

The negative interest rate has so far had a more or less normal impact on the Swedish economy. But just how far can the policy rate be cut before the monetary policy impact is reduced? The lower limit ultimately depends on costs associated with holding cash. Before this happens, however, it is possible that frictions will occur which reduce the impact of cutting the repo rate further. In addition, risks to the financial system will increase the lower the rate goes. One important factor that is difficult to assess is also whether negative policy rates change the behaviour of households and companies.

How far can the repo rate be cut?

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The Swedish repo rate has been in negative territory since February this year. Within economic theory, reducing the rate under zero has mostly been assumed to be impossible since cash carries an implicit rate of interest of zero per cent. Recent experiences with negative interest rates indicate, however, that the lower bound is not at zero. This is because there are costs associated with holding cash. In Sweden, the impact of the negative repo rate thus far seems to have been overall the same as when the repo rate is positive. But the more negative the repo rate goes, the weaker the impact on other rates (and asset prices) in the economy should be. The effective lower bound will therefore depend on how costly it is to manage cash and by how much the monetary policy impact decreases at different rate levels. In addition, risks to the financial system increase, the lower the rate goes.

This economic commentary discusses the experiences of negative rates in Sweden along with the possible problems that can put a limit on how far the repo rate can be cut. It is important to keep in mind that in addition to cutting the repo rate the Riksbank has also purchased government bonds with the aim of making monetary policy more expansionary. In reality it is therefore difficult to differentiate between the effects which occur as a result of a negative policy rate and the effects which occur due to the purchase of government bonds.

Normal impact of the negative policy rate so far in Sweden

According to economic theory, the interest rate governs saving in an economy. The Riksbank steers the nominal rate, but whether it is beneficial to save rather than to consume actually depends on the inflation-adjusted yield, i.e. the real interest rate. The real interest rate can periodically be negative, for example when a central bank pursues a particularly expansionary monetary policy.² A central bank can normally achieve a negative real policy rate by cutting the nominal policy rate below the rate of inflation. When inflation is low this becomes problematic, and can require a negative nominal policy rate for a certain period.

In simple theoretical models however, the interest rate cannot normally be negative, as if it were, households and companies would then choose to hold cash instead, which does not give a negative rate of return.³ If the banks charge negative interest on e.g. wage accounts, customers can avoid the "fee" they would otherwise have incurred on their bank account by instead withdrawing their salary in cash (which has a guaranteed nominal return of zero).

In practice, however, there are both costs and a number of technical difficulties associated with only using cash. For example, it must be stored in a secure manner, which costs money. Some also find it awkward to have to pay their bills by going to

1. The authors would like to thank Karl Walentin and Andreas Westermark for their valuable viewpoints.

2. When the central bank lowers the nominal rate, the real rate falls since prices are sticky. It is not unusual for the real rate to end up in negative territory, making it particularly disadvantageous to save rather than to consume. This increases demand in an economy and tends to gradually push up inflation. (In a small, open economy, it also tends to cause the price of imported goods to go up, which in itself directly contributes to a higher rate of inflation).

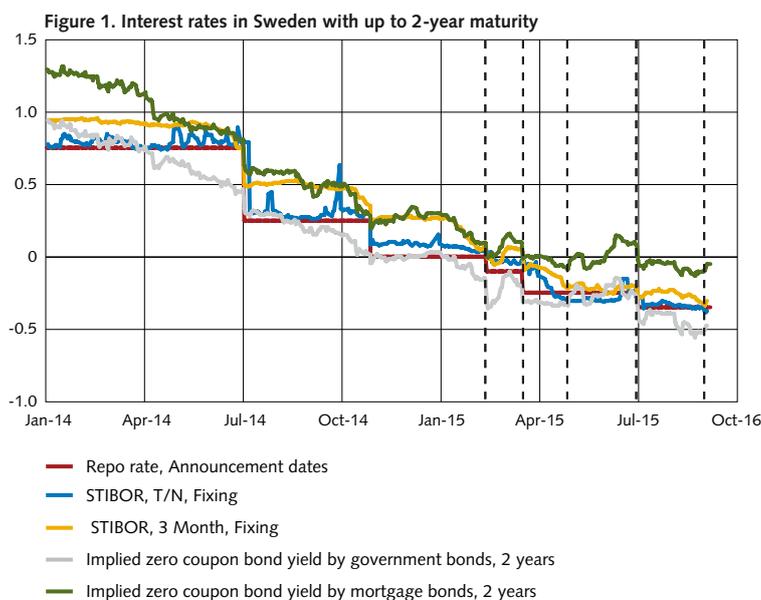
3. See Söderström and Westermark (2009), for instance.

the bank instead of paying them over the Internet at home. It is also not free to pay bills over the counter using cash. In addition to this, many bank branches in Sweden are currently cash-free. In other words, there are both costs and a large number of technical and practical difficulties associated with paying bills in cash.

Since cash does not constitute a friction-free alternative to electronic money in practice, this opens the door for nominal rates, for example a central bank's policy rate, being negative. It is therefore a practical question as to how negative the policy rate can be. The more negative the policy rate is, the less of a restriction the costs of managing cash will be.⁴ Sooner or later, companies and households will go over to using cash all the time, rendering the central bank's rate cuts ineffective.

Negative policy rates have so far been the exception. During the spring the Riksbank has cut the repo rate below zero, and continued lowering it in steps, most recently to -0.35 per cent. But negative interest rates are not confined to Sweden; the Danish central bank, Danmarks Nationalbank, introduced a negative policy rate (certificate rate) for the first time as early as July 2012.⁵ The Swiss central bank has also cut its policy rate, to -0.75 per cent, when it abandoned the exchange rate floor against the euro at the beginning of the year. When negative policy rate levels are introduced it does not necessarily translate into negative rates on banks' deposit accounts. Even when interest rate levels are low, many bank customers in practice pay the bank for the privilege of having a wage account via card fees and other fees. It can however be difficult for a lot of people to reconcile themselves to the idea of "paying to save". We cannot therefore exclude the possibility that cash withdrawals may increase even at negligible negative interest rates, despite the aforementioned costs associated with holding cash. When a central bank introduces negative rates, this obviously sharpens the focus on the increase in cash withdrawals. As yet, however, the experiences from Denmark, Switzerland and Sweden do not indicate any substantial rise in the use of cash.

The period of negative interest rates has been short in Sweden, but so far the impact on other short-term rates has been basically normal. The majority of short-term market rates have followed the repo rate into negative territory, as expected (see Figure 1). The Riksbank has simultaneously purchased government bonds for monetary policy purposes. In practice it can therefore be difficult to determine whether the market rates have become negative as a result of the repo rate or whether the Riksbank's purchasing of government bonds has also had an impact.

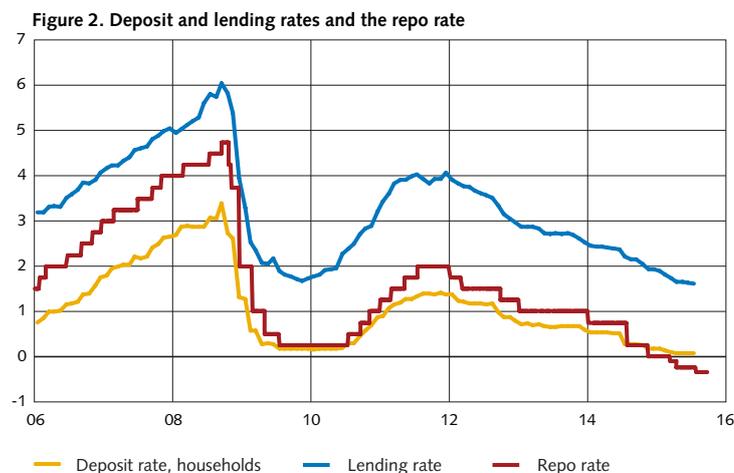


Source: The Riksbank

4. For example, few people would have their money in a bank account if the interest rate was -500 per cent.

5. The Danish policy rate remained negative until the end of April 2014 and then returned to negative territory in September 2014 and has remained at -0.75 per cent ever since.

We have however seen that deposit rates, generally speaking, have not followed the repo rate into negative waters. The banks have thus chosen not to pass the negative rates on to their customers' deposit accounts. Figure 2 shows the deposit and lending rates to households in Sweden. We see that at the same time as deposit rates have stayed at zero, lending rates have continued to fall concurrently with the repo rate.⁶



Factors which affect the impact of monetary policy when the policy rate goes very negative

When a central bank changes the policy rate, it is not the rate itself that affects the economy, but rather the consequences it has on general financial conditions. For example, monetary policy has an effect by cutting both deposit and lending rates to households and companies. When the policy rate is sufficiently negative, there is therefore reason to believe that the impact on the economy will weaken since it seems as though the banks choose not to charge negative interest on their customers' deposit accounts. As long as market rates and lending rates continue to fall, the impact will basically be normal. Such a development is, however, not sustainable for the banks in the long term. If lending rates continue to follow the policy rate down, the profitability of the banks will sooner or later come under pressure. It is then possible that the banks will start compensating by increasing the margin between the repo rate and lending rates, which will reduce the impact of further policy rate cuts. Eventually, lending rates will stop falling and this will tend to reduce the actual impact of monetary policy even further. The banks might have difficulty lending money to customers when lending rates are frozen, while the market rates continue to fall in line with the repo rate. Customers can then opt for other methods of financing. However, when profitability comes under sufficient pressure, it cannot be ruled out that banks will also allow both deposit and lending rates to fall below zero, thus helping to restore their profitability. In this situation, the practical limit may however have been passed for when cash starts to become a serious alternative to holding money in a bank account, thereby rendering further cuts ineffective.⁷

Frictions and costs on financial markets that occur when the policy rate becomes negative

Before cash becomes more attractive for transactions than credit cards, and before the changes between deposit and lending rates markedly weaken the transmission mechanism, other, smaller, frictions can occur on the financial markets. These frictions on their own may not harm the efficacy of monetary policy, but the combination of several of them may well do.

6. Some large companies are experiencing negative deposit rates, however.

7. The interest rate channel along with many other channels should however continue to work approximately as normal.

Many laws and regulations are based on the implicit assumption that interest rates cannot be negative. In addition, many financial contracts also express the interest rate as an increment on some reference rate that is often close to the repo rate. One such example is so-called floating rate notes/bonds. A note/bond usually means that the issuer of a bond pays the purchaser a specific sum at periodic intervals over the maturity of the bond. When the note/bond rate is variable, it can be negative if a central bank cuts the policy rate to below zero. In purely technical terms, it can be the case that the purchaser of the bond instead needs to make note/bond payments to the issuer. When the repo rate first went negative, this initially created an unclear legal situation in Sweden. Even though the law regarding floating rate notes/bonds now seems to have found a solution, other problems may arise as regards price formation when interest rates are negative. Another problem associated with negative interest rates is that the banks, other financial participants and non-financial companies may have IT systems that only have a limited capacity to deal with them. Such limitations can often be managed using manual routines, however.

In addition to the potential difficulty of getting used to the idea of “paying to save”, other behavioural changes may occur as a result of negative policy rates, such as greater risk-taking. Since negative interest rates are nevertheless a relatively new phenomenon, we still know very little about this. It cannot be ruled out that many experience a phenomenon called “loss aversion”, i.e. that people dislike losses considerably more than they like profits. Within the field of behavioural economics, there are studies showing that people are prepared to invest in riskier assets to avoid an almost certain loss.⁸

There is a limit to how negative the repo rate can be

In conclusion, there are therefore a number of different aspects regarding how negative the repo rate can be. Table 1 below summarises some of the most important components in the analysis of the repo rate's lower bound.

Table 1. Schematic representation of effects which occur when the repo rate is negative

FRICTIONS				RISKS	
Lowering the repo rate to	Deposit rate (households)	Lending rate	Interest rate channel	Cash is profitable	Additional stability risks at different levels of the repo rate
Weakly negative	Does not follow	Follows	OK	No	Exaggerated risk-taking
		Partially follows	Weak	For some	FRN, reallocation of deposits
		Does not follow	Very weak	For many	
Very negative	Follows	Follows	Weak	For most	Liquidity risks for banks

The arrow to the left shows how the repo rate becomes increasingly negative. The colour of the other arrows shows the assessment of how the various aspects are influenced at the different rate levels, where green indicates a normal pattern while red indicates expected occurrence of major risks or frictions. As discussed above, the monetary policy impact via the interest rate channel is expected to decrease as the repo rate is cut further due to the banks increased margins on lending rates. At some point, a situation occurs whereby lending rates are not affected at all by further rate cuts. Ultimately, the banks would probably choose to charge negative interest on deposit accounts as well, which means that they can also reduce lending rates so that the interest rate channel becomes “functional” again. In the right-hand column however, we can see that at these levels it is worthwhile for most people to withdraw

8. Kahneman and Tversky (1979), and Tversky and Kahneman (1992). See also Engström, et al. (2015).

cash instead, posing very large risks to the financial system, particularly if this should occur at a rapid rate. How far the repo rate can be cut will therefore be a matter of judgement, in which the greater risks and reduced impact via the interest rate channel associated with further cuts will be factors that have to be taken into consideration.

Will negative interest rates become more common in the future?

As we have seen, the most obvious problem associated with negative interest rates is that cash will sooner or later become a viable alternative to keeping money in the bank. In academia, however, there are economists who have theories on how to cope with this. For example, Rogoff (2014) suggests that cash could be phased-out, firstly large banknotes followed by smaller denominations. Another suggestion is to impose a tax on money, known as a "Gesell tax" after the economist Silvio Gesell (1949), a suggestion which has been further developed by e.g. Goodfriend (2000) and Buiter and Panigirtzoglou (2003). Another example is described by Kimball.⁹ Essentially, these methods are based on putting cash on the same footing as electronic money by introducing a type of exchange rate between both payment methods. In practice this means that cash ceases to exist as a separate payment method. In a system without cash, we can basically set negative interest rates without any problems at all. In that case, very negative nominal rates, as a part of an expansionary monetary policy, cannot be ruled out. How this more theoretical reasoning can be put into practice is an open question, however.

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9. See <http://blog.supplysideliberal.com/tagged/money>.