

Øystein Olsen: A flexible inflation targeting regime

Speech by Mr Øystein Olsen, Governor of Norges Bank (Central Bank of Norway), at the Centre for Monetary Economics (CME) / BI Norwegian Business School, Oslo, 11 October 2016.

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The accompanying charts can also be found on the Norges Bank's [website](#).

Introduction

Inflation targeting was formally introduced in Norway 15 years ago. The changeover to a new monetary policy regime was a consequence of the fact that the exchange rate regime had outlived its role. It no longer yielded the desired result for a small open economy in a world of free capital movements. Through the 1990s, a number of central banks were mandated to aim for low and stable inflation. Since then, many countries have followed suit.

Inflation targeting has become more flexible with time, both in Norway and other countries. In the conduct of monetary policy, greater weight is now given to achieving a reasonable trade-off between the path for inflation and the path for output and employment. Monetary policy cannot be strictly rule-based – it must be flexible and robust. At the same time, we are continuously mindful of the main objective of monetary policy – low and stable inflation over time.

The evolution of inflation targeting reflects the practical experience gained since it was introduced. The trade-offs have been challenging at times. In these past 15 years, the economy has been exposed to different types of shocks. The supply side has been influenced by increased labour immigration following EU enlargement in 2004. The financial crisis and its still prevailing legacies have posed challenges that monetary policy has had to address. And not least, the Norwegian economy has had to contend with wide fluctuations in the terms of trade – in both a positive and a negative direction.

Chart: Performance

Inflation targeting has performed well over the past 15 years taken as a whole. When inflation targeting was introduced, inflation had already come down after years of high inflation and has since been low and relatively stable. At the same time, monetary policy has contributed to moderating fluctuations in the real economy. Flexible inflation targeting has functioned well. The monetary policy framework has provided sufficient flexibility to address the shocks that have hit the economy.

Long-term interest rates have fallen

Chart: International interest rates

In recent years, monetary policy has faced a new challenge in many countries. The interest rate level that is consistent with balanced developments in the economy has fallen. This is reflected in the low level of global interest rates. The decline in real interest rates has been particularly marked over the past 15–20 years. In 2001, when inflation targeting was adopted, real long-term interest rates were around 3 percent. Now, those same interest rates are around zero.

Chart: Forces driving the fall in the global real interest rate

The causes of the decline in interest rates are complex. In recent years, extraordinary measures by many central banks have pushed down long-term rates. Over a longer time horizon, the factors behind the decline in interest rates are more structural in nature. The savings glut in emerging economies, particularly China and oil exporting countries, has been

one important factor. In many countries, savings have probably also increased as a result of demographic developments and a more uneven distribution of income. At the same time, investment in many advanced economies has been low. A factor may be prospects for low returns on investment in productive capital. In the wake of the financial crisis, conditions of a more cyclical nature have also contributed to the fall in interest rates. While deleveraging has pulled up savings, greater uncertainty may have dampened the willingness to invest.

These developments have consequences for monetary policy. The level of the real interest rate that is consistent with balanced developments in the economy has fallen in pace with increased savings and lower demand for capital. This level is usually referred to as the neutral interest rate.

The difference between the actual real interest rate and the neutral real interest rate provides an indication of whether monetary policy is expansionary or contractionary. A real interest rate that is below the neutral interest rate stimulates economic growth, while a higher real interest rate dampens growth.

The neutral interest rate is not fixed, but will over time move around a level determined by long-term productivity, population growth and saving preferences.¹ Fluctuations around this level may be partly attributable to factors such as transient changes in saving and investment behaviour.

The neutral interest rate is not directly observable. Central banks must nevertheless form a perception of how expansionary or contractionary monetary policy is and of the interest rate that is consistent with balance in the real economy. The forecasts for the key policy rate move towards this level as different economic shocks unwind.

In the past few decades, international estimates of the neutral real interest rate have fallen and are now at 1 percent or below in many countries (see Rachel et al (2015), Laubach et al (2015), Hamilton et al (2015), Constâncio (2016) and Zhu (2016)). Norway is part of a global market, and international interest rate developments affect interest rate setting at home, particularly through the exchange rate channel. Norges Bank's estimate of the neutral interest rate has been gradually revised down in pace with international developments. The Bank's forecasts are now based on the assumption that a neutral nominal money market rate in Norway will be between 2½ percent and 3½ percent in the coming years. The associated neutral nominal key policy rate is somewhat lower.²

Norges Bank's projections imply that the key policy rate at the end of 2019 will be lower than the estimate for the neutral interest rate. This partly reflects the shocks to which the Norwegian economy has been exposed in recent years, primarily the pronounced fall in oil prices. Prospects for continued expansionary monetary policies abroad pull in the same direction.

The low level of the neutral interest rate raises a number of issues that I want to discuss today. First, I would like to focus on two aspects that have been given weight in recent years in Norges Bank's assessment of a robust interest rate path. The first concerns the effect of changes in the policy rate, which are more uncertain when the rate falls to levels where our experience is very limited. The second relates to the challenge persistently low interest rates pose to financial stability. I will then touch upon the ability of monetary policy to address a future downturn against the backdrop of global economic developments.

¹ This level is often referred to in the literature as the "long-term equilibrium interest rate", which can be thought of as the equilibrium real interest rate generated by theoretical economic growth models. Examples include variations of the Ramsey model (see Rachel et al (2015) and Baker et al (2005)).

² The spread between the money market rate and the expected key policy rate (the interest rate premium) can vary somewhat over time (see Lund et al (2016) for a discussion of the premium in the Norwegian three-month money market rate).

Greater uncertainty about the effect of the policy rate?

Monetary policy decisions are made under uncertainty. Central banks operate in an environment of uncertainty regarding the current situation, the driving forces in the economy and the functioning of the economy.

Much of this uncertainty is associated with conditions beyond the influence of monetary policy, such as the oil price and economic developments among trading partners. In recent years, the uncertainty related to these conditions has at times been higher than normal, as was the case this summer, when the UK vote to leave the EU fuelled uncertainty regarding the EU economic outlook. When faced with this type of uncertainty, the policy rate will normally be based on projections of economic variables as if they were known with certainty, an approach that is supported by economic theory.³

The uncertainty associated with the effect of monetary policy is of a different nature in that it relates to the functioning of the economy – and the effect of the policy rate in particular.

For monetary policy to function normally, changes in the policy rate must pass through to the bank lending and deposit rates faced by households and enterprises. In Norway, the latest policy rate cuts have had a broad impact on banks' interest rates. Lending and deposit rates for households are both approximately one percentage point lower now than when the key policy rate was reduced in December 2014. Rates facing enterprises have also fallen. Banks' profitability and net interest income have remained solid in the same period.

At the same time, given the current low interest rate level, we are navigating in uncharted waters. Banks' response to changes in the policy rate may differ from their usual behaviour.

In normal times, when the policy rate is well above zero, changes in the policy rate can pass through fully to lending rates without affecting banks' margins as banks can then change deposit rates in tandem with lending rates. The pass-through is more uncertain when interest rates are already low. Banks risk losing deposits if deposit rates are lowered in tandem with the policy rate. If banks do not hold back on lending rates at the same time, an important source of banks' income will be affected.

Households and enterprises may also respond differently to interest rate changes when interest rates are already at a low level. Our empirical models are quantified on data from a period when the interest rate level was higher. So far, there is no clear indication that historical relationships have collapsed, but nor do we have experience of such low interest rates over such a long period of time. The relationship between the interest rate and consumption may change when interest rates approach zero. Households that save will find that their savings yield a lower return. This may provide incentives to increase saving to secure a sufficiently high pension.

It may also be difficult to predict financial market reactions to very low and negative interest rates. With the growing realisation that bank savings yield a negative real return, the interest in alternative investments may increase. Financial market volatility may increase.

As early as 1967, US economist William Brainard discussed how central banks should respond to economic shocks when there is uncertainty about the impact of the policy rate on the economy. He concluded that the policy rate should be used with greater caution when uncertainty about its effect increases (Brainard (1967)).

The result can be illustrated within a simple model where the central bank sets the policy rate with the objective of minimising the deviation of inflation from the target.

³ Under the precondition that interest rates are set by minimising a quadratic loss function and that the economy can be approximated using a linear model, the certainty-equivalence theorem applies: Interest rates are set as if projections for economic variables included in the model (additive uncertainty) were not associated with uncertainty.

Chart: Uncertain effect of policy rate

In the model, as shown in the chart, the central bank minimises a quadratic loss function. Under a flexible inflation targeting regime, the inflation gap and the output gap will both be included in the loss function. For the sake of simplicity, we use only one target variable, y .

With the help of a little algebra, we can rewrite the loss function. We then see that both the expected deviation from the target and increased uncertainty surrounding the target variable result in a higher loss. The uncertainty is represented by the variance of the target variable.

The relationship between the target variable, the policy rate (r) and the part of the economy that is not affected by the policy rate (x) may be described using a linear model – also simplified. If a shock to the economy leads to a change in x , the policy rate is adjusted to counteract the shock. The effect of the policy rate on the economy is given by parameter α .

In this model, there is uncertainty about the effect of the policy rate. The effect will vary around a level, here denoted α_0 . The total effect of the policy rate depends on the size of ϵ , which is uncertain. The uncertainty is given by the variance in the effect of the policy rate, represented by σ^2 . As shown in the chart, the interval within which the effect of the policy rate varies will increase with the degree of uncertainty.

Within this framework, uncertainty about the effect of a change in the policy rate will influence how a central bank is to react to economic shocks. For the sake of comparison, the chart shows the monetary policy response with and without uncertainty about its effect.

The model illustrates two important points.

First, the higher the uncertainty about the effect of the policy rate, the more cautious monetary policy should be, as illustrated by the more cautious monetary policy response in (a), where there is uncertainty, compared with (b), where there is no uncertainty. The intuition behind the result is that uncertainty about the effect of an interest rate change will introduce additional uncertainty into the economy. This warrants a cautious approach.

Second, the uncertainty that is introduced into the economy must be weighed against the benefit that can be achieved. If the effect of the policy rate is expected to be limited, greater weight should be given to the uncertainty.

The model results rest on an important trade-off: the expected size of the target variable's deviation from the target is weighed against the uncertainty of the target variable estimate. This central trade-off is expressed by the loss function.

Chart: Monetary policy and uncertainty – active response

The trade-offs can be illustrated graphically. The next charts show a situation where the policy rate is used to counteract the effect of a negative shock to the real economy. The effect of rate cuts is associated with uncertainty. In this instance, it is assumed that the central bank does not explicitly take this into consideration. The uncertainty has been illustrated using relatively broad bands around the expected paths for inflation and the output gap.

Chart: Monetary policy and uncertainty – a more cautious response

A slightly more cautious monetary policy response as a result of the central bank's recognition of the uncertainty results in a different path. This chart describes a path where the key policy rate is reduced by somewhat less. The assumed real economic costs – as measured by the output gap – are somewhat higher, and inflation moves further from the target. In that respect, this is a less appropriate path for the policy rate. But there is also a benefit – the uncertainty about the future path is substantially reduced. When choosing between the two paths, the benefits must be weighed against the costs.

A robust monetary policy should take account of uncertainty regarding the functioning of the economy. The policy rate in Norway has come down to a low level, approaching a lower

bound. This has increased the uncertainty about the effect of monetary policy. Over the past year, Norges Bank has therefore reacted somewhat less to new information, whether the information has pulled in the direction of a lower or a higher policy rate, than it would have done in a more normal situation. It has been appropriate to proceed with caution.

Low interest rates could be a precursor to financial instability

The neutral interest rate level will likely remain low for several years ahead. This has brought to the fore the question of how far monetary policy should go in taking responsibility for financial stability. For Norges Bank, the consideration of restraining the build-up of financial imbalances has long been an element of a robust monetary policy. The aim is to mitigate the risk of particularly adverse economic outcomes further ahead.

A period of low interest rates can engender financial imbalances. The risk that growth in property prices and debt will become unsustainably high over time is increasing. With high debt ratios, households are more vulnerable to cyclical downturns. In the event of a reduction in household income, debt burdens may become heavy to bear, forcing households to reduce spending on consumption, with a deeper downturn as a result.

Chart: Estimated path for total consumption during recessions

A recently published study by Norges Bank examines developments in private consumption during recessions. The analysis is based on data from 61 international recessions in the past four decades (see Hansen et al (2015)). An important outcome is shown in this chart. The chart compares two different paths for consumption during a recession. The blue line shows the average path, while the yellow line shows the path following a period of high debt growth. The results confirm that high debt growth ahead of a recession leads to a deeper downturn. It also takes longer for the economy to recover.

Chart: Monetary policy and financial stability – financial imbalances give rise to tail risk

The next chart illustrates the tail risk that can arise when financial imbalances build up. The uncertainty bands around inflation and the output gap are highly asymmetrical. The probability of a deep recession increases later in the projection period.

Chart: Monetary policy and financial stability – consideration of financial imbalances reduces tail risk

When financial imbalances are building up, monetary policy can contribute to dampening vulnerabilities by keeping the interest rate somewhat higher than would otherwise have been the case. The risk of a deep economic downturn is reduced. The benefit can be illustrated graphically. The uncertainty bands become narrower and the tail risk diminishes when the key policy rate follows the purple line and not the blue line. But, as we can see, this policy also entails a short-term cost. Capacity utilisation is lower, and it takes somewhat longer to stabilise inflation around the target.⁴

In Norway, household debt ratios have been increasing for several years. House price inflation has accelerated recently. High house price inflation could fuel debt accumulation and make households more vulnerable. This suggests in isolation a somewhat higher key policy rate than would otherwise have been the case. The aim is to achieve an improved path for inflation, output and employment over time. “Leaning against the wind” is therefore in line with our central bank mandate. Flexible inflation targeting with a sufficiently long horizon should take financial stability into account if the situation so allows and so warrants.

⁴ Gerdrup et al (2016) present a model where the costs of allowing monetary policy to take account of financial imbalances are weighed against the benefits.

But it is not the primary responsibility of monetary policy to head off an emerging storm. Regulation and surveillance of financial institutions are the first line of defence against shocks to the financial system. In the years following the financial crisis, the regulatory framework has been strengthened. That does not mean that our work is done. The financial system is in constant flux. Economic agents in search of yields will seek out new opportunities. Today's regulations are not necessarily well suited to meet tomorrow's challenges. We still need more knowledge about the use of macroprudential tools. The prospect of a persistently low neutral interest rate has made this work even more important.

In the work on constructing an appropriate interest rate path, Norges Bank uses advanced models. They are useful and necessary tools for arriving at a good decision. But even with steadily improved models, no model is capable of fully capturing the complexity of the trade-offs. It is particularly demanding to model and quantify how the risk of a build-up of financial imbalances may influence developments in inflation, output and employment over time. In coming to our policy decision, we also take into account the uncertainty associated with the functioning of the economy, including the effect of the policy rate. Given this uncertainty, it is neither possible nor desirable to fine-tune economic developments. Any attempt to actively fine-tune the economy could do more harm than good. The choice of interest rate path must therefore be based on judgemental assessments, which reflects the fact that the world and the trade-offs are more complex than even the most advanced models can reproduce.

The role of monetary policy

I will now turn to the role of monetary policy and take a look at international developments. Several observations can be made. First, many countries have experienced the heavy burden of undoing the damage caused by the financial crisis. The interest rate level among many of our trading partners has been very low for a long time. Additional ammunition in the form of unconventional measures has also been needed, which reflects the fact that the real economic challenges following the crisis have been far greater than those associated with more normal cyclical downturns.

Though the headwinds have been strong, other policy areas have provided little support. Fiscal leeway has been limited by high debt levels. Monetary policy has become overburdened. Despite stretching the limits of monetary policy, central banks have not been able to underpin growth and inflation. Monetary policy in many countries has sought to prevent an even deeper and more persistent downturn.

A number of international studies indicate that the overall growth potential of advanced economies has weakened. The fall in the neutral interest rate is one of the consequences. An expansionary monetary policy has required a lower interest rate level than earlier.

The structural challenges associated with low underlying growth cannot be addressed by monetary policy. Long-term economic growth is determined by labour input and productivity. Both factors are beyond the control of central banks.

This does not mean that monetary policy is without importance for economic activity. A credible monetary policy that delivers low and stable inflation sets the stage for stable economic developments. By conducting a monetary policy that stimulates employment in the short term, we can also avoid unemployment becoming entrenched at high levels. But monetary policy easing and low interest rates do not pave the way for durably higher growth.

Emergence from a situation of low growth, low inflation and low interest rates requires an improvement in the growth potential of the economy. Leading central banks and key institutions, such as the IMF and the BIS, have highlighted the urgency of implementing structural reforms (see Carney (2016), Draghi (2016), Praet (2015), IMF (2016), BIS (2015)).

Structural reforms could boost the growth potential of many economies. At the same time, many factors suggest that the period of low interest rates is far from over. Many of the forces that have pulled down the interest rate level will continue to prevail. A low neutral interest

rate level implies a lower key policy rate also in more normal times, limiting the scope for reducing the interest rate in order to counter a downturn. The question has been raised as to whether monetary policy will have sufficient capacity to cope with a severe downturn.

In recent years, central banks have moved into unknown territory. Many countries have experienced that the effect of rate cuts does not necessarily end at the zero bound. Where the lower bound lies and how fast the effect unwinds is uncertain. The experience gained so far shows that the lower bound depends on the prevailing situation and that it varies across countries, partly as a result of differences in banking systems.

Recent years have also shown that central banks' toolkits can contain more than policy rates. We have gained new insights into the effect of quantitative easing, liquidity provision and policy rate guidance. The measures have been implemented both to maintain the monetary policy transmission mechanism and to loosen monetary policy as the room for further rate cuts has gradually narrowed.

Loose monetary policies have contributed to pushing up growth in advanced economies. The US economy has been recovering for some time, and unemployment has declined. In the euro area, the upturn remains moderate. As cyclical conditions improve in more countries and the after-effects of the financial crisis unwind, the international interest rate level will move upward, but most likely to a new and lower "normal". This gives rise to a number of challenges, partly because it affects the room for manoeuvre in monetary policy.

Conclusion

In spite of the demanding task monetary policy has faced in many countries, it is difficult to find alternative strategies to today's flexible inflation targeting framework. A lower neutral interest rate level does not stand in the way of monetary policy's role as the first line of defence in managing the economy. Monetary policy has been able to respond rapidly to cyclical variations. The framework did not hinder a powerful response when the financial crisis erupted. Inflation expectations were firmly anchored. This enabled central banks to reduce the amplitude and length of the downturn. Here in Norway, the monetary policy regime also functioned effectively in the face of the sharp fall in oil prices.

But what is viewed as a good monetary policy framework is not static and can change with experience and research. The Ministry of Finance will now assess the need for modernising the regulation on monetary policy in Norway. After 15 years of the current regulation, a review is in order. I would, however, emphasise that our experience of the current framework is positive. This suggests a need for adjustments rather than a regime change.

Inflation targeting was introduced in 2001 and has functioned effectively. Confidence in low and stable inflation is firmly anchored. The primary task of monetary policy must always be price stability. When inflation is firmly anchored, monetary policy can also contribute to stable developments in the real economy. The flexibility and room for the exercise of judgement provided by our mandate has strengthened monetary policy and the Norwegian economy.

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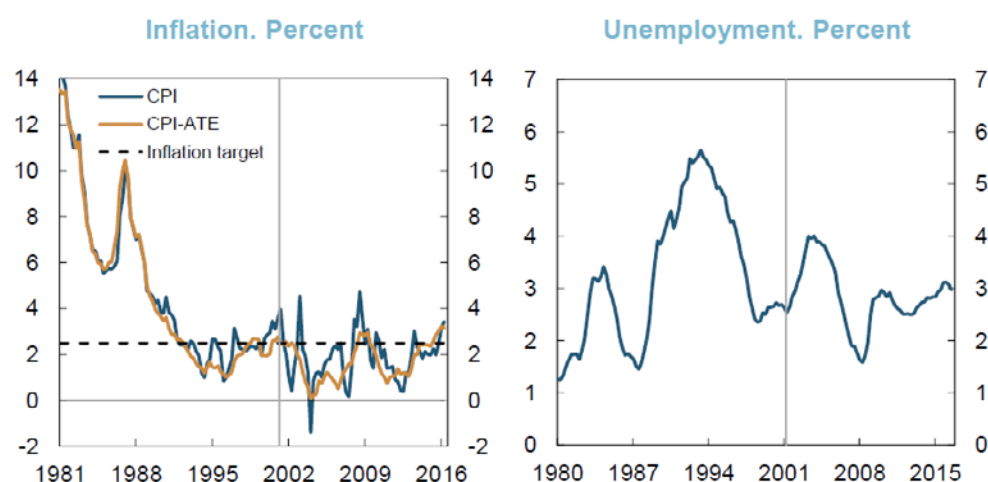
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Performance



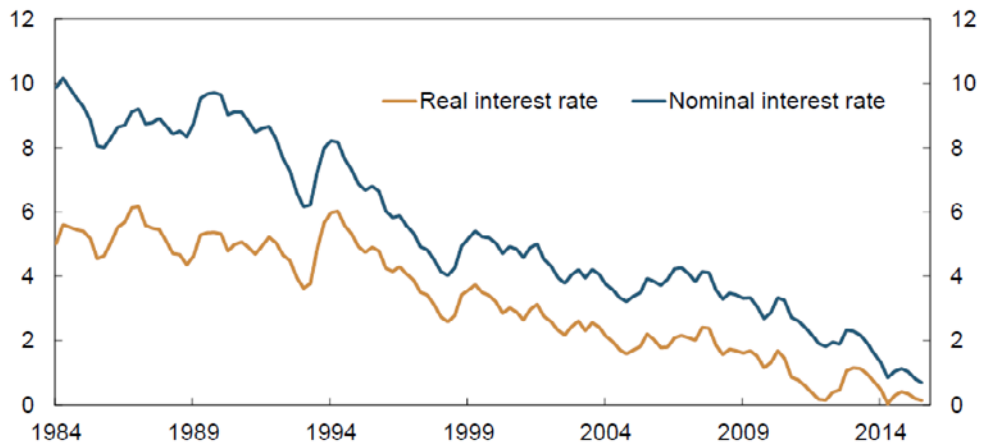
Sources: Norwegian Labour and Welfare Administration (NAV), Statistics Norway and Norges Bank

2



International interest rates

Long-term interest rates. 14 OECD countries¹⁾. Percent

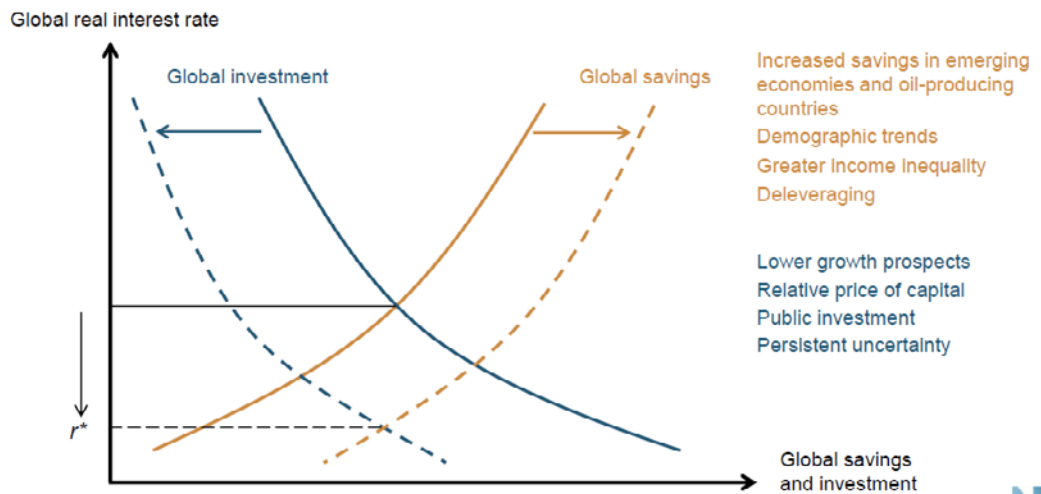


1) US, Germany, France, Italy, UK, Japan, Netherlands, Austria, Belgium, Sweden, Denmark, Canada, Switzerland and Norway. Unweighted average.
Source: OECD

3



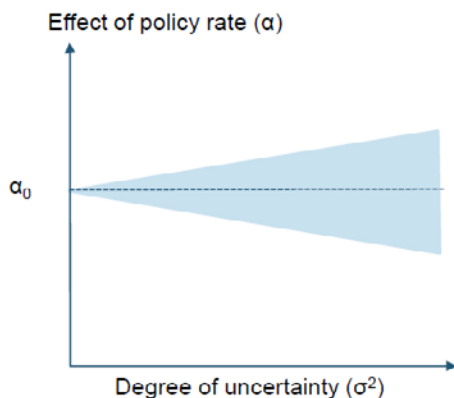
Forces driving the fall in the global real interest rate



4



Uncertain effect of policy rate



Target:

$$\text{Minimise } L_t = E_t (y_t - y^*)^2 = (E_t(y_t) - y^*)^2 + \text{var}_t(y_t)$$

Effect of policy rate on economy:

$$y_t = y^* - \alpha_t r_t + x_t$$

$$\alpha_t = \alpha_0 + \varepsilon_t, \varepsilon_t \sim N(0, \sigma^2)$$

Monetary policy response when x_t changes:

a) Uncertainty about effect of policy rate

$$\sigma^2 > 0, \quad r_t = \frac{1}{\alpha_0 + \frac{\sigma^2}{\alpha_0}} x_t$$

b) No uncertainty about effect of policy rate

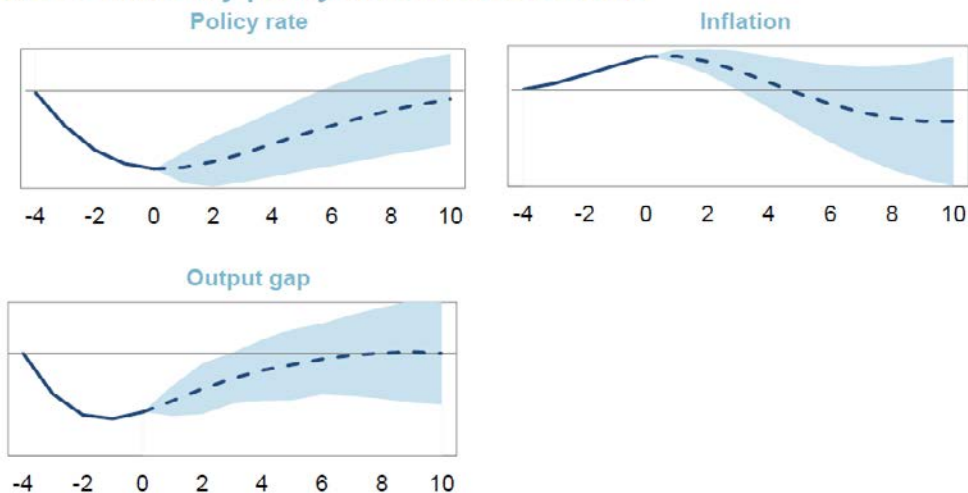
$$\sigma^2 = 0, \quad r_t = \frac{1}{\alpha_0} x_t$$

5



Monetary policy and uncertainty

Active monetary policy to counteract shocks

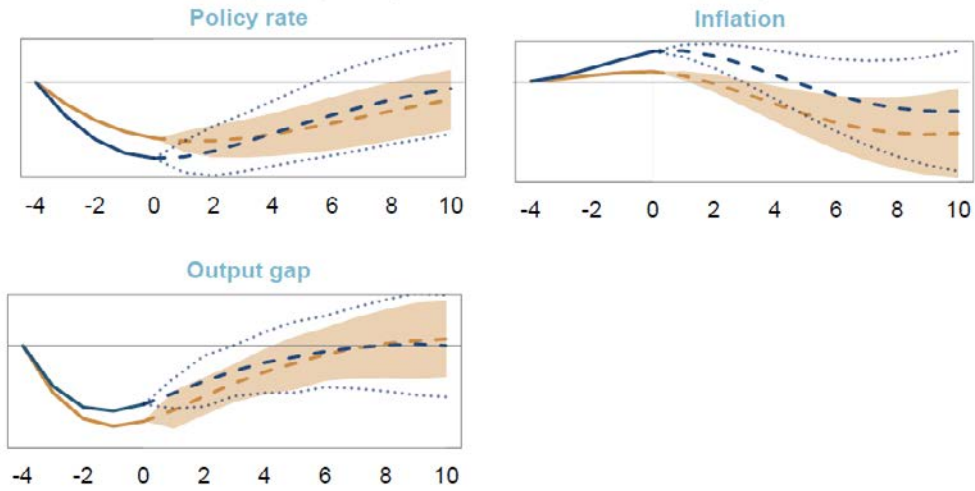


6



Monetary policy and uncertainty

A more cautious policy response reduces uncertainty

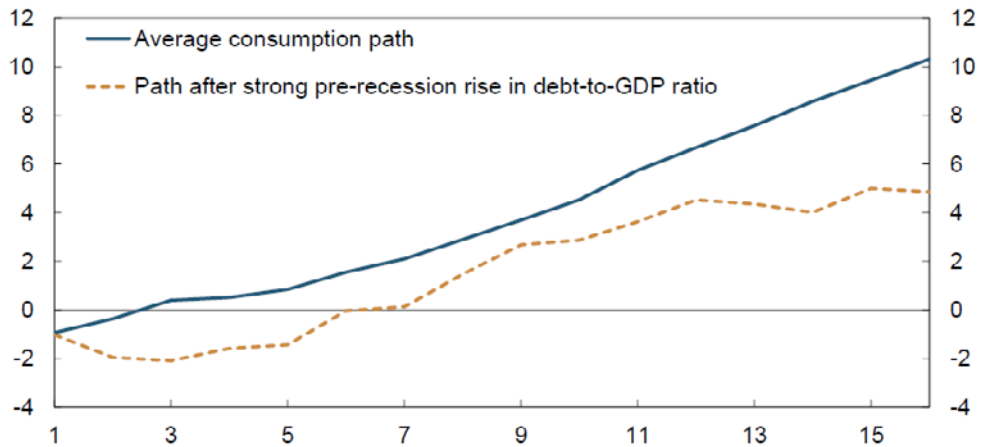


7



Estimated path for total consumption during recessions

Number of quarters from start of recession. Percent



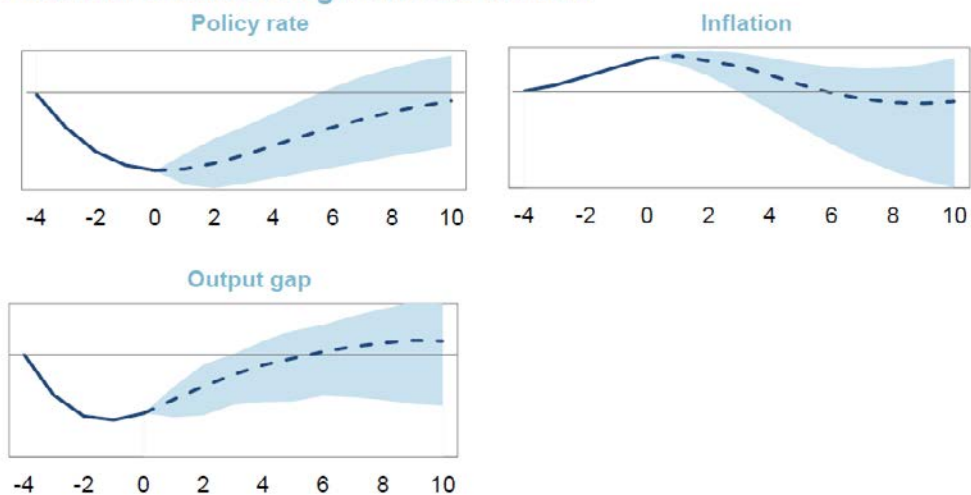
1) Strong growth is defined as a rise of more than one standard deviation above the average. The rise is the average rise in the five years preceding the start of the recession.
Sources: BIS, Federal Reserve Bank of Dallas, OECD, Statistics Norway and Norges Bank

8



Monetary policy and financial stability

Financial imbalances give rise to tail risk

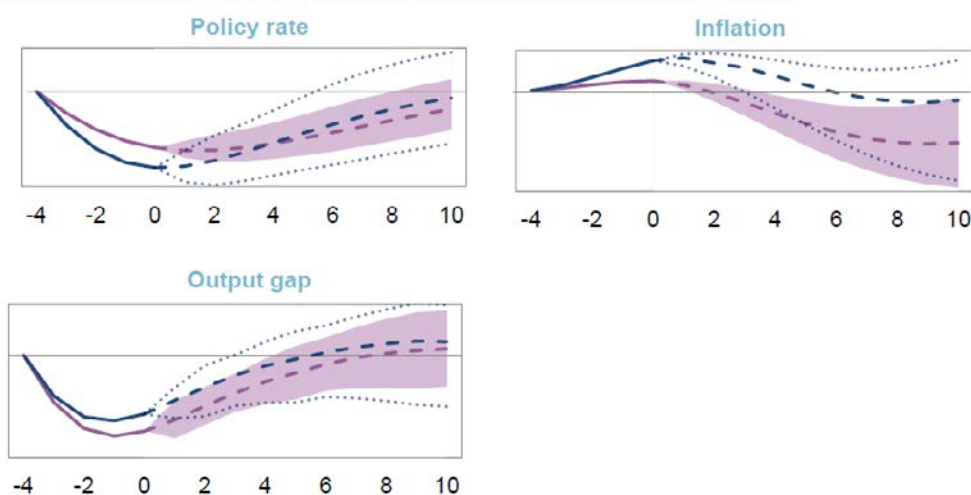


9



Monetary policy and financial stability

Consideration of financial imbalances reduces tail risk



10

