

# **Beyond Rational Expectations: Practical Policy Considerations – Comment on Sims<sup>\*</sup>**

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As usual, Chris Sims (2008a) has given us an interesting and thoughtful paper. Since the title of this session is “Expectations formation: beyond rational expectations,” I will use most of the discussion to discuss some practical policy considerations about expectations formation beyond rational expectations that I have been confronted with at the Riksbank. I will make a couple of specific comments on Chris’s paper at the end of my discussion. I will first summarize the flexible inflation targeting that the Riksbank conducts and emphasize how expectations matter in monetary policy. Then I will give three examples of practical issues relating to expectations formation. The first is the Riksbank’s record so far of managing private-sector interest-rate expectations. The second is the consequence for the Riksbank’s repo-rate path of its recent downgrading of the CPIX core measure of inflation in favor of the CPI. The third is to what extent the recent increase in inflation expectations is a serious problem or not. Finally, I return to Chris’s paper and question his skepticism concerning the Phillips curve and his possible alternative to it.

## **Flexible inflation targeting<sup>1</sup>**

As other inflation-targeting central banks, the Riksbank conducts so-called flexible inflation targeting.<sup>2</sup> This means that the Riksbank conducts monetary policy so as to stabilize inflation around the inflation target, but it also attaches some weight to stabilizing the real economy, more precisely its resource utilization. Strict inflation targeting, corresponding to King’s 1997 “inflation nutter”, would mean that the Riksbank only aims at stabilizing inflation around the inflation target without any

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<sup>1</sup> Svensson (2008) provides more discussion of the Riksbank’s flexible inflation targeting and the role of transparency in it.

<sup>2</sup> The terms “strict” and “flexible” inflation targeting were to my knowledge first introduced in a paper of mine presented at a conference at the Bank of Portugal in 1996, later published as Svensson (1999).

concern for the stability of the real economy.<sup>3</sup> Maximum stability of inflation around the inflation target would require very aggressive contractionary or expansionary policy depending on whether inflation seems to fall above or below the inflation target and would cause a lot of instability in the real economy. No inflation-targeting central bank that I know of, and certainly not the Riksbank, behaves in this way. Real-world inflation targeting is always flexible inflation targeting, not strict. The relative weight placed on the stability of the real economy may vary between different countries and central banks, but it is never zero.

Because of the lags between monetary-policy actions and the effect on inflation and the real economy, effective flexible inflation targeting has to rely on forecasts of inflation and the real economy.

Flexible inflation targeting can be described as “forecast targeting:” The central bank chooses an instrument-rate path so that the forecast of inflation and resource utilization “looks good.” That the forecast “looks good” means that inflation is on target and resource utilization normal or, when inflation and/or resource utilization deviate from the target and/or normal, respectively, inflation goes to target and resource utilization goes to normal at an appropriate pace.<sup>4</sup> From a more technical perspective, that the forecast “looks good” means that it is optimal in the sense of minimizing a standard intertemporal quadratic loss function.<sup>5</sup>

After each policy decision, the Riksbank publishes and motivates its interest-rate path and its forecast of inflation and the real economy, presented as mean forecasts with uncertainty intervals. Such publication is an example of the exceptionally high degree of transparency (in a historical perspective) that characterizes inflation targeting.

This transparency serves several functions. It makes possible more effective external scrutiny and evaluation of monetary policy. This strengthens the Riksbank’s incentive to achieve its stated objectives and to provide good analysis and decisions.<sup>6</sup> Transparency also ensures more effective democratic accountability and increases the legitimacy of the Riksbank (Blinder, Goodhart, Hildebrand, Wyplosz, and Lipton 2001). Finally, transparency allows for more effective implementation of monetary policy by allowing more effective “management of expectations”.

## Expectations matter

It is now well understood that monetary policy in general and inflation targeting in particular is what is called “management of expectations” (Woodford 2004, 2005). Monetary policy affects inflation and the real economy mainly through its effects on private-sector expectations about future interest

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<sup>3</sup> The term “inflation nutter” for a central bank that is only concerned about stabilizing inflation was introduced in a paper by Mervyn King at a conference at Gerzensee, Switzerland, in 1995, later published as King (1997).

<sup>4</sup> The idea that inflation targeting implies that the inflation forecast can be seen as an intermediate target was introduced in King (1994). The term “inflation-forecast targeting” was introduced in Svensson (1997), and the term “forecast targeting” in Svensson (2005). See Svensson and Woodford (2005) and especially Woodford (2007a, b) for more discussion and analysis of forecast targeting.

<sup>5</sup> In a situation with forward-looking private-sector expectations, the minimization of the loss function should be under so-called commitment in a timeless perspective. This means that the central bank behaves with a certain consistency over time and does not try to manipulate private-sector expectations for short-run benefits. See Svensson and Woodford (2005) for details and Bergo (2007) for an example of a real-world application for Norges Bank.

<sup>6</sup> In Faust and Svensson (2001), increased transparency induces the central bank to pursue a policy closer to the socially optimal one.

rates, inflation and the real economy. Expectations of future instrument rates (the expected instrument-rate path) matter and affect the yield curve and longer nominal interest rates. Expectations of future inflation affect actual inflation and longer real interest rates. Expectations of future developments of the real economy and longer real interest rates affect current decisions and plans for the real economy.

Given that expectations matter so much, what does theory say about expectations formation? Before the rational-expectations revolution, private-sector expectations were often assumed to be adaptive. For instance, expectations of future inflation would be a distributed lag of past inflation. The rational-expectations revolution brought rational expectations, that is, model-consistent expectations. Importantly, rational expectations do not imply that all agents must have the same expectations. Rational expectations are conditional on the information available, and if there is asymmetric information so that different agents have different information, their expectations need not be identical. Recently there has been a lot of work on expectations formation in situations of incomplete information and learning, where agents learn by Bayesian updating or recursive or constant-gain least squares, for instance. Chris Sims has introduced the concept of rational inattention, where information and expectations are constrained by costly information processing. Greg Mankiw and Riccardo Reis have examined the consequences of sticky information, situations where observation of the state of the economy is infrequent. Behavioral economics has contributed behavioral theories of expectations formation. There is a lot of ongoing theoretical work on expectations formation that should be very relevant for monetary policy.

## **Expectations formation in practice: Example 1**

### **The Riksbank's management of interest-rate expectations<sup>7</sup>**

The Riksbank has, since February 2007, been one of the few central banks that publish an instrument-rate path. Publishing and motivating an instrument-rate path should be the most effective way of affecting the private-sector's interest-rate expectations. What is then the Riksbank's record in managing such expectations? How have market expectations of future interest rates been affected by the repo-rate paths the Riksbank has published (the repo rate is the Riksbank's instrument rate).

Figures 1-7 illustrate this by comparing the announced repo-rate path with the implied market forward interest rates at the end of the day before the announcement ("Before") and at the end of the day of the announcement ("After"). The implied forward-rate curves have been adjusted by the Riksbank staff for possible risk premia, to be the staff's best estimate of market expectations of future repo rates. Depending on the maturity, the forward-rate curve is derived from the rates for STINA (Tomorrow-Next Stibor interest-rate swaps) contracts, FRAs (Forward Rate Agreements), or interest-rate swaps.<sup>8</sup>

Figure 1 is from the first announcement of a repo-rate path, on February 15, 2007 (before my term as Deputy Governor which started on May 21, 2007). The black step-shaped solid curve shows the actual repo rate. The black dotted curve shows the announced repo rate. The yellow (gray for a black-and-white printer) solid curve shows the implied forward rates the day before the announcement, and the red (black for a black-and-white printer) solid curve shows the implied forward rates after the announcement. Comparing the yellow/gray and the black dotted curve, we see that the market

<sup>7</sup> Svensson (2008) provides more discussion of the Riksbank's record in managing interest-rate expectations.

<sup>8</sup> Market expectations as revealed by the adjusted forward-rate curve should not be interpreted as homogenous expectations but as an average of heterogeneous expectations.

expected a higher repo-rate path than the Riksbank announced. Comparing the yellow/gray and the red/black curve, we see that market expectations shifted down slightly, but not all the way to the announced repo-rate path. The market seemed not to believe that the Riksbank would actually follow its own path, and there were many comments expressing surprise and criticism of how low the path was.

There were policy announcements on March 30 and May 4, 2007, when the repo-rate was held unchanged. On these occasions no full *Monetary Policy Report* and no repo-rate path and no forecast of inflation and the real economy were published.<sup>9</sup> Figure 2 is from the next time a repo-rate was published, on June 20, 2007 (from my first policy meeting). During the spring of 2007, wage settlements were higher and productivity outcomes were lower than the Riksbank had forecasted. Because of the resulting increase in inflation pressure and the still strong outlook for the real economy, the Riksbank shifted up the repo-rate path quite a bit. The old repo-rate path from February 15 is shown as the grey dotted curve. On this occasion, market expectations before the announcement were quite in line with the new repo-rate path for the first year and a half but higher than the path at longer horizons. After the announcement, market expectations shifted up slightly. Interestingly, they then shifted away from the new repo-rate path, as if the market anticipated future upward revisions of the repo-rate path. Perhaps the market still did not believe that the Riksbank was likely to follow its own path.

The next policy announcement was on September 7, 2007. The repo-rate was increased in line with the path published in June. On this occasion no repo-rate path and no forecast of inflation and the real economy was published, but the Riksbank stated that it would from the next policy announcement, in October, publish a repo-rate path and forecast of inflation and the real economy after each policy meeting, not only at the three policy meetings per year with a full *Monetary Policy Report*.

Figure 3 shows the announcement on October 30, 2007. The Riksbank kept the repo-rate path unchanged. Market expectations were quite in line with the repo-rate path and there were no significant shifts in the expectations at the announcement. Now the market seemed to take the repo-rate path more seriously than in February and in June.

Figure 4 shows the announcement on December 19, 2007. The Riksbank again kept the repo-rate path unchanged, which was expected by the market, and there were no significant changes in expectations at the announcement. During the fall, the inflation forecast shifted up and the real-economy forecast became weaker. On balance the Riksbank thought that the old repo-rate path was still good.

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<sup>9</sup> The Riksbank held seven policy meetings during 2007. At three of these meetings (January, June, and October) the *Monetary Policy Report* was published. At the intervening meetings before December 2007, no repo-rate path or forecast of inflation and the real economy were published. From December 2007 the Riksbank has published a repo-rate path and a forecast of inflation and the real economy at each policy meeting. From February 2008 there will be six policy meetings per year.

Figure 1. February 15, 2007  
Percent

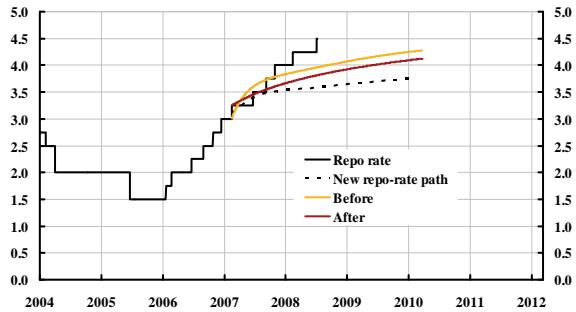


Figure 2. June 20, 2007  
Percent

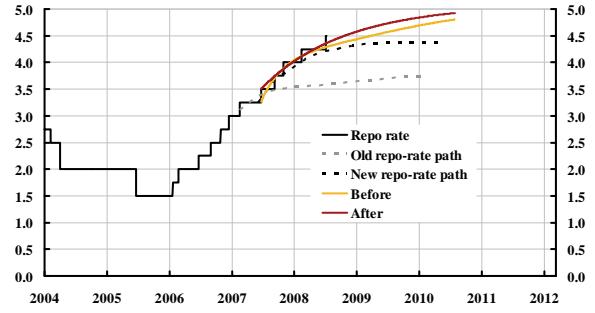


Figure 3. October 30, 2007  
Percent

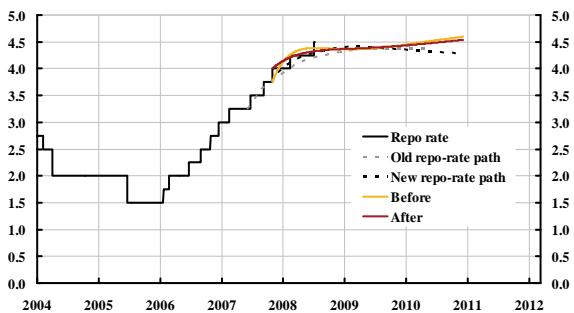


Figure 4. December 19, 2007  
Percent

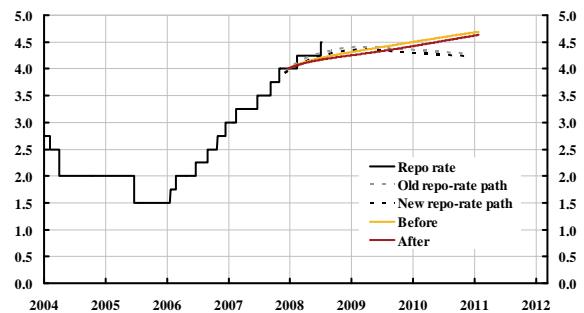


Figure 5. February 13, 2008  
Percent

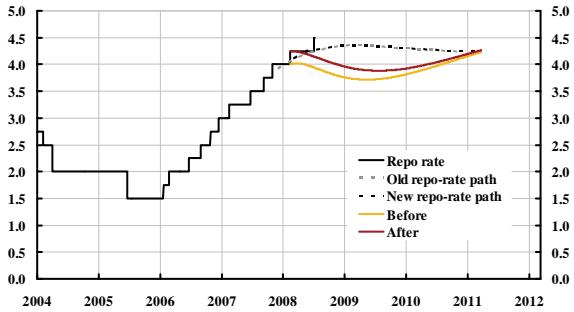


Figure 6. April 23, 2008  
Percent

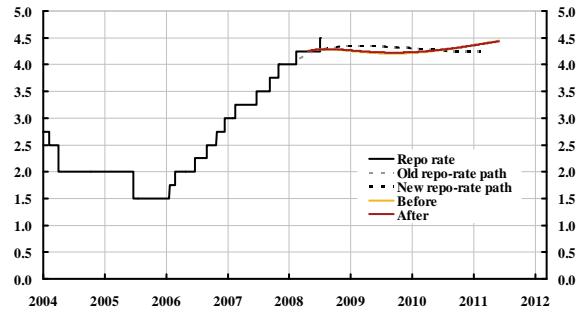


Figure 7. July 3, 2008  
Percent

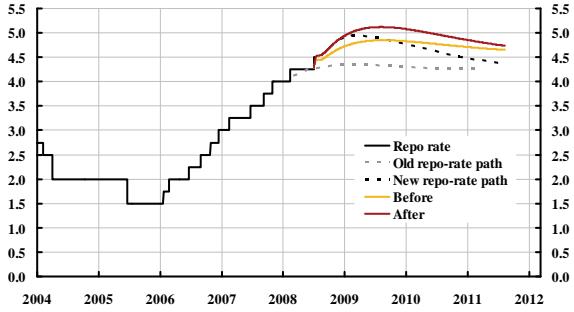


Figure 5 shows the announcement on February 13, 2008. Again the Riksbank kept the repo-rate path unchanged, and it increased the repo rate accordingly. This time market expectations were not in line. Bad news about the U.S. economy and increasing problems in financial markets in the U.S. and Europe led the market to expect no repo-rate increase and a much lower repo-rate path. The Riksbank already had a rather pessimistic forecast for the U.S. economy, and the bad news was not out of line with that forecast. Furthermore, the direct effects of the U.S. economy on the Swedish economy are not so large, which the market seemed to under-appreciate. In any case, there was a big surprise for the market, and there were many angry comments. Although ex post the Riksbank's motivation and decision seemed to be accepted, there were complaints about the Riksbank not having prepared the market for the forthcoming decision. As seen in figure 5, market expectations shifted up significantly towards the Riksbank's repo-rate path, but expected forward rates were still up to 50 basis points below the published repo-rate path about 1.5 years ahead. Apparently the market did not at this time believe that the Riksbank would follow the new repo-rate path but soon adjust it downward.

Figure 6 shows the next policy announcement, on April 23, 2008. The repo-rate path was kept unchanged and the repo-rate was held constant in line with the path. This was expected by the market and there were no shifts in expectations at the announcement.

Figure 7 shows the next policy announcement, on July 3, 2008. Because of increased inflation and inflation pressure with the outlook for the real economy only marginally weaker, the repo-rate path was shifted up quite a bit and the repo rate was increased by 25 basis points to 4.50 percent. The market had expected an increase and a higher repo-rate path, but not quite as high. Expectations of the future repo-rate shifted up significantly towards the path and even exceeded the repo-rate path at horizons longer than a year.

These seven observations are of course too few to draw any reliable conclusions, and too few for much quantitative analysis. They also coincide with a period of several changes in the Riksbank's communication and corresponding learning by both the Riksbank and the market.<sup>10</sup> However, the observations show that the Riksbank may both keep the repo-rate path unchanged and change it quite a bit, depending on the situation. Any observer should after these observations understand that the repo-rate path is a conditional forecast, not an unconditional commitment. Furthermore, whereas the market may not have taken the first repo-rate paths in February and June 2007 very seriously, the market seems to have taken the repo-rate path more seriously thereafter, except in February 2008, when the market expected a much lower path and adjusted only part of the way towards the new repo-rate path. When there has been a significant shift of market expectations, they have always shifted in the direction of the Riksbank's repo-rate path, except for longer maturities in June 2007 and July 2008. On five out of seven occasions, the market has done quite a good job of predicting the Riksbank's new repo-rate path, also when it has shifted quite a bit from the previous path. I believe one cannot reject the hypothesis that the Riksbank has managed interest-rate expectations pretty well, although it has not been a complete success. It will be good when we have a few more years of data to better evaluate the Riksbank's management of expectations.

Because of the importance of expectations in monetary policy, it is natural that a fair amount of resources and time in practical policy is used to analyze, discuss and to some extent predict the development of inflation expectations. Such analysis does not simply assume rational expectations. In practice, I myself tend to think of actual inflation expectations as an informal average of adaptive

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<sup>10</sup> These changes are reported in more detail in Svensson (2008).

expectations, rational expectations and the Riksbank's inflation target. The next two examples of practical expectations considerations illustrate a relatively informal analysis of expectations formation.

## Expectations formation in practice: Example 2 Downgrading of the CPIX and the impact on the repo-rate path

The Riksbank's inflation target of 2 percent refers to the CPI. The CPI includes mortgage costs, so when the Riksbank raised the repo rate in order to lower future inflation, in the short term mortgage costs would increase and CPI inflation would increase. This fact posed a pedagogical challenge, in particular in the mid 1990s when the Riksbank, because of better credibility and fiscal consolidation, could lower the repo-rate quite a bit and falling short and long interest rates contributed to CPI inflation falling quite a bit below the target. In order to avoid continuously having to explain these direct short-term effects of interest-rates on inflation, in the opposite direction to the longer-term effects, the Riksbank started to refer to the CPIX (a core inflation measure that excludes mortgage costs and the effects of indirect taxes and subsidies). When the Riksbank used the assumption of a constant repo rate in its forecasts, it would normally use the rule of thumb that the repo rate should be raised (lowered) if the CPIX inflation forecast at a two-year horizon for a constant repo rate is above (below) 2 percent. When the Riksbank started to publish its own repo-rate forecast in February 2007, the corresponding CPIX inflation forecast was approaching 2 percent at a horizon two-three years into the future. Figure 9 shows the CPIX forecast announced on February 13, 2008. The red (black for a black-and-white printer) dotted curve shows the mean forecast, which approaches 2 percent around the three-year horizon. The shaded blue (gray for a black-and-white printer) fields show the uncertainty intervals.

Figure 8. CPI, February 13, 2008  
Percent

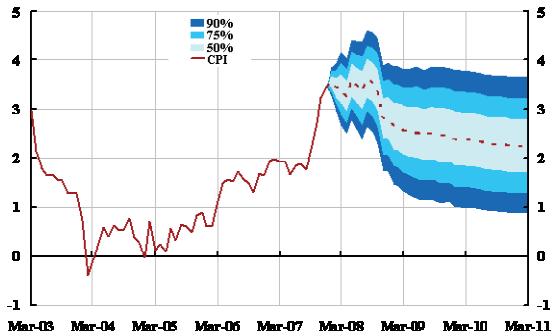
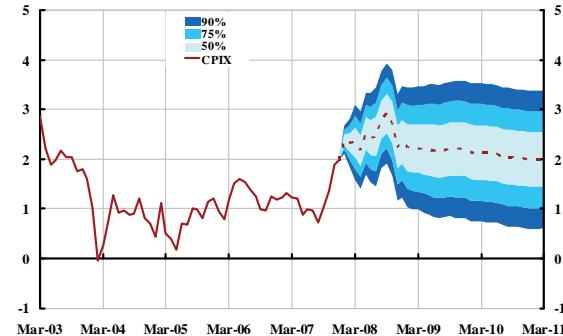


Figure 9. CPIX, February 13, 2008  
Percent



Previously, at horizons beyond two years, the forecasts of CPI and CPIX inflation would be quite close, so the CPI inflation forecast would also be close to 2 percent at a two-three year horizon. However, in recent years, a discrepancy between CPI and CPIX inflation has arisen, such that the CPI inflation exceeds CPIX inflation by about 0.2 percentage points at horizons of two years and longer. Hence, if CPIX inflation approaches 2 percent, CPI inflation approaches 2.2 percent and hence exceeds the inflation target by 0.2 percent. Figure 8 shows the CPI forecast announced on February 13, 2008. The mean forecast exceeds 2 percent at a three-year horizon.

The main reason for this discrepancy has to do with how Statistics Sweden computes housing costs in the CPI. Housing costs are computed as the product of a (house-)capital stock index and an interest-rate index. The capital stock index is computed as a long moving average. House prices in Sweden have increased considerably during the last few years. This implies that the capital stock index will increase for many years in the future, also if house prices stop increasing. For this reason, the CPI will on average exceed the CPIX by about 0.2 percentage points for many years to come.

Mainly for this reason, in June 2008 the Riksbank decided to downgrade the CPIX and increase the emphasis on the CPI forecast (Wickman-Parak 2008). The effect of this will eventually be that the CPI forecast will approach 2 percent at a two-three year horizon whereas the CPIX forecast will approach 1.8 percent. Will the lowering of the CPI (CPIX) inflation forecast from 2.2 percent (2 percent) to 2 percent (1.8 percent) at a horizon of two-three years require a shift in the repo-rate path?

My judgment is that no adjustment of the beginning (say the first year or year and half) of the nominal repo-rate path is warranted by this shift. Eventually, after allowing enough time for inflation expectations to adjust, the steady-state nominal interest-rate would be 0.2 percentage points lower. To see this, assume first that the private sector does not believe that the announcement of the downgrading of the CPIX and the increased emphasis of the CPI will imply a lower level of the inflation forecast and hence does not adjust its inflation expectations. Achieving a fall of 0.2 percentage points of the CPI and CPIX inflation forecast at a two-three year horizon would then require a somewhat tighter policy by the Riksbank and a somewhat higher real and nominal instrument-rate path. Assume instead that the private sector interprets the shift as a fall in the inflation target of 0.2 percentage points and that private-sector inflation expectations shift down by 0.2 percentage points. Then an unchanged *real* interest-rate path would in principle shift down the CPI forecast by 0.2 percentage points and leave the output-gap forecast unchanged. With lower inflation expectations, the *nominal* instrument-rate path would then have to shift down a bit. Thus, under the former assumption of no change in private-sector inflation expectations from the announcement, the nominal instrument-rate path would shift up; under the latter assumption of a perfectly credible announcement and corresponding shift in inflation expectations, the nominal instrument-rate path would shift down. If the truth is somewhere in between, an unchanged nominal instrument-rate path may be an acceptable approximation. Hence, it can be argued that there are no monetary-policy implications (in the sense of any shift in the beginning of the nominal instrument-rate path) from the announcement.

## **Expectations formation in practice: Example 2**

### **The recent increase in inflation expectations: A problem?**

Both inflation and inflation expectations, measured in different ways, have risen in Sweden and elsewhere. Central banks in many countries are worried about inflation expectations. How serious a problem is it that inflation expectations have increased?

Actual inflation has also gone up. I believe that some agents form expectations in rather naïve ways and are much influenced by current inflation. It is actually normal that inflation expectations go up with actual inflation. Therefore, the question is really: have inflation expectations increased in a normal way, or have they increased more than is normal? In the latter case, there may be more of a problem than in the former. A very simple way to answer this question is to regress measures of inflation expectations on current and lagged realized inflation and then look at the residuals. The

Riksbank staff now do this as part of the normal analysis of inflation expectations before each policy meeting. So far, the recent residuals have been close to zero. I have then concluded that inflation expectations have only increased in a normal way, given how inflation has increased. Therefore, I have so far not been so worried about the increase in inflation expectations. If the residuals were positive, I would conclude that there are additional factors behind the increase in inflation expectations, for instance that the Riksbank is losing some of its credibility.

This examination of regressions of inflation expectations on inflation implicitly assumes that inflation expectations would come down when inflation comes down. This may not be the case. There may be a ratchet effect this time, such that inflation expectations do not go down with inflation as easily as they have gone up. We will not know until we can look at the regression residuals when inflation is falling. If there is a ratchet effect, there is more reason to worry about inflation expectations, and it is more important to prevent them from going up.

Let me now make a couple of comments on Chris's paper.

### **Skepticism about the Phillips curve?**

Chris is very skeptical about the Phillips curve, in the standard forms where inflation depends on expected future inflation and real marginal cost, an output gap, or another real variable corresponding to a measure of tightness. He actually seems skeptical about the conventional wisdom concerning the transmission mechanism of monetary policy, the way monetary policy affects inflation and real activity. The conventional wisdom is, somewhat simplified, that monetary policy affects expectations about future short interest rates, which because of sticky inflation expectations affect expectations about future short real interest rates. These expectations then affect longer real interest rates, which have an impact on real activity, aggregate demand, real marginal costs and output gaps. There are more transmission channels through the financial sector and, in open economies, via exchange rates and capital movements, but these are the main channels emphasized in the conventional wisdom.

The fact is that by applying this simple conventional wisdom to make forecasts for inflation and the real economy, central banks, in particular inflation-targeting central banks, have in the last 15 years been extremely successful in controlling inflation, compared to previous periods. Actually, by applying flexible inflation targeting, these central banks have succeeded in stabilizing *both* inflation and the real economy to an unprecedented extent. The best proof of the pudding is in the eating, I believe. I find it very difficult to believe that these central banks would have been so successful if there was a major flaw in their view of inflation determination. Therefore, unless there is more substantial evidence of conventional Phillips curves (including the more sophisticated Phillips curves used in central-bank DSGE models) not working, I continue to believe that there is something right in them. This does not mean that I think it is wrong to continue to look for such evidence.

### **Alternatives to the Phillips curve?**

Chris is not very explicit in this paper about what alternative to the Phillips curve and the conventional wisdom he proposes. In a previous paper with criticism of the Phillips curve (Sims 2008b), he presents a variant of the Fiscal Theory of the Price Level (FTPL) where the present real value of future debt repayment is more or less exogenous and the price level adjusts so as to satisfy

the public-sector budget constraint and makes the real value of nominal public debt equal to the present real value of future debt repayments.

I am not at all convinced by this example. I am skeptical about the applicability of the FTPL to advanced countries with fiscal policy under control and independent central banks with a price-stability mandate. Certainly I am skeptical about the applicability of the FTPL to Sweden. I am convinced that the Swedish Government will adjust its expenditures and revenues so as to always repay the national debt in full in kronor. Generally, Swedish fiscal policy is a model for the rest of the world, with a sustainable surplus and excellent control over expenditure and taxes. Furthermore, I am convinced that the real value of these kronor repayment will be determined by the Riksbank through its price-stability mandate. I will certainly do my best to resist any (very unlikely) pressure on the Riksbank to contribute to financing any fiscal deficit. Certainly the law is on the Riksbank's side. The Swedish Constitution and the Riksbank Act are consistent with the Maastricht Treaty. The Constitution states that “[n]o public authority may determine how the Riksbank shall decide in matters of monetary policy” (The Instrument of Government, chapt. 9). The Riksbank Act states that “[m]embers of the Executive Board may neither seek nor take instructions when fulfilling their monetary policy duties” (chapt. 3) and “[t]he Riksbank shall not extend credit to or purchase debt instruments directly from the state, another public body or an institution of the European Union” (chapt. 8).

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