes of long-term government bonds, this can be interpreted as a risk that inflation will not reach its target within the foreseeable future. If inflation falls below its target, this has a negative impact on the term premium. The news value that a central bank is starting to buy government bonds is therefore greater than the communication that the purchases will decrease or existing holdings will be sold. *The signalling channel* is thus of less significance. The fact that the central banks have shown that they can buy bonds as part of their monetary policy could also have structurally lowered the term premium in the USA (IMF 2018).

[14] NIER forecast June 2019.

Concluding remarks

The policy rate in Sweden, like in many other countries, has been and still is very low. The repo rate is currently negative, and the Riksbank is still buying government bonds to invest interest rate income and replace maturing bonds. In December 2018, the Riksbank increased the repo rate for the first time in seven years. In 2019, the Riksbank announced that monetary policy in Sweden could be less expansionary in the mid-term.

Today's term premium in Sweden is negative. It can be interpreted as investors are not compensated for investing in long-term bonds. This may be because investors are prepared to pay an insurance premium against future surprises in the form of low inflation.

If expectations regarding economic growth do not change in such a way that the Riksbank needs to deviate from its forecasts about the future monetary policy, these expectations will probably not cause a sharp increase in Swedish risk premia. In contrary, however, a change in international market rates could have a significant impact on the Swedish term premium. Foreign macro events, such as inflation surprises, could have a greater impact on the term premium and the equity risk premium than unexpected changes in Swedish monetary policy. In a worst-case scenario, an unstructured and abrupt increase in international market rates could lead to greater market uncertainty and reduced willingness in Sweden to take risk. As a result, asset prices could fall when investors sell risky assets and instead seek more secure investments.

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Appendix 1: How do quantitative easing and a negative policy rate affect the term premium in Sweden – regression results

The results show that the term premium fell when the repo rate was lowered to 0 percent in October 2014. It fell further when the repo rate was lowered again and purchases of government bonds were announced on two occasions in February and March 2015. In April 2015, the Riksbank announced an increase in the volume of purchased government bonds, but then the term premium increased.[15] This can be partly explained by the market expectation that the repo rate would be lowered at the same time. Instead, the Riksbank left it unchanged. Thus, the term premium did not fall despite the increase in the purchase of government bonds. In April 2016, the repo rate announcement was in line with the market's expectations, but the Riksbank decreased the volume of its government bond purchases. This could explain the increase in the term premium. In April 2017, the Riksbank decided to reduce the purchase volume of government bonds at the same time as the market expected the repo rate to stay the same. Even though the decision signalled a less expansionary monetary policy, the term premium fell. The explanation for this can be that the Riksbank also simultaneously changed its repo rate forecast and announced that the previously communicated increase would be postponed (Riksbank 2017). This indicated that the low interest rates would continue.

Table 2. Relationship between monetary policy and the ten-year interest rate and components that form the ten-year interest rate (basis points)

Date	Events	ΔTen-year interest rate	ΔTerm premium (Component 1)	ΔFuture short-term interest rates (Component 2)
2014-10-28	Repo rate is lowered to 0%.	-8.37*** (0.04)	-4.11* (0.10)	-4.26** (0.02)
2015-02-12	The repo rate is lowered to -0.1% and purchases of government bonds totalling SEK 10 billion are announced.	-5.75 (0.12)	-4.37* (0.08)	-1.38 (0.35)
2015-03-18	The repo rate is lowered to -0.25% and the purchases increase by SEK 30 billion.	-12.18*** (0.01)	-7.38*** (0.01)	-4.81*** (0.01)
2015-04-29	The purchases increase to SEK 80–90 billion.	10.58*** (0.01)	7.21** (0.02)	3.37** (0.05)
2015-07-02	The repo rate is lowered to -0.35% and the purchases increase to SEK 125–135 billion.	-4.10 (0.24)	-2.25 (0.31)	-1.85 (0.22)
2015-10-28	The purchases are increased to SEK 200 billion.	-0.65 (0.82)	0.88 (0.67)	-1.53 (0,31)
2016-02-11	The repo rate is lowered to -0.5%.	-3.99 (0.25)	-2.67 (0.24)	-1.31 (0.37)
2016-04-21	The purchases are increased to SEK 245 billion.	8.44** (0.03)	5.43** (0.04)	3.01* (0.07)
2016-12-21	The purchases are increased by SEK 30 billion.	-2.52 (0.44)	-2.36 (0.29)	-0.16 (0.90)
2017-04-27	The purchases are increased by SEK 15 billion.	-8.04** (0.05)	-5.06* (0.07)	-2.98* (0.07)
2018-12-20	The repo rate is raised to -0.25%	-0.47 (0.87)	-0.24 (0.89)	-0.23 (0.86)

Note: The event days fall between 2014-10-28 and 2018-12-20. The analysis period consists of 2013-01-01 to 2019-01-01. We calculate daily changes in the components of the long-term interest rate. The value in parentheses is the p-value, which is calculated using the same method as Glick and Leduc (2012). The p-value measures the proportions of the analysis period's daily changes and is larger in absolute terms than changes on event days. *, ** and *** mean that the observed changes are signification at 10 per cent, 5 per cent and 1 per cent.

15 The purchase of government bonds indicates a more expansionary monetary policy and compresses long-term interest rate, which leads to a lower term premium. In April 2015, we instead find a higher term premium in conjunction with the purchase of government bonds (Diagram 7).