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Frontiers of Monetary Policymaking:

Adding the Exchange Rate as a Tool to Combat
Deflationary Risks in the Czech Republic

by Ali Alichi, Jaromir Benes, Joshua Felman, Irene Feng, Charles Freedman,
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Abstract

The paper first describes how the Czech National Bank (CNB) moved gradually from a fixed exchange rate regime to the frontiers of Inflation-Forecast Targeting. It then focuses on the CNB's recent experience in adding the exchange rate as a complementary monetary policy tool to stimulate the economy and combat the risks of deflation when the policy interest rate is at the zero lower bound. It assesses the theoretical basis of such a policy, the communications approach used by the CNB when announcing the new framework, and the effects thus far on inflation and output.

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I. INTRODUCTION

In this paper, we first describe how the Czech National Bank (CNB) moved gradually from a fixed exchange rate regime to the frontiers of Inflation Targeting (IT), or, more precisely, Inflation-Forecast Targeting (IFT).[1] The main focus of the paper will then be on the CNB's recent experience in adding the exchange rate as a tool to combat deflationary risks.[2]

When the CNB was forced off exchange-rate targeting in 1998, it did not satisfy many of the so-called "preconditions" for full-fledged IT.[3] So it initially introduced numerical objectives for inflation while continuing to manage the exchange rate loosely—a regime that we refer to as IT Lite (Figure 1). But this fledgling IT regime did not work well. In the absence of a forward-looking framework for policy analysis, the CNB tended to focus excessively on current economic outcomes and hence was slow to take policy action in anticipation of projected future developments. This resulted in an unnecessarily deep slowdown and periods of high unemployment[4] that came close to costing the CNB its independence.[5]

In response, the CNB began to adopt a more transparent forward-looking monetary policy approach. The biggest shift came in 2002, when it adopted a forecasting and policy analysis system (FPAS), a modeling framework that allowed the central bank to forecast inflation and output based on endogenous interest rates.[6] The FPAS was designed to support an explicit IFT framework with a flexible exchange rate. This also allowed the CNB to make and explain policy in a way that was increasingly comprehensible and credible to financial markets and the public.

As its policymaking and communications techniques improved over time, the CNB became one of the world's leading IT central banks. In fact, in 2008, the CNB became one of just five IT central banks to publish the projected interest rate path, based on its staff forecast. This very sophisticated form of forward guidance was introduced just before the global financial crisis, helping the CNB avoid some of the difficulties faced by other central banks during the crisis period.

Nevertheless, the Czech Republic faced a prolonged period of economic weakness following the euro crisis, including six consecutive quarters of negative GDP growth in 2011-13.[7] The central bank responded by bringing its policy interest rate to the zero lower bound (ZLB) by November

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[1] For a brief introduction to Inflation Targeting see Freedman and Laxton (2009a, 2009b, and 2009c).

[2] Franta and others (2014) have been simultaneously studying the same issue. Their work is complementary to our work and we strongly recommend it to interested readers.

[3] The main lacking "precondition" was a forward-looking monetary policy framework.

[4] The unemployment rate peaked at 9.3 percent in 2000. For a more detailed discussion of the history of monetary policy in the Czech Republic see Laxton, Rose and Scott (2009).

[5] See Ötker-Robe and Vavra (2007).

[6] For complete documentation of the FPAS introduced in 2002 see Coats, Laxton and Rose (2003).

[7] When this paper was drafted GDP data suggested six quarters of contraction over 2011Q4-2013Q1.

2012, after which it used a strengthened form of its forward guidance on the policy rate, signaling its readiness to use the exchange rate as a further tool if needed. Still, in November 2013, the CNB decided that further monetary stimulus was needed. There was little scope to rely upon quantitative easing, as some other central banks had done, because the Czech banking system was already in long-term liquidity surplus, while markets for private debt instruments were relatively shallow.[8] So the CNB decided to use the exchange rate as a complementary monetary policy tool to stimulate the economy and reduce deflation risks.

The success of this policy depended on convincing economic agents that the CNB was not introducing an additional nominal objective for monetary policy, as adding an exchange rate target could potentially result in conflicts with its existing inflation and output objectives.[9] This has required clear communication of what the CNB is doing and what it is not doing. In particular, the CNB has made it clear that it is not treating the value of the exchange rate as a new target but rather as an additional tool to ease monetary conditions to achieve the existing inflation and output objectives. To be consistent with the IFT framework, the CNB also emphasized that the announced value for the exchange rate floor could be changed as economic circumstances required.[10] This is similar to changing the policy interest rate during normal times in response to new information that requires adjustments in monetary conditions. Another key communication issue was the exit strategy. Here, the CNB clarified that they would stop using the exchange rate tool when it becomes necessary to tighten monetary conditions to ward off inflation pressures. Subsequently, the CNB began to provide information on the dates before which it would not move away from the new framework.

It is too soon to judge the success of this strategy. But already some tentative lessons can be drawn for similar economies, particularly those that are small and open, where there are concerns about deflation and policy interest rates are at the ZLB. At the same time, it is important to note at the outset that our analysis ignores some important issues that are relevant to larger economies, including the implications for the global system of using exchange rates as a policy tool.

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[8] See Franta and others (2014).

[9] All IT central banks in practice have both output and inflation objectives. An attempt to target inflation on a period-by-period basis could result in extreme variability in the output gap. In practice, IT central banks bring inflation back to the long-term target in a way that does not result in undesirable implications for the real economy. Inflation-forecast targeting central banks publish forecasts of both the output gap and inflation to provide more information about how they are managing the short-run output-inflation tradeoff. See Freedman and Laxton (2009a).

[10] The following is a direct quote from CNB's Q&A that followed the November 7, 2013 decision: "As in the case of interest rates in the past, the Bank Board may decide to change this level at a subsequent monetary policy meeting - either in light of the message of the new macroeconomic forecast or based on an assessment of the balance of risks to the (current) forecast. It can be expected, however, that any change in this level would need a much stronger impulse than in the case of interest rates. The Bank Board discusses monetary issues eight times a year. In exceptional cases it may also hold extraordinary meetings…"

II. HISTORY OF MONETARY POLICY IN THE CZECH REPUBLIC

IIa. 1991-97: Fixed Exchange Rate Regime

In the wake of the liberalization of the Czech economy in the early 1990s, the exchange rate peg initially proved to be a key stabilizing force, providing a successful nominal anchor for the economy.[11] As long as the economy remained relatively closed to international capital movements, it was simultaneously possible to have an independent monetary policy and to continue gradual integration into international capital markets. But by 1993-95 volatile capital inflows began testing the exchange rate regime, leading the CNB to widen the band around the exchange-rate peg to +/- 7.5 percent in 1996. This action was temporarily successful in reversing short-term capital outflows.

Toward the end of this period, however, macro stabilization policies were not working well. In particular, money targeting was becoming difficult and the increasing financial integration exposed policy to the "Impossible Trinity" dilemma, i.e., the incompatibility of having open capital markets, a fixed exchange rate, and an independent monetary policy at the same time. As a result, the monetary framework could not cope well with the challenges, especially as real GDP growth was declining, disinflation was not proceeding, and the large current account deficit was becoming a critical macroeconomic risk.

While the macroeconomic situation was unsustainable and would eventually have required a policy reaction, adverse events in early 1997—contagion from the Asian crisis and domestic political instability—resulted in a crisis. About 20 percent of reserves were used to defend the peg, and interest rates rose from 12 percent to 26 percent.[12] Still, the peg had to be abandoned and the exchange rate subsequently depreciated by 13 percent.

In the aftermath of the crisis, the exchange-rate peg had been discredited and money targeting was difficult to conduct. So the CNB initially introduced a new policy framework that was based on a managed float. But this framework did not provide a credible nominal anchor to stabilize the economy and keep inflation and inflation expectations at low levels. Accordingly, IT was adopted as the best available possibility, in spite of the fact that only a few of the so-called "pre-conditions" were in place.

IIb. 1998-2001/2: IT Lite (without a forward-looking framework)

Most IT emerging market countries have undergone a period of transition prior to adopting IT, only gradually abandoning the anchor role of the exchange rate. The length of the transition period has depended on the extent to which the necessary conditions for IT were in place at the

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[11] See Capek and others (2003) and Ötker-Robe and Vavra (2007).

[12] The interbank one-week PRIBOR rate peaked at 75 percent in the heat of the crisis.

outset, or the urgency of the need for an alternative anchor. It has also depended on the speed of progress in putting in place the remaining elements of IT, in particular the adoption of a flexible exchange rate regime and the institutional/operational environment conducive to a smooth implementation of the framework.[13]

The Czech Republic followed a similar path. IT Lite was introduced after an intensive preparation period of six months. At that point, the CNB also enjoyed a substantial degree of autonomy in setting the policy objectives (goal independence) and deciding on policy strategy (operational independence). For instance, the newly-set inflation targets did not require approval by the government. The CNB also had instrument independence and was able to adjust its key interest rate, thereby allowing it to implement its monetary policy decisions effectively. This situation reflected the absence of fiscal dominance, owing to the country's solid fiscal position. It also reflected the fact that the Czech economy had reasonably developed financial markets by this time.

However, the CNB had some way to go before having all the elements in place to support full-fledged IT. Most importantly it had no formal mandate for price stability. Indeed, there was little political support for IT and the state-owned banking system was fragile. Moreover, the CNB had no experience in inflation-forecast targeting and little credibility, accountability or transparency.

The transition began with a managed float. While the bands on the exchange rate were dropped relatively early, the CNB continued intervening to curb large (short-term) volatility in the foreign exchange market from 1998 until 2002, at which point it stopped intervening. This change reflected the realization that over time there can be difficulties with a managed float.

The adoption of IT without all the supporting elements caused problems for the CNB. It was difficult to forecast inflation and output in the face of inadequate data series, rapid structural shifts, and an imperfect understanding of the transmission mechanism. As a result, the CNB adopted a cautious stance, which ultimately resulted in interest rates being kept too high for too long. They remained high for much of 1998 and contributed to an initial undershooting of inflation combined with a protracted recession and period of high unemployment. This episode, and the lack of public familiarity with the new regime, in turn led to questions about the central bank's independence.[14] Figures 2, 3, and 4 show output growth, the unemployment rate, nominal and real interest rates, and actual and expected inflation over this period.

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[13] See Batini, Kuttner and Laxton (2005) and Freedman and Ötker-Robe (2009).
[14] See Ötker-Robe and Vavra (2007).

IIc. 2001/2-2007/8: Full-fledged Inflation-Forecast Targeting

In order to move towards full-fledged IT, the CNB realized it would have to develop a forward-looking monetary policy framework with the ability to forecast the Czech economy and map the transmission channel between its tools and its output/inflation objectives. In addition, it would have to change its organizational structure to support the policymaking element of IT and the communications element that is needed to develop transparency, accountability and eventually credibility.

Why not just use a Taylor rule? Such an approach is a useful academic device, but the Taylor rule, in which the policy interest rate is adjusted with respect to current year-on-year inflation and the current output gap, is an overly simplistic representation about what central bankers need to think about and then communicate to financial markets and the public. In particular, lags, expectations and important nonlinearities (such as the ZLB and the links between inflation and output) can play an important role in the monetary policy transmission mechanism process.[15] Hence, a model-based forward-looking framework is needed to deal with lags and manage expectations by the private sector (financial sector participants, wage-price setters, etc.).

Accordingly, over time, the CNB gradually improved its policy framework, moving toward the standard approach employed by the majority of IT central banks, namely Inflation-Forecast Targeting (IFT). Under IFT, the central bank's inflation forecast represents an ideal intermediate target to manage and communicate the short-run output-inflation tradeoff. That is, in the context of returning inflation to its long-term target rate following a shock, the central bank simulates the various possible paths available to it and decides on a path that takes into account the trade-off between the costs of forecast inflation being away from its target and the costs of output remaining away from potential.[16]

As it became apparent that the CNB needed consistent model-based forecasts of the economy in which to embed an inflation-forecast based reaction function, considerable effort was devoted to developing a forecasting and policy analysis system (FPAS) designed explicitly to support an IFT regime. The major elements of the FPAS included:[17]

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[15] See Isard, Laxton, and Eliasson (2001) for examples of the limitations of backward-looking Taylor rules for real-world policymaking. See Clinton and others (2010), Argov and others (2007) and Alichi and others (2009) for examples of the policy implications of important nonlinearities such as the ZLB, the Phillips curve and endogenous policy credibility.
[16] In realistic models of economies with important lags in the monetary transmission mechanism it simply is neither feasible nor optimal to keep current inflation on target at all times.
[17] See Laxton, Rose and Scott (2009) for more discussion of designing an FPAS to support IFT regimes. The development of the FPAS was published in two books by the CNB with the assistance of the IMF—Coats (2000) and Coats, Laxton and Rose (2003).

- organizing the staff and their resources in order to best support policymaking within the institution;
- constructing a quarterly projection model (QPM);
- developing a multivariate filter to help impose some consistency in measuring potential output and the NAIRU;[18]
- introducing risk analysis and confidence bands into the forecast;[19] and
- integrating the near-term forecast (largely based on expert knowledge and judgment) with the medium-term forecast (in which the QPM plays an important role along with the judgment of staff economists).[20]

The QPM plays a number of important roles in the FPAS. It is an organizing and disciplining device; provides medium-term perspective and consistency to the projection; and allows staff to incorporate a forward-looking transmission mechanism into their discussions. The FPAS also improves the efficiency of forecast production, thanks to its seamless and flexible design. This involves a shift in emphasis from data collection and descriptive analysis to information extraction, allows more structured debate about risks and policy issues among policymakers and between staff and policymakers, and permits greater transparency in policy recommendations. Extensive documentation also makes the production of the forecast more transparent and allows for ex-post evaluations to help improve the process.

The FPAS also allowed staff to more easily prepare alternative scenarios and to create confidence bands around the baseline forecasts, allowing policymakers to shift their attention from purely descriptive analysis of recent inflation and economic developments to focusing on the appropriate trajectory of policy interest rates to bring inflation back to the long-term inflation target. The FPAS greatly reduced the CNB's reaction time with respect to substantial shocks, but still left open the difficult policy challenge of recognizing the sources of the shocks and finding an appropriate policy response.

At the heart of the FPAS is the transmission mechanism between the actions taken by the central bank and their effect on inflation and output. The CNB, like all IT central banks, views the functioning of the transmission mechanism as shown in Figure 5. As the figure shows, actions with respect to the policy rate path affect longer-term market interest rates as well as the exchange rate. The interest rate movements affect domestic demand, while exchange rate movements affect the demand for tradable goods and services. The movements in aggregate demand feed into inflation via their effect on the output gap (the difference between aggregate demand and potential output) and exchange rate movements have a direct effect on the price of traded goods and services. Changes in the observed rate of inflation may affect inflation expectations, which may in turn affect the rate of inflation in the future.

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[18] For a recent example see Benes and others (2010b).
[19] For an example with important nonlinearities see Clinton and others (2010).
[20] For a discussion of blending information from near-term forecasts with the projections from structural models see Benes and others (2010a).

There are a number of shocks—financial, foreign, commodity prices, fiscal policy, potential output, and inflation—that can affect the transmission mechanism at various points in the process. By influencing the exchange rate, the output gap and inflation itself, such shocks can cause the projected path for inflation to deviate from what is anticipated by the central bank. The response by the central bank to this deviation is represented by the arrows from inflation and expected inflation to the policy interest rate. That is, the central bank responds to the shocks by adjusting its path for the policy interest rate in such a way that projected inflation returns to its target over time. During this period the CNB described in words the interest rate path that was contained in the forecast.

IId. Do Policymakers at the CNB use the FPAS Framework?

CNB policymakers take the staff's analysis and forecasting work very seriously in making their interest rate decisions. To quote the foreword of the CNB's 2014 III (August) Inflation Report:

"The forecast for the Czech economy is drawn up by the CNB's Monetary and Statistics Department. The forecast for inflation at the "monetary policy horizon" (about 12–18 months ahead) is of greatest relevance to the decision-making on the current interest rate settings.

"The forecast is the key, but not the only, input to the Bank Board's decision-making. At its meetings during the quarter, the Bank Board discusses the current forecast and the balance of risks and uncertainties surrounding it. The Bank Board's final decision may not correspond to the message of the forecast due to arrival of new information since the forecast was drawn up and to the possibility of asymmetric assessment of the risks of the forecast and divergent views of some board members on the development of the external environment or the linkages between the various indicators within the Czech economy."

It is important to emphasize that policymakers are always focusing on the implications of recent economic developments for future movements of the important variables in the economy. The choice of the horizon over which projected inflation is to return to target following a shock is related to structural elements in the economy, such as the flexibility of wages and prices and the speed of adjustment of inflation expectations to actual movements in inflation, as well as other factors, such as financial stability considerations.[21]

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[21] To the extent that a more efficient monetary policy reduced macroeconomic (inflation and output) variability, it could improve financial stability. However, if it resulted in higher uncertainty about future monetary policy, it could lead to financial instability. For example, forward guidance that reduces interest rate uncertainty in the short run and increases it over the longer run, could result in an underpricing of macroeconomic risks. Issues of financial stability are beyond the scope of this paper. For a discussion of forward guidance issues see Woodford (2012) and Filardo and Hoffman (2014).

The CNB's forward-looking policymaking framework is very transparent and credible. The institution has gone to considerable lengths to communicate why and how it formulates and implements monetary policy. To quote again from the foreword to the 2014 III (August) Inflation Report: "The inflation forecast and the assumptions underlying it are published with the aim of making monetary policy as transparent, comprehensible, predictable and therefore credible as possible. The Czech National Bank is convinced that credible monetary policy effectively influences inflation expectations and minimizes the costs of maintaining price stability."

As was the case with many other countries, the Czech economy performed well over much of the 2000s. Output grew at a fairly strong rate (Figure 2), unemployment fell gradually from over 7 percent to under 5 percent, and longer-term inflation expectations became well anchored (Figure 4).

IIe. 2008-2013: Publishing the Policy Rate Path to Provide Forward Guidance to Financial Markets

As monetary policy became more forward-looking and preemptive, the medium-term forecasts formed the basis for discussions of the CNB's strategy. That is, given the objectives and the understanding of the transmission mechanism between actions and objectives, the forecasts allowed the Bank Board and the CNB staff to determine the best path or paths for the policy tool.[22]

There are two common approaches to incorporating interest rates into the forecast. Some central banks base their forecasts on exogenous policy rates, i.e., they will either remain unchanged or follow the term structure prevailing in the market. However, the majority of IT central banks now prepare a forecast in which policy interest rates are completely endogenous, determined by the requirement that inflation returns to its target over the policy horizon. Within the family of paths that satisfy this condition, the central bank board will choose, as its base case, a path that "looks good," i.e., one where at the end of the policy horizon output is around potential and inflation is approaching its target, while along the path key macroeconomic indicators are not unduly volatile.

Why should central banks base their forecast on endogenous rates rather than exogenous rates? Perhaps the most important reason is that models that assume exogenous rates are internally inconsistent. This problem is particularly evident in models where expectations are (at least partly) model-consistent.[23] In such cases, longer-term forecasts based on exogenous policy rates

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[22] Critically, these forecasts were conditional on the information known at the time that the forecast was prepared. So they would necessarily change as new information became available and the understanding of economic relationships changed.
[23] See Isard and Laxton (2000) for more details.

would fail to converge since there is no anchor to the system. That is, inflation could increase or decrease explosively without leading to an offsetting monetary policy reaction. And while judgmentally-adjusted forecasts are not likely to explode, an increase or decrease in inflation over the forecast horizon that does not give rise to an increase or decrease in real interest rates is logically inconsistent with the stated policy approach of an IT central bank. Thus, from the point of view of logical coherence, the CNB considered that it was better to have a fully consistent forecast with endogenous interest rates.

There are also benefits from the perspective of transparency and ease of communications to having an endogenous interest rate convention. Whether an IT central bank chooses to describe its policy path qualitatively or quantitatively, it is able to tell a logical and coherent story as to the appropriate monetary policy reaction to pressures on inflation and output.

Most of the central banks that use endogenous interest rates do not make public the interest rate path on which their inflation and output forecasts are based. However, this creates some awkwardness, as these banks are forced to talk about a particular outlook for inflation and output without being clear about what interest rate path underlies it. Consequently, these banks tend to use qualitative terms such as "inject more monetary stimulus" or "gradually withdraw the existing level of monetary stimulus" to give financial markets some idea of the path for interest rates, without being too explicit.

Five IFT central banks whose forecast is based on an endogenous interest rate path have gone further by publishing an explicit projected path for interest rates. These are the central banks of New Zealand, Norway, Sweden, Israel, and Czech Republic. They do this because they believe that publication can help them to influence interest rates beyond the short term. Svensson (2007) explained the Riksbank's decision to publish its interest rate forecast as follows:

"Monetary policy works by affecting expectations about the future interest rate. It is the entire interest rate path that is important for future inflation and resource utilization, not merely the interest rate over the coming weeks. The Riksbank has, therefore, come to the conclusion that the only right thing is to explicitly discuss the interest rate path and to choose a particular path as the main forecast, as well as publishing the interest rate path and justifying its selection. This is in my opinion the most effective way of conducting monetary policy. Not to discuss and select a particular interest rate path as a main forecast would be an incomplete decision-making process. Not to publish the interest rate forecast would be to hide the most important information."

The CNB started publishing the projected interest rate path (with confidence intervals) in 2008Q1.[24] This was after CNB became sufficiently comfortable with the framework and realized

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[24] Confidence intervals are important to emphasize that the central bank is never committing to follow a baseline path for the policy rate, but is committed to adjusting this path in response to new information. The CNB currently develops its confidence bands based on an analysis of past forecasting performance, but it is now possible to construct confidence intervals based on models with significant nonlinearities such as the zero interest rate floor. See Clinton and others (2010).

that publishing the forecast could actually be helpful in explaining what the central bank really meant, and didn't mean. This represented a very sophisticated form of forward guidance that is consistent with the basic principles of IT and avoids some of the problems with just using words.

When the CNB (2008) decided to publish the baseline forecast and fan charts for the model-consistent interest rate path, it spelled out its rationale in a box in its Inflation Report. The explanation focused on transparency and communications, and the importance of recognizing the conditional nature of the interest rate path:

"Starting from 2008, instead of providing a verbal description of the expected interest rate path the CNB will publish its interest rate forecast in numerical form, as a fan chart. This box explains the conditional nature of the rate forecast and the methodology for the construction of fan charts.

"By releasing its interest rate forecast, the CNB is continuing to enhance its monetary policy transparency. If the public can better comprehend the central bank's actions and assess the quality of its analyses and forecasts, its trust in the bank's ability to keep inflation on target increases. It is vital, however, that all users of the central bank's forecasts are aware that the published forecast-consistent interest rate path should in no way be interpreted as a commitment of the central bank to set interest rates in line with the forecast. There are two reasons for this. First, the forecast represents the most probable future path of interest rates under given initial assumptions and information. New information on the domestic and global economy that comes in after the forecast is drawn up can change the interest rate outlook. The second reason is that the CNB Board may not entirely agree with the forecast prepared by the Monetary and Statistics Department or may regard the associated risks as being skewed to one side or the other."

More recently, a number of other central banks have used different forms of forward guidance. These have included time-contingent forward guidance (US and Canada) and state-contingent forward guidance (US and UK). In the former, the emphasis is on holding interest rates at a particular level for a certain period of time. In the latter, the emphasis is on holding interest rates until a certain event or series of events occur. All forms of forward guidance are conditional, in the sense that new information and future shocks can override or nullify the forward guidance. But the kind of forward guidance provided by publication of the projected interest rate path in baseline and alternative forecasts makes much clearer the types of future developments that would lead to movement of the policy interest rate away from the ZLB.

At the time the CNB began publishing the projected policy rate in February 2008, it signaled there would be (modest) pressures for the policy rate to decline over time (Figure 6). The CNB followed through and cut rates by 25 basis points in August 2008 before the Lehman event on September 15. This was soon followed by a sharp 75 basis point rate cut in November, an example of how shocks to the financial or economic environment can result in a significant unexpected change to the path of the policy interest rate (Figure 7). Market expectations of the

future path of the policy rate also shifted down, but not to the same extent initially as in the CNB's baseline (Figure 8).

As it turned out the decline in interest rates projected by the CNB was warranted (based on what happened in the economy in 2008) and market expectations of the future policy rate gradually shifted downwards. But there was no reason for market participants to have exactly the same expectations of the future policy rate as the CNB at the time. Furthermore, the CNB's baseline forecast is produced by the staff and while it is an important input into the monetary policymaking process, members of the Bank Board will have their own views about the baseline projection and risks associated with the Czech economy. What is critical is that the framework that the Board and the staff use for analysis is known to and understood by the financial markets. This is the case in the Czech Republic.

III. ANNOUNCEMENT OF FX FLOOR AS AN ADDITIONAL TOOL TO REDUCE DEFLATION RISKS

IIIa. Background

Following the onset of the financial crisis, the authorities in advanced economies aggressively reduced their policy interest rates and employed unconventional policies to address financial problems and to provide support to the economy.[25] Unconventional policies became especially important once policy interest rates approached the ZLB, exhausting the room for further rate reductions.

Initially, the main unconventional policies were qualitative and quantitative easing. The former focused on changes in the *composition* of the central bank's portfolio, while the latter focused on increases in the *size* of the portfolio. Qualitative easing was intended to provide support to particular asset markets that were not operating efficiently, thereby improving their functioning and reducing the risk premiums on the financial assets in question.[26] Quantitative easing was based on the belief that an increase in central bank balance sheets in and of itself would provide support to aggregate demand.

A number of explanations have been suggested for why quantitative easing would have such an effect. These included reductions in risk premia on the particular financial instruments being acquired by the central bank, reductions in interest rates on the financial instruments being acquired because of imperfect substitutability across financial instruments, the classic real

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[25] See Freedman and others (2010) and Benes and others (2013).

[26] The most well-known recent qualitative easing policy is perhaps the "Operation Twist" that was undertaken by the Fed in the United States. This policy involved an extension of the average maturity of the Fed's holdings of securities in order to support stronger economic recovery. For more details, see the press release of the FOMC on September 21, 2011 (http://www.federalreserve.gov/newsevents/press/monetary/20110921a.htm).

balance effect, and a general belief that sizable increases in central bank balance sheets have historically been associated with upward pressure on demand and inflation.

The effectiveness of these policies is still open to debate. While their usefulness in facilitating the reopening of markets that were frozen or in improving the operation of markets that were not fully functioning has been accepted, their success in the broader task of underpinning aggregate demand is still unclear.[27] Part of the problem in evaluating their success is the fuzziness regarding the mechanisms though which they work. Even if the mechanisms do indeed operate, the magnitude of the effects remains in doubt. And if the effects are unclear, their ability to influence expectations also remains in doubt.

Consequently, central banks added another mechanism to their toolbox of monetary policy instruments: forward guidance. This tool aimed at bringing about market expectations that very low policy interest rates would be maintained for some time in the future, thereby reducing medium-term and longer-term market interest rates. There were a number of variants of forward guidance policy. During the credit crisis of 2008, the US Federal Reserve provided time-contingent guidance, indicating rates would be kept low for an "extended period" and the Bank of Canada made a "conditional commitment" to keep rates at the lower bound of 25 basis points until the end of the second quarter of 2010. More recently, the Federal Reserve and Bank of England introduced state-contingent commitments, conditional on the non-occurrence of certain economic events, such as the economy crossing a threshold in the unemployment rate or inflation expectations, or the emergence of a threat to financial stability.

IIIb. CNB's Decision to use the Exchange Rate as an Additional Monetary Policy Tool

By 2010, the Czech economy seemed to be recovering, but it then experienced another slowdown in late 2011. By 2012, it was clearly mired in recession, the result of a marked slowdown in demand from the eurozone and continuing domestic fiscal consolidation. At the same time, core inflation remained negative, even as headline inflation had temporarily risen above the new 2 percent target,[28] primarily due to indirect tax increases, coupled with some cost-push shocks, such as higher global food prices. Consequently, the policy rate was reduced to a zero (technically, 0.05 percent) in November 2012.[29] Despite this action, the outlook remained weak: the recession seemed likely to drag on, labor markets were weak, and deflation risks were rising. Clearly, something else needed to be done.

So, starting in September 2012, the Board signaled that it was considering the use of the exchange rate as an additional tool of monetary policy. In subsequent meetings, the CNB

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[27] See Gagnon and others (2011) for a discussion of the effectiveness of quantitative easing policies by the Fed.
[28] This target was decided in 2007 to be adopted in 2010.
[29] At the time this paper was prepared, the policy rate was still expected to remain at the ZLB until at least the end of 2015, given the economic weakness.

provided projections that suggested a further easing in monetary conditions was necessary. It then reinforced this message through verbal interventions regarding the need for policy easing. But this strategy was not sufficiently effective. Ultimately, words needed to be supported by deeds.

Accordingly, in November 2013 the CNB announced it would introduce the exchange rate as an additional tool within the context of its IFT monetary policy framework. The rest of this section examines the theoretical basis for this strategy, the way that the CNB communicated its use of this approach and the results to date.

IIIc. Simple Illustrative Theoretical Example

Svensson (2001) provided a simple and very useful theoretical framework to motivate the use of the exchange rate as a complementary monetary policy tool. He argued that a foolproof way of escaping from the ZLB would consist of announcing a price-level target path, then devaluing the currency and temporarily pegging the exchange rate.[30] The peg would later be abandoned in favor of price-level or inflation targeting when the price-level target was reached.

Svensson's logic was as follows:

- Pegging temporarily at a depreciated exchange rate is always feasible. The central bank can purchase as much foreign currency as it wishes, thereby putting a floor on the exchange value of the foreign currency.

- The depreciation would increase aggregate demand, inflation, and expected inflation. The announcement of a price level target that is clearly above the current price level strengthens the expected rate of inflation.

- The resulting increase in expected inflation would reduce real interest rates, further supporting the domestic economy.

- The abandonment of the exchange rate peg in favor of price level- or inflation-targeting once the higher announced price level target is reached will minimize concerns about long-run inflation and thereby maintain an anchor for long-term inflation expectations.

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[30] It is important to stress that this is a simple theoretical example and that the CNB did not announce a price-level path target. The logic would be the same if a central bank simply committed to a higher price level in the future relative to a no-policy response scenario where inflation was allowed to remain systematically below the target over the policy horizon.

Of these steps, it is the devaluation of the currency that is critical. Without this dimension, there would not be any credible mechanism to make the public believe the central bank would be able to increase inflation in the short run and raise the price level in the long run.

There are two key concerns about Svensson's proposal. First, there is a question about whether expectations would really behave in the hypothesized manner. Second, there is a concern that if this strategy were employed following a global crisis, the devaluation might improve demand in the home country at the expense of depressing demand in other countries that were facing similarly difficult economic conditions. In this context, however, there might be a difference between introducing such a policy in a large country and a smaller one, where the short-run spillovers to other countries might be relatively small.

IIId. Managing Expectations with Communications

The success of using the exchange rate as a complementary tool depends on the extent, and the way, that it influences the public's expectations. Ideally, the strategy would increase short-term inflation expectations without de-anchoring long-term expectations or (more broadly) changing the public's perceptions of the ultimate objectives of the central bank.[31] Changing public perceptions in such a complex way is no easy feat. We discuss how the CNB used its communication policy to explain the new policy approach in order to establish credibility quickly.

On November 7, 2013, the CNB made the following statement:

"The Bank Board also decided to start using the exchange rate as an additional instrument for easing the monetary conditions. The CNB will intervene on the foreign exchange market to weaken the koruna so that the exchange rate of the koruna against the euro is close to CZK 27."[32]

Subsequently, the CNB responded to a number of questions about its foreign exchange intervention policy, and put detailed answers to those questions on its web site.[33]

On November 14, the CNB used its 2013 IV Inflation Report to expand upon the new policy instrument in a lengthy box entitled "Using the Exchange Rate as an Instrument to Ease the

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[31] In other words, the exchange rate must be perceived as a temporary tool, not an additional longer-term objective, so that the public believes that the central bank remains committed to its longer-term 2 percent inflation target.

[32] In a subsequent Q&A, the CNB clarified that the intervention is one sided: "What does the CNB's exchange rate commitment mean for the future evolution of the koruna exchange rate? This means the CNB has undertaken to prevent excessive appreciation of the koruna below CZK 27/EUR. On the stronger side of the CZK 27/EUR level, the CNB is preventing the koruna from appreciating further by intervening on the foreign exchange market, i.e. by selling koruna and buying euro. On the weaker side of the CZK 27/EUR level, the CNB is allowing the koruna exchange rate to float. In other words, the exchange rate will be close to CZK 27 to the euro or even weaker in the period ahead. Potential fluctuations to levels weaker than CZK 27/EUR will be determined by supply and demand on the interbank foreign exchange market."

[33] The Q&As of most interest can be found in Appendix I.

Monetary Conditions" (Appendix II). The alternative scenario referred to in the last paragraph of the box ("the exchange rate tool scenario") is shown in Figure 9. In the baseline scenario, the policy interest rate needed to support the economy and move inflation back to its long-term 2 percent target in the absence of exchange rate intervention (the solid line) is shown as being significantly in the negative range for several quarters, a policy outcome that may not be technically feasible. In the alternative scenario, a more feasible strategy is shown: the objectives are achieved with a policy rate (the dashed line) just above the ZLB, because the exchange rate of the koruna shifts close to CZK 27/EUR, much weaker than in the baseline scenario.

A box in the subsequent Inflation Report of 2014 Q1 provided additional detail on the mechanism underlying this approach. The Czech Republic is a small, open economy, so exchange rate movements have fairly powerful and relatively reliable effects on aggregate demand and inflation. For example, the CNB provided illustrative calculations based on the Czech input-output tables showing that a 5 percent decline in the koruna would likely have fairly large effects on the CPI. Approximately 24 percent of the CPI is imported and consumed directly. And an additional 9 percentage points is imported as intermediate inputs, processed and then makes its way to the final consumer basket.[34]

IIIe. An FX Floor Strategy with only Two Days of Intervention

Figure 10 shows the foreign exchange rate and intervention since 2013, while Figure 11 shows the movement of the exchange rate on November 7, 2013. The koruna moved from 25.8 to the euro just before the announcement at 1 pm to almost 27 immediately afterwards, ending the day at almost exactly 27. The CNB did not actually need to intervene much to achieve the desired movement —it bought foreign exchange for just a few hours over two days, for a total of about 8 billion euros (about 5 percent of GDP). Since November 2013, the koruna has been trading higher than 27 without any further CNB intervention.

Why was it so easy and fast? The short answer is that the communications worked: financial market participants soon understood the strategy. They understood that the CNB was not targeting the exchange rate but rather using it to boost economic activity and increase inflation and reduce the risks of bad deflationary outcomes. They also started to understand that the CNB had unlimited intervention power on the buy side of the foreign exchange market.

IIIf. Preliminary Assessment

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[34] It is important to emphasize that reduced-form econometric estimates of pass through are typically not very reliable as these estimates will depend on what shock is driving the exchange rate and if it was accommodated by monetary policy. For a monetary-policy induced shock to the exchange rate where the central bank is committed to raising the price level, pass through should be expected to be much higher than in circumstances when the central bank is adjusting its policy interest rate to offset the effects of the depreciation on underlying inflation. For a discussion of these issues see Laxton (2008).

At the time of completion of this paper, more than a year has passed since November 2013, making a preliminary evaluation of the policy framework and outcomes worth undertaking. We consider two questions. The first is the way in which the central bank and the markets have adjusted to the new framework and their understanding of how it operates. The second is the effect of the policy announcements and actions in influencing the exchange rate and, consequently, inflation and output developments. While it is still early to reach definitive conclusions, given the lags in the effect of monetary policy, it is nonetheless useful to determine what can be said on the basis of the evidence to date.

IIIf.1 Adjustment to the new Framework

One of the crucial elements of the framework introduced by the CNB in November 2013 was that the exchange rate became an additional instrument for achieving the goals of monetary policy. It is important to emphasize that this was not a fixed exchange rate framework. Rather, a crucial element in the policy framework was that the announced exchange rate level could be changed over time as needed in response to new information about inflation and output, especially as there were significant downside risks for the Czech economy. More specifically, if the initial depreciation turned out to be insufficient to move the rate of inflation away from negative territory and provide the desired stimulus to the economy, a further depreciation of the koruna could be announced and undertaken.

The understanding of the way in which the exchange rate was an instrument and could be adjusted to achieve the goals of policy became more evident over time in the CNB's statements and, in this way, influenced market reactions to new information. It is of interest to see the way in which the communication of policy by the CNB moved in this direction over the first half of 2014.

Initially, the emphasis was on the reasons for the change in approach and the implications of the initial depreciation. The possibility of subsequent exchange rate changes was not especially emphasized. In fact, the minutes for November 7, 2013 noted that "the [short-term] target level for the exchange rate could not be subject to frequent modifications." Accordingly, the statements released by the CNB Board in the first half of 2014 emphasized that if necessary the exit date would be extended. In this way, the CNB could strengthen expectations that the weak exchange rate would be maintained for a sufficiently long period of time to provide the needed stimulus to the economy and the required upward pressure on the rate of inflation.

However, by mid-2014, the minutes noted "that it was also not possible to rule out a future need to change the intervention level of the exchange rate in the weaker direction, although the currently observed slight anti-inflationary risks did not warrant such a monetary policy response at present." This type of language alerted market participants to the fact that there was some probability of a future change in the announced exchange rate floor. In particular, the release of new data that showed lower than forecast inflation or a weaker outlook may well have led

financial markets to raise the probability of a future depreciation and cause the market rate for the koruna to weaken below the announced rate.

This possibility was buttressed by the asymmetrical nature of the arrangements announced by the CNB. As the CNB put it in its February 2014 press conference, "The Board repeated that it regards the commitment as one-sided. This means that the CNB will prevent excessive appreciation of the koruna exchange rate below CZK 27/EUR by using FX interventions, i.e. by selling koruna and buying foreign currency. On the weaker side of the CZK 27/EUR level, the CNB is allowing the exchange rate to move according to supply and demand on the FX market." Nonetheless, the effect on the exchange rate would have been subdued by the statement of the CNB Board on July 31, 2014 that it "would have to find a further noticeable increase in anti-inflationary factors before moving the exchange rate commitment to a weaker level."
Figure 12 shows the daily movement of the koruna vis-à-vis the euro from 2013 to early 2015. Since the November 7, 2013 announcement, the koruna has generally traded in a range near 27.5 to the euro.[35] In fact, its movements seemed to reflect the arrival of new pieces of information and their implications for the future behavior of the authorities. Lower than anticipated inflation would increase the probability of a further depreciation of the currency while stronger growth would suggest a reduced probability of such action.

The 2014 Q2 CNB Inflation Report commented on the exchange rate as follows:

"The average exchange rate of the koruna against the euro was CZK 27.4 in 2014 Q2. This represents a year-on-year depreciation of 6.3 percent and quarter-on-quarter stability. The koruna fluctuated in a very narrow band between CZK 27.3 and CZK 27.5 to the euro and spent most of the period in an even narrower range just above CZK 27.4 to the euro. The koruna was 0.3 percent weaker than the forecast for 2014 Q2 (CZK 27.3). In the first half of July, the koruna remained flat at around CZK 27.4 to the euro.

"The exchange rate commitment of the CNB to maintain the exchange rate at CZK 27 to the euro remained the key factor affecting the exchange rate in the period under review (and so far this year). The exchange rate movements were in line with the asymmetric nature of the exchange rate commitment and still required no actual foreign exchange market interventions by the CNB."

IIIf.2 Effects on Inflation and Output

To repeat, the reason that the new policy tool was so easy to implement is that the communications worked: financial market participants soon understood the strategy and believed it was credible. Accordingly— and critically—inflation expectations have behaved as well as

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[35] Since November 2013, there has been no further CNB intervention.

could be hoped. In particular, longer-term inflation expectations have remained well anchored at 2 percent, as desired by the CNB and consistent with effectiveness of the exchange rate policy, even as actual short-term inflation has eased (Table).[36] Indeed, inflation has been somewhat lower than initially expected, for several reasons. To begin with, administered prices did not move in the projected manner; indeed, some actually declined. Also, very subdued inflation in the euro area and the weakness in wage growth for the earlier part of the period had a negative impact on the increase in the inflation rate in the Czech Republic. And perhaps more importantly, international petroleum prices fell very sharply starting in the second half of 2014, pushing down headline inflation all over the world.

Czech Republic: Inflation Expectations (annual; percent)

	2014	2015	2016	Long-term Target
Sep 2013 Survey	1.6	1.8	2.0	2.0
Apr. 2014 Survey	1.2	2.2	2.0	2.0
Oct. 2014 Survey	0.5	1.8	2.0	2.0

Source: Consensus Economics

These exogenous factors aside, the macroeconomic effects of the November 2013 decision have been pretty much as expected.[37] The depreciation has lifted the prices of imported goods and the volume of exports, helping to avert the deflationary tendencies in the Czech Republic. And economic growth has picked up, in line with the CNB forecast made in the latter part of 2013.

Accordingly, macro expectations have been broadly consistent with the CNB's communications and predictions. The evolution of the monthly short-term Consensus Forecasts for 2014 and 2015 for the major macroeconomic variables is shown in Figure 13. With the major exception of CPI inflation, which as just noted has been weaker than expected, forecasts of the major macroeconomic variables strengthened over the course of 2014. In particular, projected GDP growth for 2014 increased from under 2 percent in late 2013 to around 2½ percent by August 2014.

The Consensus Forecasts for 2015 show strength continuing across the board. GDP is expected to increase by around 2½ percent, with solid domestic consumption and investment growth and continued high growth in industrial production (reflecting in part the maintenance of the increase

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[36] Twice a year in the spring and the fall, Consensus Economics conducts a survey of longer-term expectations. These are the data shown in the table below the paragraph. The monthly survey of shorter-term expectations is the basis of the data shown in Figure 13. For a comparison of inflation expectations with other countries see Alichi and others (2014).

[37] Details of the CNB's views can be found in the Inflation Reports for 2014 Q1 and Q2.

in export growth). Wages are expected to pick up to more than 3 percent in 2015, even as CPI inflation slides to ½ percent.

These forecasts are in line with the CNB's current view that the future strength of the economy and inflation is sufficient for there to be no need for a further depreciation in the currency at this time.

IV. TENTATIVE CONCLUSIONS

While many countries have responded to the post-2008 world by undertaking quantitative and qualitative easing, the CNB has gone in a different direction, adding exchange rate policy as an additional tool to its policy toolkit. This technique has much clearer linkages from central bank policy actions to aggregate demand and inflation than the other unconventional monetary policies being used. Accordingly, it may be more likely to achieve the requisite changes in growth and inflation. Indeed, so far economic and inflation developments in the Czech economy seem to be moving in much the expected way.

That said, it will take some time before there can be definitive judgments about the success of the policy. In particular, exiting from the framework with an exchange rate floor still presents important challenges. An early exit might come as a surprise to markets, while a delayed one might raise questions over whether the floor is actually a new objective, rather than a mere policy tool. The CNB has tried to address this issue by being more specific about the earliest date at which it would exit from the new framework.

Even if the policy succeeds, lessons for other countries will need to be drawn carefully. The strategy can work only if the central bank has considerable credibility – and few other central banks enjoy the same credibility as the Czech National Bank. Its Inflation-Forecast Targeting framework is one of the most advanced in the world, based on an excellent technical forecasting (and nowcasting) capacity, policymakers who take the staff's analysis and forecasting work very seriously in making their interest rate decisions, and strenuous efforts to communicate its policy strategy and rationale. All of these factors make it much more likely that its exchange rate policy can succeed in changing expectations.

In addition, the structure of the economy also plays an important role. As a very open economy, the effects of depreciation on demand, inflation and expected inflation are much higher than would be the case in more closed economies. And as a small economy, its policy actions do not create the same concerns about beggar-thy-neighbor policies as would arise if a larger economy employed the same strategy.

In short, the CNB's decision to use the exchange rate as a tool for easing monetary conditions is path-breaking. But only time will tell whether it will provide a model for other countries to follow.

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Figures

Figure 1: Czech Koruna and the History of Monetary Policy Regimes
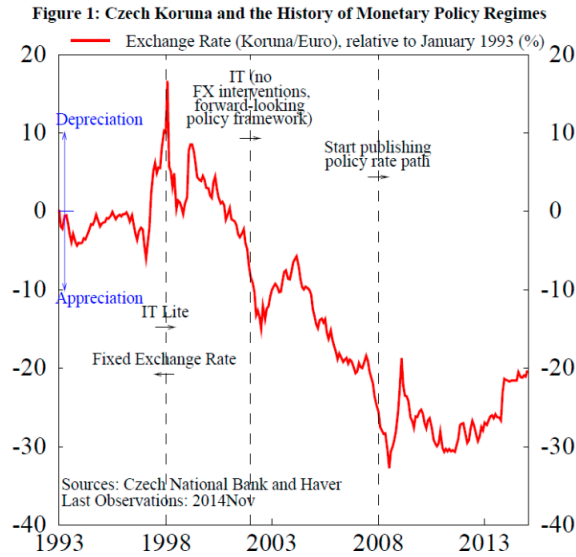
Sources: Czech National Bank and Haver
Last Observations: January 2015

Figure 2: Unemployment Rate and Real GDP
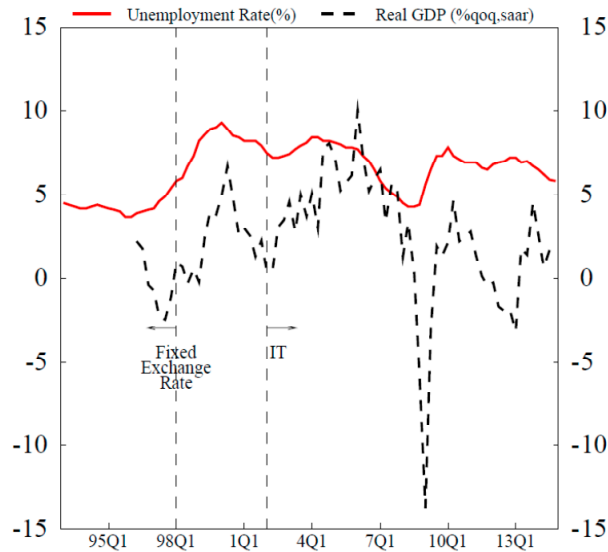
Sources: Czech Statistical Office and Haver
Last Observations: January 2015

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Figure 3: Nominal & Real Interest Rates
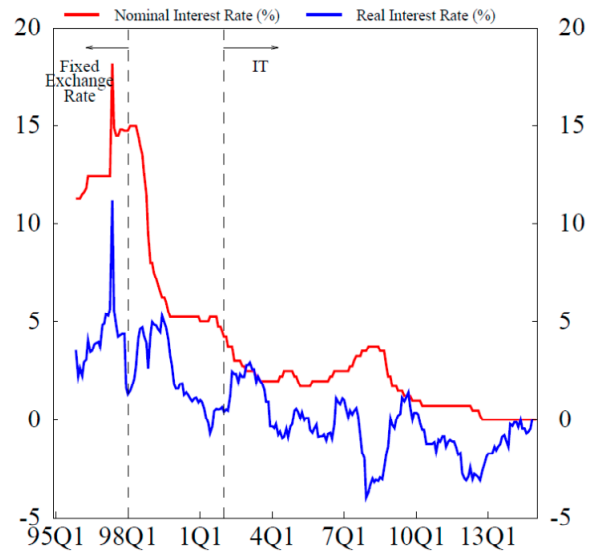
Sources: Czech National Bank, Czech Statistical Office and Haver
Last Observations: 14Q4

Figure 4: Inflation and Inflation Expectations
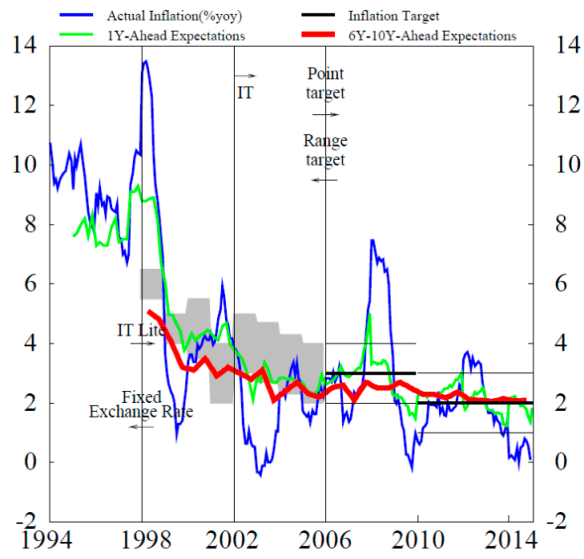
Sources: Consensus Economics and Haver
Last Observations: January 2015

Figure 5: Central Bank View of the Transmission Mechanism

Source: Authors
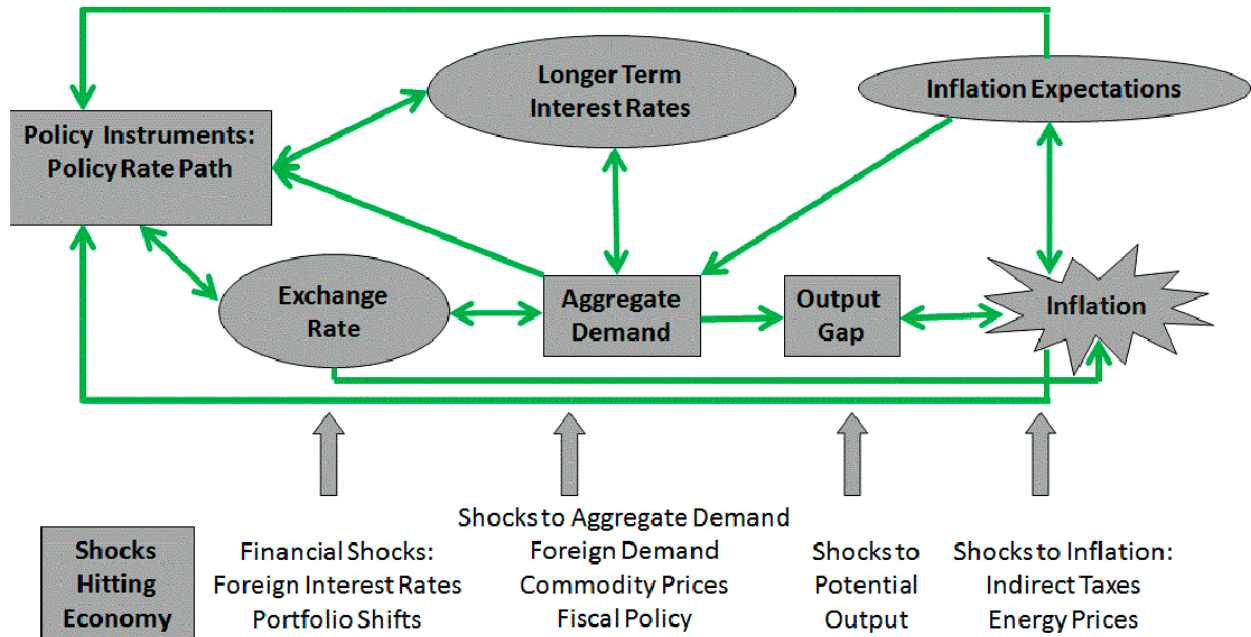
Figure 6: February 7, 2008 Inflation Report
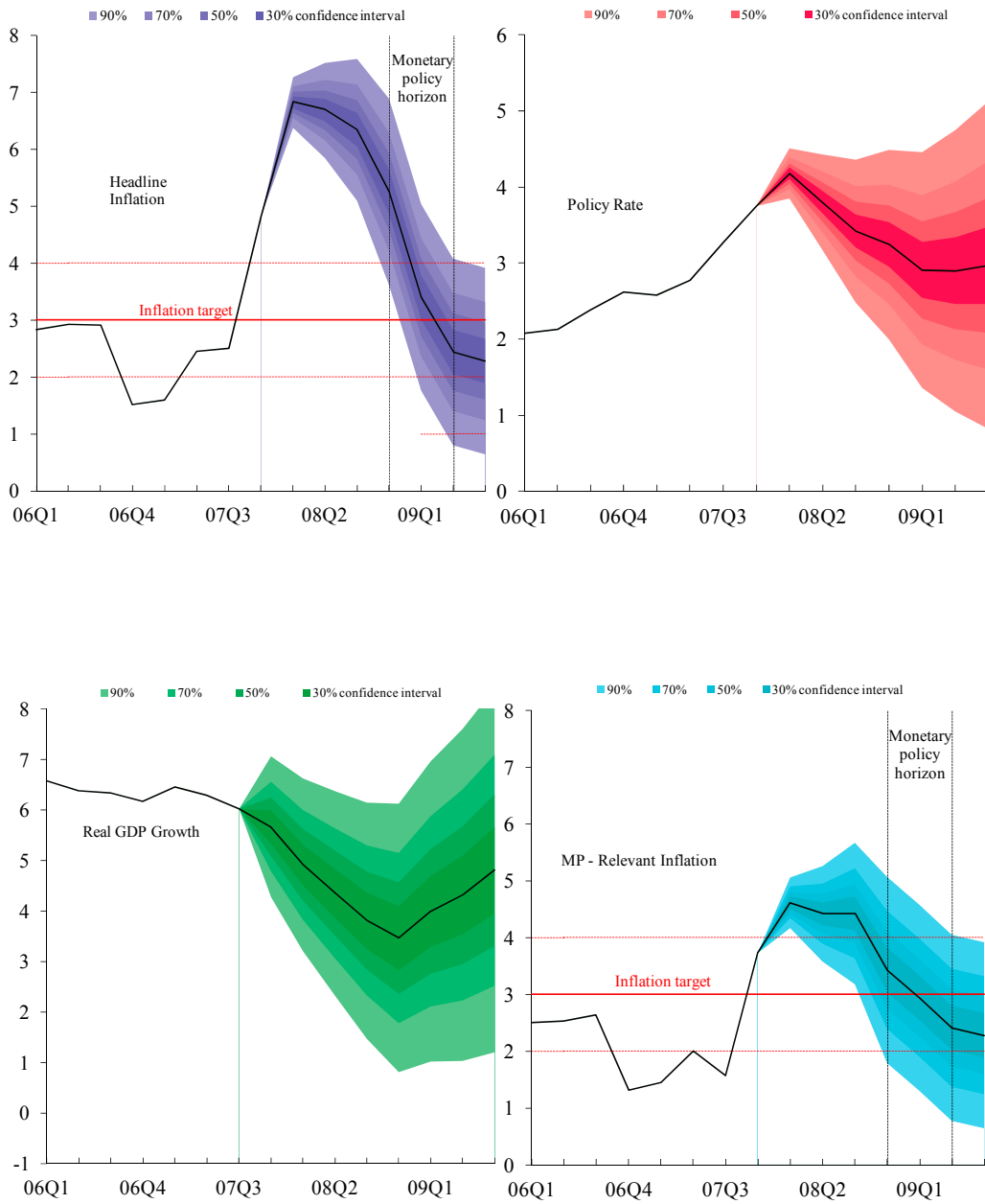
Source: Czech National Bank
First Quarter of Projections: 07Q4
Last Quarter of Projections: 09Q3

Figure 7: November 6, 2008 Inflation Report
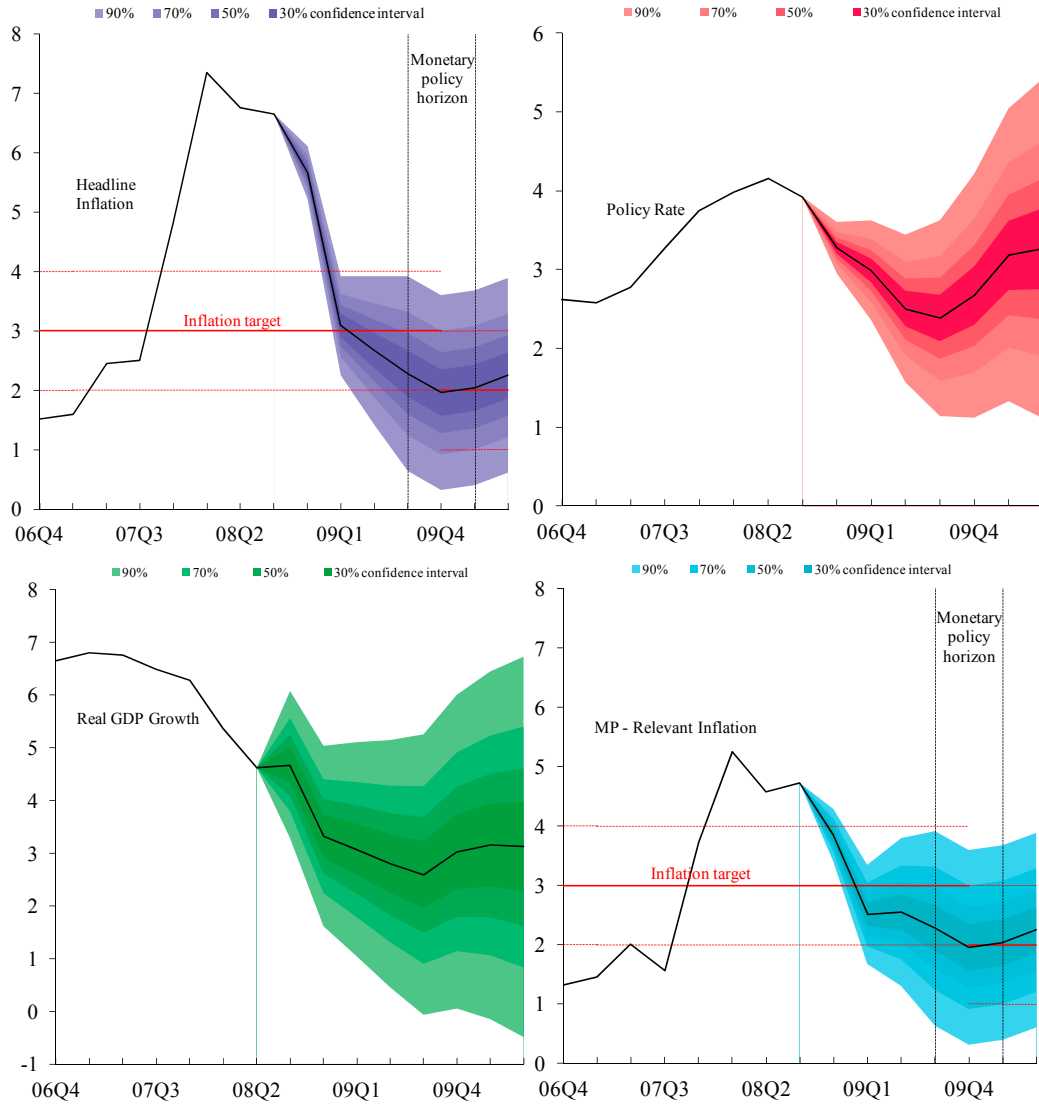
Source: Czech National Bank
First Quarter Projections: 08Q3
Last Quarter Projections: 10Q2

Figure 8: Interest Rate Projections around November 6, 2008
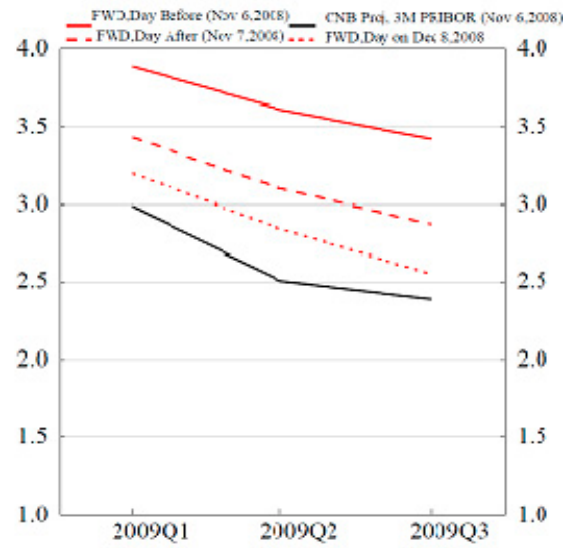
Source: Czech National Bank and Bloomberg
Last Observation: 2014Q3

Figure 9: November 7, 2013 Inflation Report
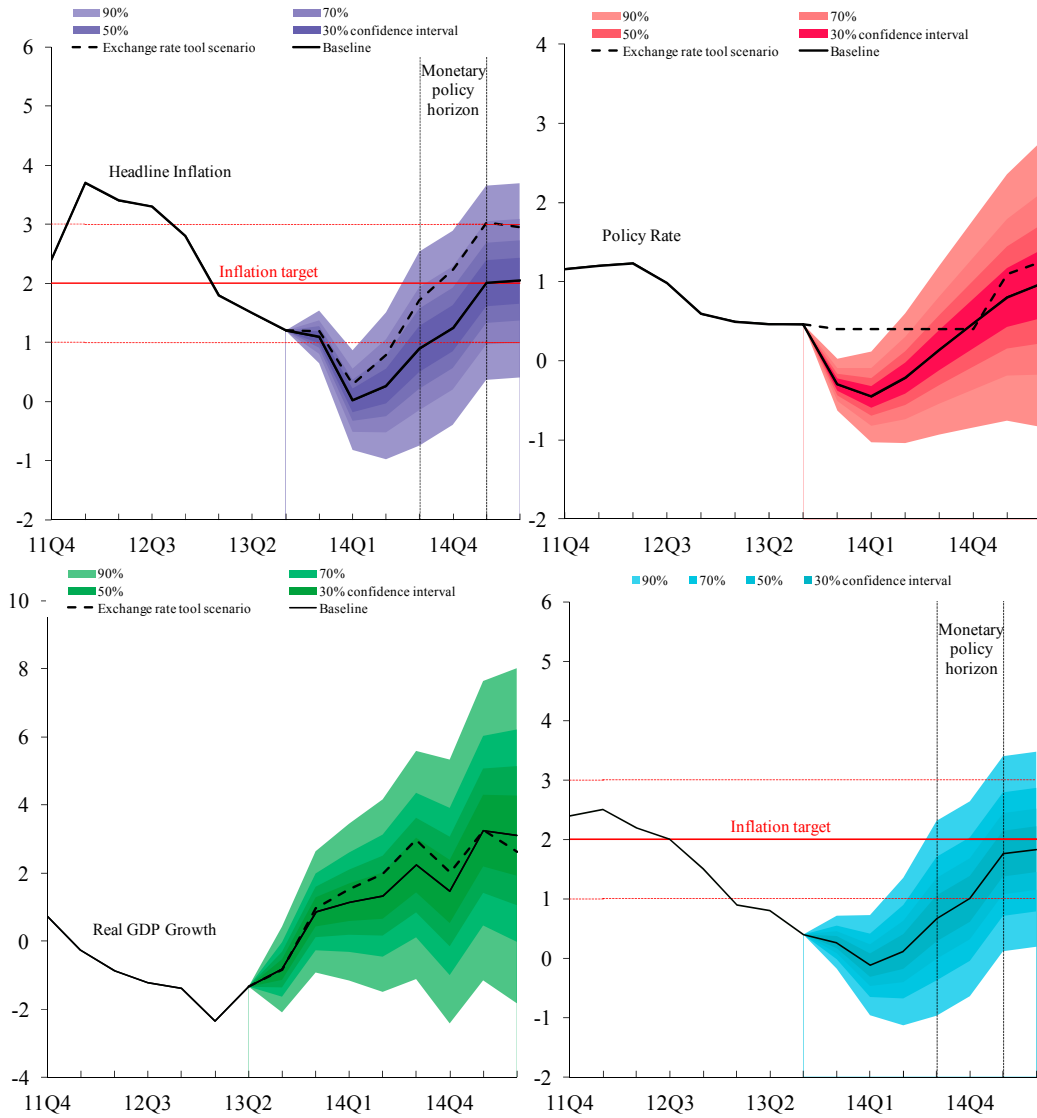
Source: Czech National Bank
First Quarter of Projections: 13Q3
Last Quarter of Projections: 15Q2

Figure 10: Interventions and Koruna/Euro Exchange Rate (Jan. 2013 – Jan. 2015)
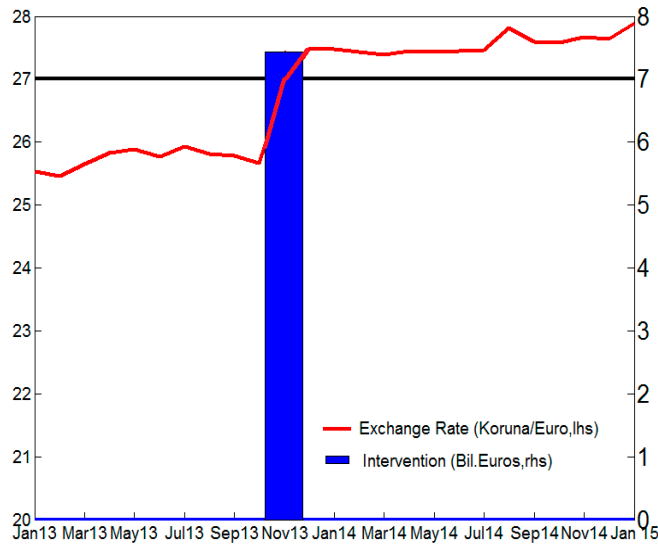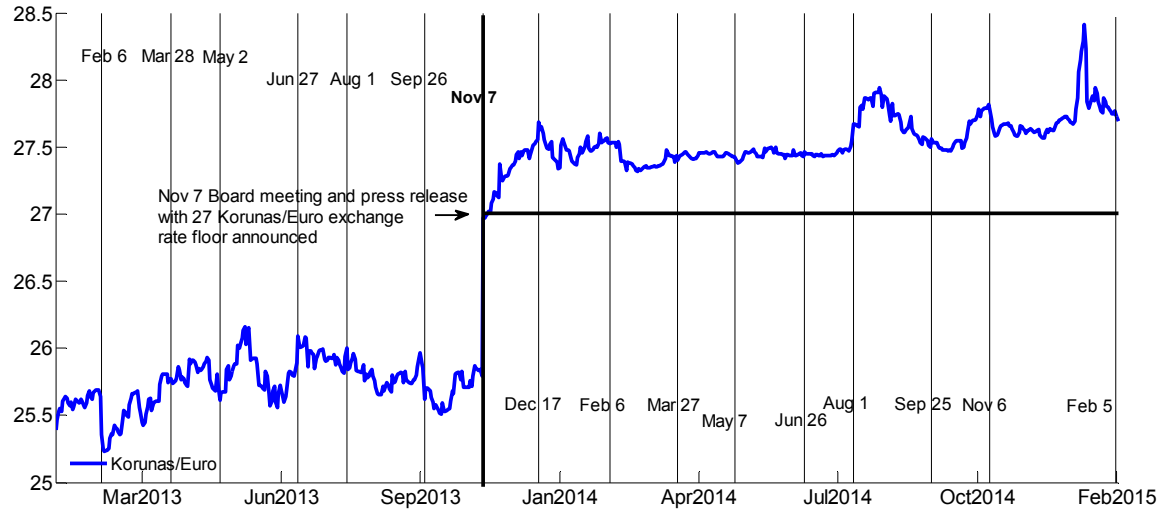

Source: Czech National Bank and Haver
Last Observation: January 2015

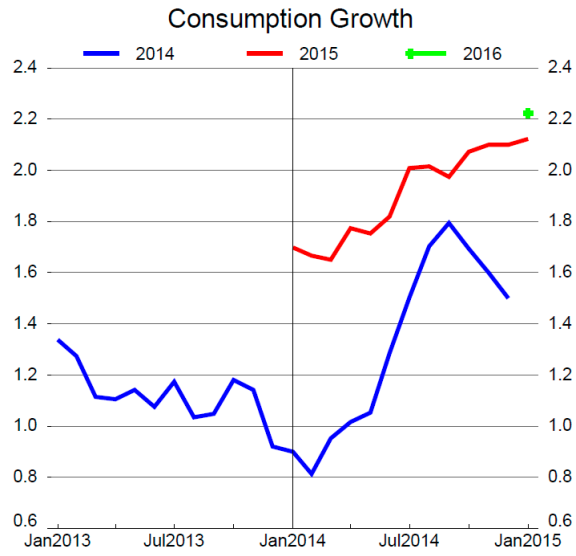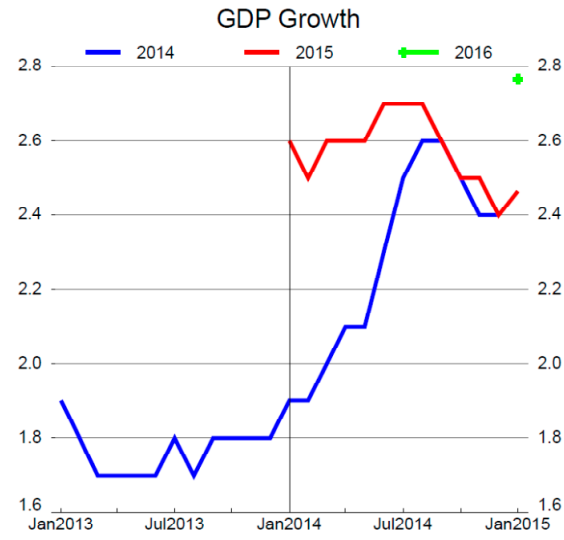Figure 11: Hourly Koruna/Euro Exchange rate (Nov 7, 2013, 8:00-17:00)

Source: Bloomberg

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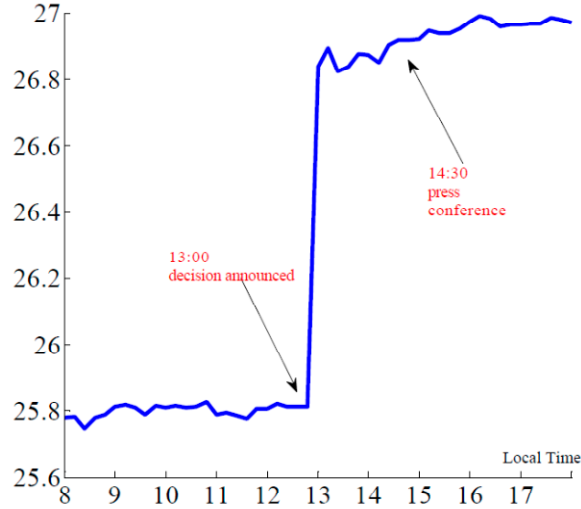
Figure 12: Daily Koruna/Euro Exchange Rate (Jan. 2013 – Feb. 2015)
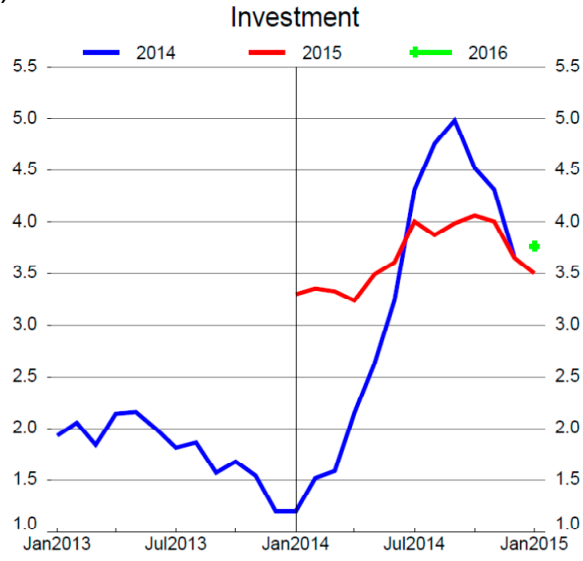

Source: Bloomberg Vertical lines represent the dates of CNB Board Meetings and Press Releases.

Figure 13: Evolution of Consensus Forecasts For the Years 2014-2016
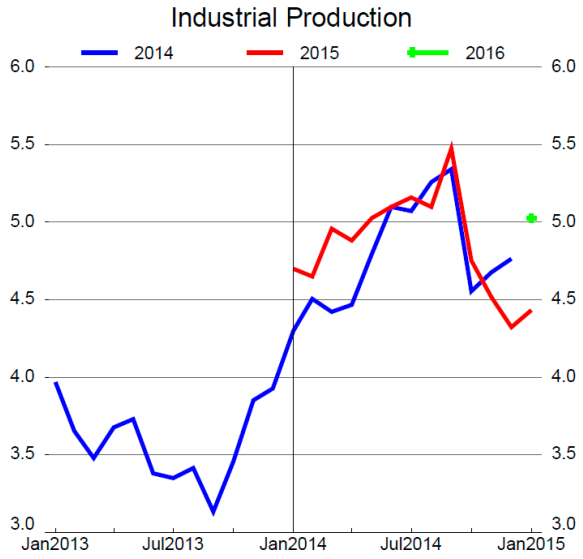

GDP Growth

Consumption Growth

Source: Consensus Economics

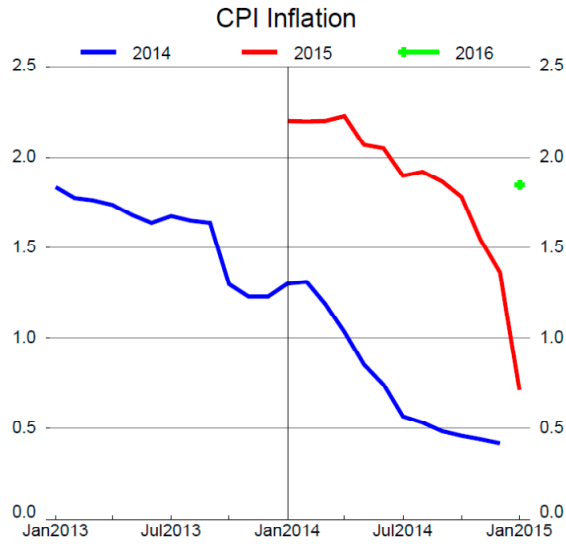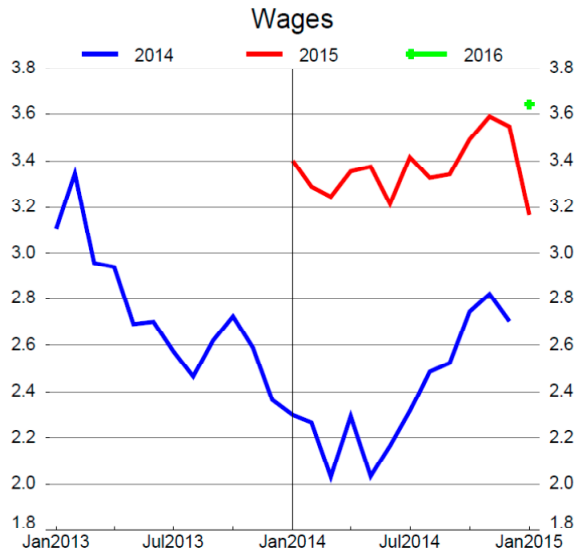Figure 13 (continued): Evolution of Consensus Forecasts For the Years 2014-2016

Source: Consensus Economics

Source: Consensus Economics

Figure 13 (continued): Evolution of Consensus Forecasts For the Years 2014-2016

Source: Consensus Economics

Source: Consensus Economics

Appendix I. Selected Q&As from CNB web site in November 2013

What is the aim of using the exchange rate as a monetary policy tool? Why has the CNB started to use foreign exchange interventions?

The aim of using the exchange rate as an additional monetary policy tool – and therefore of using foreign exchange interventions to weaken the koruna – is the same as in the case of interest rates: to maintain price stability in the Czech economy in line with the CNB's inflation target (which has been set at 2 percent since 2010). In other words, the CNB is trying to significantly limit the risk of deflation, and accelerate the return to a situation where it will again be able to use its standard tool, i.e. interest rates. It should be emphasised that the koruna exchange rate is not a new monetary policy objective. It is merely a tool that is being used at the moment to fulfil the inflation target.

When did the CNB start using foreign exchange interventions, and why has the CNB decided to achieve its monetary policy objective using the exchange rate?

The CNB Bank Board decided to use the exchange rate as a monetary policy tool, and therefore to commence foreign exchange interventions, on 7 November 2013. For the Czech Republic, as a small open economy with a long-term excess of liquidity in its banking sector, this is a more effective tool for easing the monetary conditions than any other. The use of foreign exchange interventions as an appropriate tool for countering deflation risks was recently also recommended by an IMF mission. The decision to use the koruna exchange rate as a potential additional tool for monetary policy easing after the lower bound on interest rates was reached was made by the Bank Board in autumn 2012.

What does the use of the exchange rate as a monetary policy tool look like in practice? How are the interventions made?

The CNB's Financial Markets Department will purchase foreign currency as needed in accordance with market conditions so as to achieve the desired easing of the monetary conditions as mandated by the Bank Board. The CNB will intervene in the foreign exchange market if needed to weaken the koruna so as to maintain the exchange rate of the koruna against the euro close to CZK 27/EUR in accordance with the Bank Board's decision. In other words, the CNB regards the commitment as asymmetric, i.e. one-sided in the sense that it will not allow the koruna to appreciate to levels it would no longer be possible to interpret as "close to CZK 27/EUR". There is no limit on the amount of the purchases. As a central bank, the CNB can purchase any amount of foreign currency.

What does the CNB's exchange rate commitment mean for the future evolution of the koruna exchange rate?

This means the CNB has undertaken to prevent excessive appreciation of the koruna below CZK 27/EUR. On the stronger side of the CZK 27/EUR level, the CNB is preventing the koruna from appreciating further by intervening on the foreign exchange market, i.e. by selling koruna and buying euro. On the weaker side of the CZK 27/EUR level, the CNB is allowing the koruna exchange rate to float. In other words, the exchange rate will be close to CZK 27 to the euro or even weaker in the period ahead. Potential fluctuations to levels weaker than CZK 27/EUR will be determined by supply and demand on the interbank foreign exchange market.

As in the case of interest rates in the past, the Bank Board may decide to change this level at a subsequent monetary policy meeting – either in light of the message of the new macroeconomic forecast or based on an assessment of the balance of risks to the (current) forecast. It can be expected, however, that any change in this level would need a much stronger impulse than in the case of interest rates. The Bank Board discusses monetary issues eight times a year. In exceptional cases it may also hold extraordinary meetings.

What will be the effect of the exchange rate depreciation on the Czech economy and on businesses and households?

A weakening of the exchange rate of the koruna leads to an increase in import prices and thus also in the domestic price level. To a lesser extent, it also boosts domestic economic activity. The rise in import prices can be expected to reduce households' purchasing power, but households' demand may be redirected towards domestic goods and services to a greater extent and additionally supported by lower real interest rates as a result of higher inflation expectations. At the same time, the weaker exchange rate supports Czech exports and the profitability of corporations and their willingness to invest. The recovery in production then contributes to a rise in employment and wages, which increases the purchasing power of households.

When did the CNB last intervene, and why? What is the difference between the previous and current interventions?

The CNB last intervened in 2002. The aim of the interventions at that time was largely different from the present aim. At that time, the aim was to prevent the tightening of the monetary conditions and reduce the high volatility of the koruna exchange rate in a situation of non-zero interest rates. The current interventions are being made solely in order to ease the monetary conditions through the exchange rate and hit the 2 percent inflation target in a situation where interest rates have reached their technical limit (technical zero) and cannot be reduced any further in an effort to further ease monetary policy.

When will the interventions be discontinued (what factor will trigger their discontinuation)? Will the CNB announce the discontinuation of the interventions?

The CNB is resolved to intervene on the FX market if needed in such volumes and for such duration as needed to hit its inflation target. The use of the exchange rate as a monetary policy tool will be discontinued when it becomes necessary to tighten monetary policy significantly as a result of very substantial inflation pressures. This will be achieved by discontinuing the

interventions and then raising interest rates above (technical) zero. The need for easy monetary policy can be expected to last for a long time. The discontinuation of the use of the exchange rate as a monetary policy tool will be announced in a similar manner as its commencement, after the Bank Board makes the relevant monetary policy decision. As stated in the CNB Bank Board statement published after the most recent monetary policy meeting on 6 February 2014, the Bank Board foresees the present exchange rate commitment being maintained at least until the start of 2015.

Appendix II. Further Clarification by the CNB in the November 2013 Inflation Report Regarding its November 2013 Policy Decision to use the Exchange Rate Tool

"**Using the Exchange Rate as an Instrument to Ease the Monetary Conditions**

The global financial and economic crisis forced many central banks to start using extraordinary (sometimes referred to as non-standard or unconventional) monetary policy instruments. The Federal Reserve, the Bank of England and the European Central Bank launched asset purchases and massive provision of liquidity into the economy. The Swiss central bank de facto fixed a minimum exchange rate of the franc against the euro by intervening in the foreign exchange market. Up to now, the CNB has used its standard monetary policy instruments to dampen the impacts of the financial crisis and subsequently also the debt crisis on the Czech economy. It gradually lowered its key interest rates to technical zero in autumn 2012. However, the latest macroeconomic developments necessitate a further easing of monetary policy by the CNB. For this reason, the CNB has started to use the exchange rate as an additional monetary policy instrument in order to keep inflation close to the CNB's target and expedite a return to a situation where the CNB will again be able to use its standard tool, i.e. interest rates.

The exchange rate was selected from the relatively wide range of possible instruments back in autumn 2012, because, in a small open economy, weakening the exchange rate of the koruna is an effective tool for raising import prices and thus also the domestic price level, and for stabilising inflation expectations close to the CNB's target. To a lesser extent, a weakening of the exchange rate also boosts domestic economic activity. The rise in import prices can be expected to reduce households' purchasing power, but their demand may be redirected towards domestic goods and services to a greater extent and additionally supported by lower real interest rates as a result of higher inflation expectations. At the same time, the weaker exchange rate will support Czech exports and the profitability of corporations and their willingness to invest. The recovery in production will then contribute to a rise in employment and wages, which will increase the purchasing power of households. The above impacts of exchange rate changes on the Czech economy are quite well mapped from the CNB's point of view. In addition, according to analyses conducted using the CNB's forecasting system, the impacts of exchange rate changes can be expected to be stronger than usual if the koruna exchange rate is used as a systematic monetary policy instrument given the zero lower bound on interest rates.

The alternative scenario contained in this Inflation Report took into account the fact that the scope for lowering monetary policy rates had been exhausted on reaching technical zero (0.05 percent). Consistent with this limitation, it is impossible to lower 3M PRIBOR market interest rates below technical zero plus the risk premium between PRIBOR rates and the 2W repo rate. In the alternative scenario, the exchange rate of the koruna takes over the stabilizing role of monetary policy. The future evolution of the exchange rate reflects the CNB's presence in the foreign exchange market, in line with the Bank Board's decision of November 2013 to start

using the exchange rate as an additional tool for easing the monetary conditions. In the alternative scenario, the exchange rate weakening to CZK 27/EUR accelerates the return of inflation towards the CNB's 2 percent inflation target and allows for an earlier exit from the zero lower bound on monetary policy interest rates. As before, the Bank Board may assess this forecast scenario from the perspective of the risks it perceives and take this assessment into account in its decision on the necessary exchange rate weakening. The level close to which the CNB will maintain the exchange rate will be publicly announced on the day the decision is made."