

Billi, Roberto

**Working Paper**

## Price level targeting and risk management

Sveriges Riksbank Working Paper Series, No. 302

**Provided in Cooperation with:**

Central Bank of Sweden, Stockholm

*Suggested Citation:* Billi, Roberto (2015) : Price level targeting and risk management, Sveriges Riksbank Working Paper Series, No. 302, Sveriges Riksbank, Stockholm

This Version is available at:

<https://hdl.handle.net/10419/129718>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

SVERIGES RIKSBANK  
WORKING PAPER SERIES

302



# Price Level Targeting and Risk Management\*

*Roberto Billi*

June 2015

WORKING PAPERS ARE OBTAINABLE FROM

Sveriges Riksbank • Information Riksbank • SE-103 37 Stockholm

Fax international: +46 8 787 05 26

Telephone international: +46 8 787 01 00

E-mail: [info@riksbank.se](mailto:info@riksbank.se)

The Working Paper series presents reports on matters in the sphere of activities of the Riksbank that are considered to be of interest to a wider public.

The papers are to be regarded as reports on ongoing studies and the authors will be pleased to receive comments.

The views expressed in Working Papers are solely the responsibility of the authors and should not to be interpreted as reflecting the views of the Executive Board of Sveriges Riksbank.

# Price Level Targeting and Risk Management\*

Roberto M. Billi<sup>†</sup>

Sveriges Riksbank Working Paper Series No. 302

June 2015

## Abstract

Many argue that, in the presence of a lower bound on nominal interest rates, central banks should use a risk management approach for setting policy, which implies committing to a more expansionary policy to deal with uncertainty about the economic recovery. Using a standard model for monetary policy analysis, I study the effects of an uncertain future for both price level targeting and nominal GDP level targeting. The results clarify that, during lower bound episodes, the extent to which policy can overcome uncertainty depends crucially on the choice of policy framework.

Keywords: nominal level targets, optimal discretionary policy, zero lower bound

JEL: E31, E52, E58

---

\*I thank for comments Nick Bloom, Chris Carroll, Troy Davig, Mike Dotsey, Jeff Fuhrer, Michael Johnston, Marvin Goodfriend, Federico Ravenna, Øistein Røisland, Stephanie Schmitt-Grohé, Lars Svensson, Karl Walentin, Volker Wieland, and seminar participants at the Federal Reserve Bank of Kansas City, IIES, Norges Bank and Sveriges Riksbank, as well as conference participants at the Bank of Canada, NASM and SNDE. The views expressed herein are solely the responsibility of the author and should not be interpreted as reflecting the views of the Executive Board of Sveriges Riksbank.

<sup>†</sup>Sveriges Riksbank, Research Division, SE-103 37 Stockholm (e-mail: Roberto.Billi@riksbank.se)

# 1 Introduction

Most would agree that, to reduce the risk of particularly adverse outcomes for the economy, central banks should use a risk management approach for setting policy. Such an approach implies committing to a more expansionary policy to deal with uncertainty about the strength of the economic recovery in the presence of a zero lower bound (ZLB) on nominal interest rates.<sup>1</sup> In fact, during ZLB episodes, if the economic recovery turns out to be stronger than anticipated, the central bank can remove policy accommodation, but in an unanticipated downturn the scope for further policy stimulus is limited.

Using a standard model for monetary policy analysis, this article studies the effects of an uncertain future for both price level targeting and nominal GDP level targeting during ZLB episodes.<sup>2</sup> Recently in Billi (2015) I have shown that, if the central bank faces persistent supply and demand shocks, nominal GDP level targeting may lead to large falls in nominal GDP, because such a policy framework implies renouncing to a certain extent to stabilizing the price level. However, strict price level targeting induces greater policy inertia and thus improves the tradeoffs faced by the central bank. By introducing risk management considerations into the analysis, this article clarifies that, during ZLB episodes, the extent to which policy can overcome uncertainty depends crucially on the choice of policy framework.

In the analysis, I consider two scenarios regarding the evolution of the economy. In one, despite shocks hitting the economy, the future state of the economy is assumed to be known in advance with certainty (perfect foresight). In the other, the economy is buffeted by unforeseen shocks and thus the future is not known (uncertain future). The scenarios are compared in a small New Keynesian model, calibrated to recent U.S. data. In the model, the central bank operates under optimal discretion and faces a ZLB constraint. The policy frameworks are then ranked in terms of economic performance, based on the model's social welfare function. In the model, adverse demand shocks and the ZLB cause a tradeoff between current and future

---

<sup>1</sup>This article follows the practice of referring to a zero lower bound for nominal interest rates, but the recent experience with negative nominal rates in Europe suggests the effective lower bound is below zero.

<sup>2</sup>To view some recent proposals for nominal GDP level targeting, see for example Frankel (2013), Hatzius and Stehn (2011), Sumner (2011), and Woodford (2012). See Billi (2015) for further references.

output, because it is desirable in a ZLB episode to promise to induce an economic expansion after the ZLB episode.<sup>3</sup>

Relative to the existing ZLB literature, the article shows that under nominal GDP level targeting the existence of unforeseen shocks substantially worsens the tradeoff between current and future output, as a consequence the extent to which monetary policy overcomes uncertainty is rather limited. At the same time, however, strict price level targeting is more effective in dealing with uncertainty. This conclusion only partially explains the result in Billi (2015), because nominal GDP level targeting worsens the aforementioned tradeoff even absent uncertainty. Following Adam and Billi (2007) and Nakov (2008), a recent paper by Evans, Fisher, Gourio and Krane (2015) studies how uncertainty delays the liftoff from the ZLB in an inflation targeting framework, absent a nominal level target.<sup>4</sup>

Section 2 describes the model. Section 3 explains the policy frameworks. Section 4 explains the scenarios regarding the uncertainty. Section 5 presents the policy evaluation. And Section 6 concludes. The Appendix contains technical details on the model solution.

## 2 The model

I apply a version of the small New Keynesian model of Woodford (2010). The behavior of the private sector is summarized by two structural equations, log-linearized around zero inflation.

On the demand side of the model economy, the Euler equation describes the representative household's expenditure decisions,

$$y_t = E_t y_{t+1} - \varphi (i_t - r - E_t \pi_{t+1} - v_t), \quad (1)$$

where  $y_t$  is output measured as the log deviation from trend.  $\pi_t$  is the inflation rate, the log change of prices,  $p_t - p_{t-1}$ . And  $i_t \geq 0$  is the nominal interest rate, while  $r > 0$  is the steady-state real interest rate.  $\varphi > 0$  is the interest elasticity of real aggregate demand,

---

<sup>3</sup>In the analysis, even though supply shocks do not lead to hitting the ZLB, supply shocks can buffet the economy during ZLB episodes. See Billi (2015) for a discussion.

<sup>4</sup>The paper also provides evidence, based on Federal Reserve communications, that risk management considerations have been influential for setting monetary policy.

capturing intertemporal substitution in household spending. The demand shock  $v_t$  represents other spending, for example, government spending. Though a positive demand shock can be countered by raising the nominal interest rate, a large adverse shock that leads to hitting the ZLB results in an economic downturn.

On the supply side of the economy, the Phillips curve describes the optimal price-setting behavior of firms, under staggered price changes à la Calvo,

$$\pi_t = \beta E_t \pi_{t+1} + \kappa x_t + u_t, \quad (2)$$

where  $\beta \in (0, 1)$  is the discount factor of the representative household.<sup>5</sup> The slope parameter  $\kappa > 0$  is a function of the structure of the economy.<sup>6</sup>  $x_t \equiv y_t - y_t^n$  is the output gap.  $y_t^n$  is the natural rate of output, the output deviation from trend that would prevail in the absence of any price rigidities, which represents a *technology shock*. And  $u_t$  is a cost-push shock, or a *mark-up shock* resulting from variation over time in the degree of monopolistic competition between firms, which causes an inflation-output tradeoff for monetary policy.

Each of the three types of shocks  $(y_t^n, u_t, v_t)$  follows an AR(1) stochastic processes, with first-order autocorrelation parameters  $\rho_j \in (-1, 1)$  for  $j = y, u, v$ . And  $\sigma_{\varepsilon j} \varepsilon_{jt}$  are the innovations that buffet the economy, which are independent across time and cross-sectionally, and normally distributed with mean zero and standard deviations  $\sigma_{\varepsilon j} \geq 0$ .

Finally, the policy frameworks to be considered are evaluated based on the model's social welfare function approximated around zero inflation, as derived in Woodford (2010),

$$E_0 \sum_{t=0}^{\infty} \beta^t [\pi_t^2 + \lambda (x_t - x^*)^2], \quad (3)$$

where  $\lambda = \kappa/\theta$  is the weight assigned to stabilizing the output gap relative to inflation.  $x^*$  is the target level of the output gap, which stems from monopolistic competition and distortion in the steady state. Output subsidies are assumed to offset the monopolistic distortion so

---

<sup>5</sup> $\beta$  is determined as  $1/(1+r)$ .

<sup>6</sup>In this model  $\kappa = (1-\alpha)(1-\alpha\beta)\alpha^{-1}(\varphi^{-1}+\omega)(1+\omega\theta)^{-1}$ , where  $\omega > 0$  denotes the elasticity of a firm's real marginal cost.  $\theta > 1$  is the price elasticity of demand substitution with firms in monopolistic competition. And  $\alpha \in (0, 1)$  is the share of firms keeping prices fixed each period.

the steady state is efficient,  $x^* = 0$ . Thus, in the analysis there is no inflation bias but a stabilization bias due to discretionary policy.

### 3 The policy frameworks

Under optimal discretion, the central bank has an objective function and re-optimizes its policy decision in each period. In this analysis, two monetary policy frameworks are considered, and in each framework the private sector and central bank operate with the same information.

**Strict price level targeting.** First, the objective function is  $\min_{i_t \geq 0} E_t \sum_{j=0}^{\infty} \beta^j p_{t+j}^2$ , where  $p_t$  is the price level, which is equal to  $p_{t-1} + \pi_t$ . By focusing on price stability, the policymaker transfers the entire burden of shocks onto output. This approach involves inertia in the setting of policy, because the current policy decision depends on the past price level.

**Nominal GDP level targeting.** Second, the objective function is  $\min_{i_t \geq 0} E_t \sum_{j=0}^{\infty} \beta^j n_{t+j}^2$ , where  $n_t$  is the (detrended) level of nominal GDP, the log sum of prices and output,  $p_t + y_t$ . Because this approach requires the burden of shocks to be shared by prices and output, the policymaker acts less in accordance with a precommitment to price stability.

### 4 The uncertainty

In equilibrium, the policymaker chooses a policy based on a response function  $\mathbf{y}(\mathbf{s}_t)$  and a state vector  $\mathbf{s}_t$ . The expectations function is  $\mathbf{E}_t \mathbf{y}_{t+1} = \int \mathbf{y}(\mathbf{s}_{t+1}) f(\varepsilon_{t+1}) d(\varepsilon_{t+1})$  with  $\sigma_\varepsilon \geq \mathbf{0}$ , where  $f(\cdot)$  is a probability density function of the future innovations that buffet the economy.<sup>7</sup> In this analysis, two scenario about the future innovations are considered.

**Perfect foresight.** In the first scenario, despite shocks hitting the economy, the future state of the economy is assumed to be known in advance with certainty,  $\sigma_\varepsilon = \mathbf{0}$ . The ZLB constraint then affects the setting of policy only when it actually binds.<sup>8</sup>

---

<sup>7</sup>An equilibrium is then given by  $\mathbf{y}(\mathbf{s}_t)$  and  $\mathbf{E}_t \mathbf{y}_{t+1}$  that satisfy the optimal policy problem's equilibrium conditions, derived in Appendix A.1.

<sup>8</sup>Thus,  $\mathbf{E}_t \mathbf{y}_{t+1}$  simplifies to  $\mathbf{y}(\mathbf{s}_{t+1})$ . The model can then be solved with standard numerical methods.



**Uncertain future.** Instead the second scenario takes into account the existence of uncertainty about the future state of the economy,  $\sigma_\varepsilon > 0$ . In such a case, when the ZLB threatens, the mere possibility of hitting the ZLB causes expectations of a future downturn in the economy, as shown by Adam and Billi (2007) and Nakov (2008).<sup>9</sup>

## 5 Policy evaluation

After calibrating the model, I assess the effects of an uncertain future for the performance of the two targeting frameworks.

### 5.1 Calibration

The small model economy is calibrated to U.S. data for recent decades following Billi (2015). Regarding the structural parameters,  $\beta$  is set to 0.99, to imply a steady-state interest rate of 4 percent annual.  $\varphi$  is set to 6.25.<sup>10</sup> The implied parameters  $\kappa$  and  $\lambda$  are equal to 0.024 and 0.003, respectively. Regarding the calibration of the shocks,  $\rho_{y,u,v}$  are set to 0.8.  $\sigma_{y,v}$  are set to 0.8 percent quarterly, while  $\sigma_u$  is set to 0.05 percent quarterly. In Billi (2015) the ranking of the two targeting frameworks is shown to be robust to a wide range of alternate calibrations.

### 5.2 The effects of an uncertain future

Using the calibrated model, figure 1 shows the expected liftoff of the nominal interest rate after an adverse demand shock.<sup>11</sup> The top panel shows the response under strict price level targeting, both with perfect foresight and an uncertain future, as well as the difference between the two scenarios. In both scenarios, given the size of the shock, the central bank cuts the nominal rate all the way to the ZLB. However, with an uncertain future the nominal rate stays for a longer time below its equilibrium value, which implies greater policy stimulus.

---

<sup>9</sup>To solve the model with unforeseen shocks, I employ the same numerical procedure as in Billi (2015).

<sup>10</sup> $\alpha$  is set to 0.66, so the duration between price changes  $1/(1 - \alpha)$  is 3 quarters.  $\theta$  is set to 7.66, so the markup over marginal costs  $\theta/(\theta - 1)$  is 15 percent. And  $\omega$  is set to 0.47.

<sup>11</sup>The shock size is three standard deviations. The expected paths are obtained by averaging across 10,000 stochastic simulations.

The bottom panel shows the response under nominal GDP level targeting, with uncertainty resulting in a more expansionary policy. But comparing to the top panel, nominal GDP level targeting entails an earlier liftoff from the ZLB and less policy stimulus.<sup>12</sup> The figure thus suggests that nominal GDP level targeting is less effective in dealing with uncertainty.

[Figure 1 about here]

To illustrate the effectiveness of policy, figure 2 shows the expected path of the nominal GDP level following the adverse demand shock. As the top panel shows, under strict price level targeting, nominal GDP on impact falls below trend but later rises above trend, both with perfect foresight and an uncertain future. But with an uncertain future, the recession is deeper and the expansion is stronger. The reason for this stronger expansion is the greater policy stimulus, which improves the tradeoff between current and future output. However, as the bottom panel shows, under nominal GDP level targeting, uncertainty results in a notably deeper recession and slower recovery.

[Figure 2 about here]

Next, to rank the two targeting frameworks, table 1 summarizes their overall performance. The table reports the expected frequency and duration of ZLB episodes, as well as the welfare loss due to business cycles.<sup>13</sup> The top panel shows the results with perfect foresight, while the middle panel shows the outcome with an uncertain future, and the bottom panel shows the difference between the two scenarios. In both scenarios, nominal GDP level targeting leads to more costly fluctuations in prices and output, especially with an uncertain future. In fact, although uncertainty raises the welfare costs of business cycles, the welfare costs rises more under nominal GDP level targeting. In sum, strict price level targeting overcomes uncertainty to a greater extent than nominal GDP level targeting.

---

<sup>12</sup>As a consequence, ZLB episodes are less frequent and shorter under nominal GDP level targeting. With an uncertain future, the frequency of ZLB episodes is 8 percent of the time under nominal GDP level targeting, but rises to 15 percent under strict price level targeting; at the same time, the expected duration of a ZLB episode rises from 1.8 to 3.4 quarters (table 1).

<sup>13</sup>To calculate the welfare loss, first the value of objective function (3) is obtained by averaging across 10,000 stochastic simulations each 1,000 periods long after a burn-in period. This value is then converted into a permanent consumption loss, as explained in Billi (2015).

[Table 1 about here]

## 6 Conclusion

In this article, I study the effects of an uncertain future for both price level targeting and nominal GDP level targeting in the presence of a ZLB constraint. The analysis clarifies that, during ZLB episodes, the extent to which monetary policy can overcome uncertainty depends crucially on the choice of policy framework. In particular, the existence of unforeseen shocks worsens the tradeoff, between current and future output, faced by the central bank. However, strict price level targeting induces greater policy inertia and therefore is more effective in dealing with uncertainty. Still, the analysis is conducted in a stylized model that does not include, for example, the effects of positive trend inflation, nor balance sheet policies and fiscal spending, which involve additional tradeoffs for monetary policy. Incorporating such features into the analysis seems an interesting task for future research.

## A Appendix

### A.1 Equilibrium conditions

To derive the equilibrium conditions, the optimal policy problem can be written as

$$\begin{aligned} V(\mathbf{s}_t) = \max & \left[ - (p_{t-1} + \pi_t + I y_t)^2 + \beta E_t V(\mathbf{s}_{t+1}) \right] \\ & \text{subject to (1), (2) and } i_t \geq 0 \\ & \text{and } \mathbf{E}_t \mathbf{y}_{t+1} \text{ given,} \end{aligned}$$

where  $I$  represents an indicator function, which for any  $\mathbf{s}_t$  is equal to 1 under nominal GDP level targeting and to 0 under strict price level targeting. Write the period Lagrangian

$$\begin{aligned}
L_t = & -(p_{t-1} + \pi_t + Iy_t)^2 + \beta E_t V(\mathbf{s}_{t+1}) \\
& + m_{1t} [\pi_t - \beta E_t \pi_{t+1} - \kappa(y_t - y_t^n) - u_t] \\
& + m_{2t} [-y_t + E_t y_{t+1} - \varphi(i_t - r - E_t \pi_{t+1} - v_t)] \\
& \text{and } \mathbf{E}_t \mathbf{y}_{t+1} \text{ given}
\end{aligned}$$

The Kuhn-Tucker conditions are

$$\partial L_t / \partial \pi_t = -2(p_{t-1} + \pi_t + Iy_t) + m_{1t} = 0 \quad (4)$$

$$\partial L_t / \partial y_t = -2(p_{t-1} + \pi_t + Iy_t) - \kappa m_{1t} - m_{2t} = 0 \quad (5)$$

$$\partial L_t / \partial i_t \cdot i_t = -\varphi m_{2t} \cdot i_t = 0, \quad m_{2t} \geq 0, \quad i_t \geq 0 \quad (6)$$

## References

- ADAM, K., AND R. M. BILLI (2007): “Discretionary Monetary Policy and the Zero Lower Bound on Nominal Interest Rates,” *Journal of Monetary Economics*, 54(3), 728–752.
- BILLI, R. M. (2015): “A Note on Nominal GDP Targeting and the Zero Lower Bound,” *Sveriges Riksbank Working Paper No. 270*, Revised May 2015.
- EVANS, C. L., J. D. M. FISHER, F. GOURIO, AND S. D. KRANE (2015): “Risk Management for Monetary Policy Near the Zero Lower Bound,” *Federal Reserve Bank of Chicago Working Paper No. 2015-03*.
- FRANKEL, J. (2013): “Nominal-GDP targets, without losing the inflation anchor,” in *Is inflation Targeting Dead? Central Banking After the Crisis*, ed. by L. Reichlin, and R. Baldwin, pp. 90–94. CEPR, VoxEU.org.

- HATZIUS, J., AND S. J. STEHN (2011): “The Case for a Nominal GDP Level Target,” *Goldman Sachs US Economics Analyst*, no. 11/41, October 14.
- NAKOV, A. (2008): “Optimal and Simple Monetary Policy Rules with Zero Floor on the Nominal Interest Rate,” *International Journal of Central Banking*, 4(2), 73–127.
- SUMNER, S. B. (2011): “Re-Targeting the Fed,” *National Affairs*, Fall, no. 9, 79-96.
- WOODFORD, M. (2010): “Optimal Monetary Stabilization Policy,” in *Handbook of Monetary Economics*, ed. by B. M. Friedman, and M. Woodford, vol. 3, chap. 14, pp. 723–828. Elsevier B.V.
- (2012): “Methods of Policy Accommodation at the Interest-Rate Lower Bound,” *Federal Reserve Bank of Kansas City, Economic Policy Symposium, Jackson Hole*.

Table 1: Uncertain future and economic performance

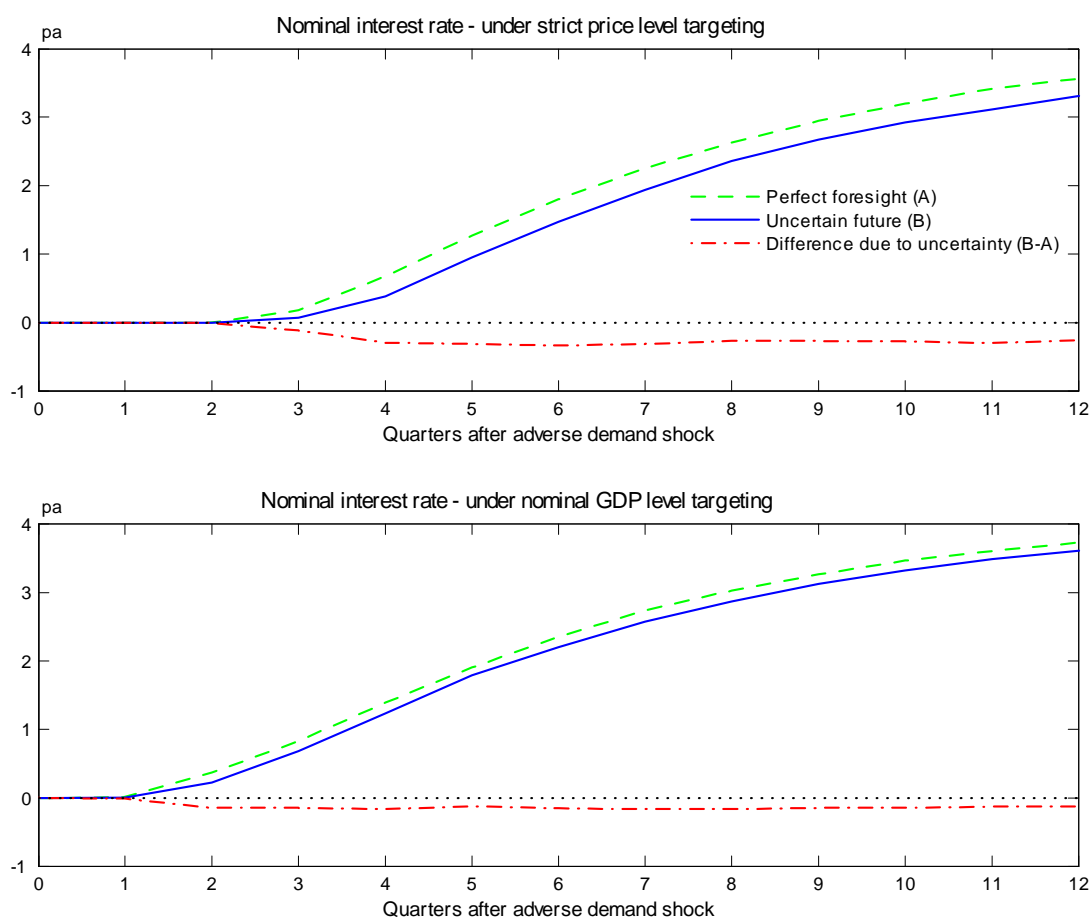
	ZLB episodes		Welfare loss <sup>c</sup>		
	freq. <sup>a</sup>	duration <sup>b</sup>	$\pi$	$x$	Tot.
Perfect foresight (A):					
Strict price level targeting	9	2.8	0	7	7
Nominal GDP level targeting	5	1.7	7	4	11
Uncertain future (B):					
Strict price level targeting	15	3.4	1	9	10
Nominal GDP level targeting	8	1.8	13	11	24
Difference due to uncertainty (B-A):					
Strict price level targeting	6	0.6	1	2	3
Nominal GDP level targeting	3	0.1	6	7	13

a. Expected percent of time at the ZLB

b. Expected number of consecutive quarters at the ZLB

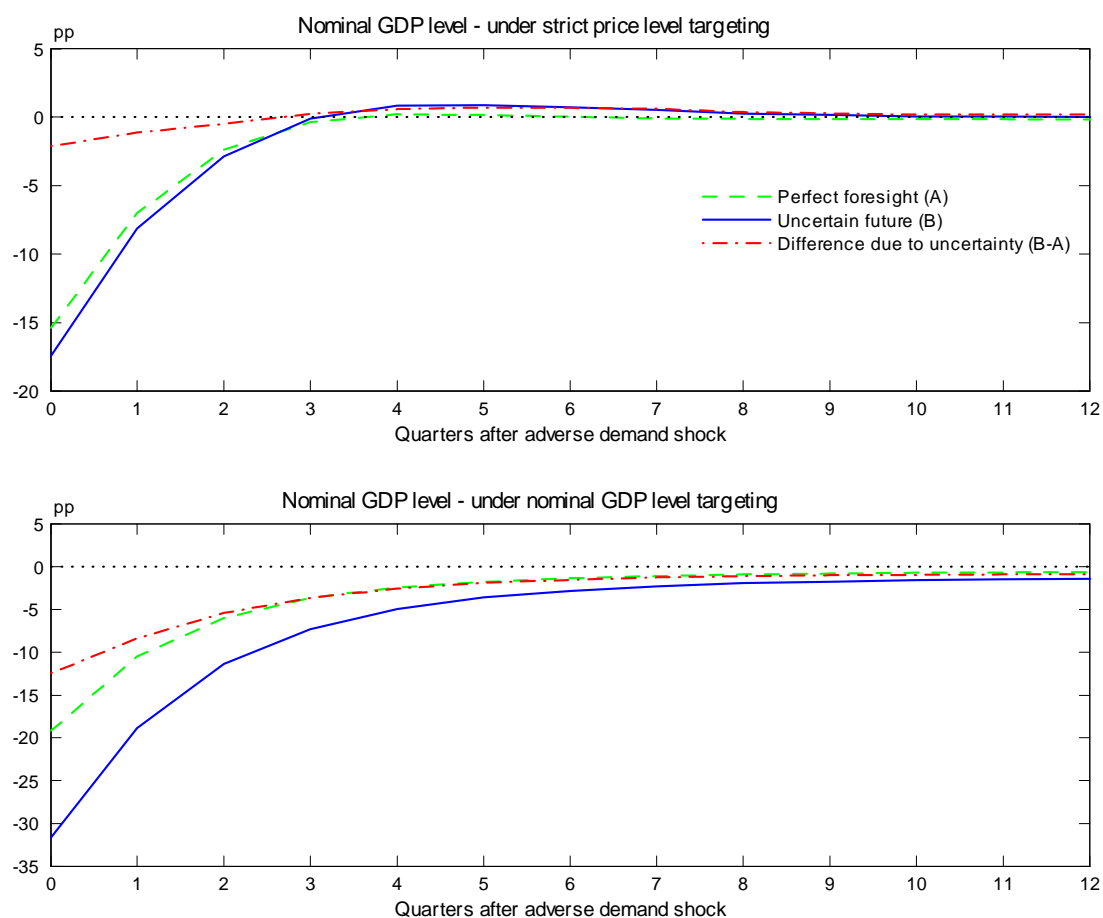
c. Permanent consumption loss (basis points)

Figure 1: Delayed policy rate liftoff in the presence of an uncertain future



Note: Expected paths after a -3 standard deviation  $v_t$  shock

Figure 2: Uncertain future and economic stability during ZLB episodes



Note: Expected paths after a -3 standard deviation  $v_t$  shock



# Earlier Working Papers:

For a complete list of Working Papers published by Sveriges Riksbank, see [www.riksbank.se](http://www.riksbank.se)

Estimation of an Adaptive Stock Market Model with Heterogeneous Agents <i>by Henrik Amilon</i>	2005:177
Some Further Evidence on Interest-Rate Smoothing: The Role of Measurement Errors in the Output Gap <i>by Mikael Apel and Per Jansson</i>	2005:178
Bayesian Estimation of an Open Economy DSGE Model with Incomplete Pass-Through <i>by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani</i>	2005:179
Are Constant Interest Rate Forecasts Modest Interventions? Evidence from an Estimated Open Economy DSGE Model of the Euro Area <i>by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani</i>	2005:180
Inference in Vector Autoregressive Models with an Informative Prior on the Steady State <i>by Mattias Villani</i>	2005:181
Bank Mergers, Competition and Liquidity <i>by Elena Carletti, Philipp Hartmann and Giancarlo Spagnolo</i>	2005:182
Testing Near-Rationality using Detailed Survey Data <i>by Michael F. Bryan and Stefan Palmqvist</i>	2005:183
Exploring Interactions between Real Activity and the Financial Stance <i>by Tor Jacobson, Jesper Lindé and Kasper Roszbach</i>	2005:184
Two-Sided Network Effects, Bank Interchange Fees, and the Allocation of Fixed Costs <i>by Mats A. Bergman</i>	2005:185
Trade Deficits in the Baltic States: How Long Will the Party Last? <i>by Rudolfs Bems and Kristian Jönsson</i>	2005:186
Real Exchange Rate and Consumption Fluctuations following Trade Liberalization <i>by Kristian Jönsson</i>	2005:187
Modern Forecasting Models in Action: Improving Macroeconomic Analyses at Central Banks <i>by Malin Adolfson, Michael K. Andersson, Jesper Lindé, Mattias Villani and Anders Vredin</i>	2005:188
Bayesian Inference of General Linear Restrictions on the Cointegration Space <i>by Mattias Villani</i>	2005:189
Forecasting Performance of an Open Economy Dynamic Stochastic General Equilibrium Model <i>by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani</i>	2005:190
Forecast Combination and Model Averaging using Predictive Measures <i>by Jana Eklund and Sune Karlsson</i>	2005:191
Swedish Intervention and the Krona Float, 1993-2002 <i>by Owen F. Humpage and Javiera Ragnartz</i>	2006:192
A Simultaneous Model of the Swedish Krona, the US Dollar and the Euro <i>by Hans Lindblad and Peter Sellin</i>	2006:193
Testing Theories of Job Creation: Does Supply Create Its Own Demand? <i>by Mikael Carlsson, Stefan Eriksson and Nils Gottfries</i>	2006:194
Down or Out: Assessing The Welfare Costs of Household Investment Mistakes <i>by Laurent E. Calvet, John Y. Campbell and Paolo Sodini</i>	2006:195
Efficient Bayesian Inference for Multiple Change-Point and Mixture Innovation Models <i>by Paolo Giordani and Robert Kohn</i>	2006:196
Derivation and Estimation of a New Keynesian Phillips Curve in a Small Open Economy <i>by Karolina Holmberg</i>	2006:197
Technology Shocks and the Labour-Input Response: Evidence from Firm-Level Data <i>by Mikael Carlsson and Jon Smedsaas</i>	2006:198
Monetary Policy and Staggered Wage Bargaining when Prices are Sticky <i>by Mikael Carlsson and Andreas Westermarck</i>	2006:199
The Swedish External Position and the Krona <i>by Philip R. Lane</i>	2006:200

Price Setting Transactions and the Role of Denominating Currency in FX Markets <i>by Richard Friberg and Fredrik Wilander</i>	2007:201
The geography of asset holdings: Evidence from Sweden <i>by Nicolas Coeurdacier and Philippe Martin</i>	2007:202
Evaluating An Estimated New Keynesian Small Open Economy Model <i>by Malin Adolfson, Stefan Laséen, Jesper Lindé and Mattias Villani</i>	2007:203
The Use of Cash and the Size of the Shadow Economy in Sweden <i>by Gabriela Guibourg and Björn Segendorf</i>	2007:204
Bank supervision Russian style: Evidence of conflicts between micro- and macro-prudential concerns <i>by Sophie Claeys and Koen Schoors</i>	2007:205
Optimal Monetary Policy under Downward Nominal Wage Rigidity <i>by Mikael Carlsson and Andreas Westermarck</i>	2007:206
Financial Structure, Managerial Compensation and Monitoring <i>by Vittoria Cerasi and Sonja Daltung</i>	2007:207
Financial Frictions, Investment and Tobin's $q$ <i>by Guido Lorenzoni and Karl Walentin</i>	2007:208
Sticky Information vs Sticky Prices: A Horse Race in a DSGE Framework <i>by Mathias Trabandt</i>	2007:209
Acquisition versus greenfield: The impact of the mode of foreign bank entry on information and bank lending rates <i>by Sophie Claeys and Christa Hainz</i>	2007:210
Nonparametric Regression Density Estimation Using Smoothly Varying Normal Mixtures <i>by Mattias Villani, Robert Kohn and Paolo Giordani</i>	2007:211
The Costs of Paying – Private and Social Costs of Cash and Card <i>by Mats Bergman, Gabriella Guibourg and Björn Segendorf</i>	2007:212
Using a New Open Economy Macroeconomics model to make real nominal exchange rate forecasts <i>by Peter Sellin</i>	2007:213
Introducing Financial Frictions and Unemployment into a Small Open Economy Model <i>by Lawrence J. Christiano, Mathias Trabandt and Karl Walentin</i>	2007:214
Earnings Inequality and the Equity Premium <i>by Karl Walentin</i>	2007:215
Bayesian forecast combination for VAR models <i>by Michael K. Andersson and Sune Karlsson</i>	2007:216
Do Central Banks React to House Prices? <i>by Daria Finocchiaro and Virginia Queijo von Heideken</i>	2007:217
The Riksbank's Forecasting Performance <i>by Michael K. Andersson, Gustav Karlsson and Josef Svensson</i>	2007:218
Macroeconomic Impact on Expected Default Frequency <i>by Per Åsberg and Hovick Shahnazarian</i>	2008:219
Monetary Policy Regimes and the Volatility of Long-Term Interest Rates <i>by Virginia Queijo von Heideken</i>	2008:220
Governing the Governors: A Clinical Study of Central Banks <i>by Lars Frisell, Kasper Roszbach and Giancarlo Spagnolo</i>	2008:221
The Monetary Policy Decision-Making Process and the Term Structure of Interest Rates <i>by Hans Dillén</i>	2008:222
How Important are Financial Frictions in the U S and the Euro Area <i>by Virginia Queijo von Heideken</i>	2008:223
Block Kalman filtering for large-scale DSGE models <i>by Ingvar Strid and Karl Walentin</i>	2008:224
Optimal Monetary Policy in an Operational Medium-Sized DSGE Model <i>by Malin Adolfson, Stefan Laséen, Jesper Lindé and Lars E. O. Svensson</i>	2008:225
Firm Default and Aggregate Fluctuations <i>by Tor Jacobson, Rikard Kindell, Jesper Lindé and Kasper Roszbach</i>	2008:226

Re-Evaluating Swedish Membership in EMU: Evidence from an Estimated Model <i>by Ulf Söderström</i>	2008:227
The Effect of Cash Flow on Investment: An Empirical Test of the Balance Sheet Channel <i>by Ola Melander</i>	2009:228
Expectation Driven Business Cycles with Limited Enforcement <i>by Karl Walentin</i>	2009:229
Effects of Organizational Change on Firm Productivity <i>by Christina Håkanson</i>	2009:230
Evaluating Microfoundations for Aggregate Price Rigidities: Evidence from Matched Firm-Level Data on Product Prices and Unit Labor Cost <i>by Mikael Carlsson and Oskar Nordström Skans</i>	2009:231
Monetary Policy Trade-Offs in an Estimated Open-Economy DSGE Model <i>by Malin Adolfson, Stefan Laséen, Jesper Lindé and Lars E. O. Svensson</i>	2009:232
Flexible Modeling of Conditional Distributions Using Smooth Mixtures of Asymmetric Student T Densities <i>by Feng Li, Mattias Villani and Robert Kohn</i>	2009:233
Forecasting Macroeconomic Time Series with Locally Adaptive Signal Extraction <i>by Paolo Giordani and Mattias Villani</i>	2009:234
Evaluating Monetary Policy <i>by Lars E. O. Svensson</i>	2009:235
Risk Premiums and Macroeconomic Dynamics in a Heterogeneous Agent Model <i>by Ferre De Graeve, Maarten Dossche, Marina Emiris, Henri Sneessens and Raf Wouters</i>	2010:236
Picking the Brains of MPC Members <i>by Mikael Apel, Carl Andreas Claussen and Petra Lennartsdotter</i>	2010:237
Involuntary Unemployment and the Business Cycle <i>by Lawrence J. Christiano, Mathias Trabandt and Karl Walentin</i>	2010:238
Housing collateral and the monetary transmission mechanism <i>by Karl Walentin and Peter Sellin</i>	2010:239
The Discursive Dilemma in Monetary Policy <i>by Carl Andreas Claussen and Øistein Røisland</i>	2010:240
Monetary Regime Change and Business Cycles <i>by Vasco Cúrdia and Daria Finocchiaro</i>	2010:241
Bayesian Inference in Structural Second-Price common Value Auctions <i>by Bertil Wegmann and Mattias Villani</i>	2010:242
Equilibrium asset prices and the wealth distribution with inattentive consumers <i>by Daria Finocchiaro</i>	2010:243
Identifying VARs through Heterogeneity: An Application to Bank Runs <i>by Ferre De Graeve and Alexei Karas</i>	2010:244
Modeling Conditional Densities Using Finite Smooth Mixtures <i>by Feng Li, Mattias Villani and Robert Kohn</i>	2010:245
The Output Gap, the Labor Wedge, and the Dynamic Behavior of Hours <i>by Luca Sala, Ulf Söderström and Antonella Trigari</i>	2010:246
Density-Conditional Forecasts in Dynamic Multivariate Models <i>by Michael K. Andersson, Stefan Palmqvist and Daniel F. Waggoner</i>	2010:247
Anticipated Alternative Policy-Rate Paths in Policy Simulations <i>by Stefan Laséen and Lars E. O. Svensson</i>	2010:248
MOSES: Model of Swedish Economic Studies <i>by Gunnar Bårdsen, Ard den Reijer, Patrik Jonasson and Ragnar Nymoen</i>	2011:249
The Effects of Endogenous Firm Exit on Business Cycle Dynamics and Optimal Fiscal Policy <i>by Lauri Vilmi</i>	2011:250
Parameter Identification in a Estimated New Keynesian Open Economy Model <i>by Malin Adolfson and Jesper Lindé</i>	2011:251
Up for count? Central bank words and financial stress <i>by Marianna Blix Grimaldi</i>	2011:252

Wage Adjustment and Productivity Shocks <i>by Mikael Carlsson, Julián Messina and Oskar Nordström Skans</i>	2011:253
Stylized (Arte) Facts on Sectoral Inflation <i>by Ferre De Graeve and Karl Walentin</i>	2011:254
Hedging Labor Income Risk <i>by Sebastien Betermier, Thomas Jansson, Christine A. Parlour and Johan Walden</i>	2011:255
Taking the Twists into Account: Predicting Firm Bankruptcy Risk with Splines of Financial Ratios <i>by Paolo Giordani, Tor Jacobson, Erik von Schedvin and Mattias Villani</i>	2011:256
Collateralization, Bank Loan Rates and Monitoring: Evidence from a Natural Experiment <i>by Geraldo Cerqueiro, Steven Ongena and Kasper Roszbach</i>	2012:257
On the Non-Exclusivity of Loan Contracts: An Empirical Investigation <i>by Hans Degryse, Vasso Ioannidou and Erik von Schedvin</i>	2012:258
Labor-Market Frictions and Optimal Inflation <i>by Mikael Carlsson and Andreas Westermarck</i>	2012:259
Output Gaps and Robust Monetary Policy Rules <i>by Roberto M. Billi</i>	2012:260
The Information Content of Central Bank Minutes <i>by Mikael Apel and Marianna Blix Grimaldi</i>	2012:261
The Cost of Consumer Payments in Sweden <i>by Björn Segendorf and Thomas Jansson</i>	2012:262
Trade Credit and the Propagation of Corporate Failure: An Empirical Analysis <i>by Tor Jacobson and Erik von Schedvin</i>	2012:263
Structural and Cyclical Forces in the Labor Market During the Great Recession: Cross-Country Evidence <i>by Luca Sala, Ulf Söderström and Antonella Trigari</i>	2012:264
Pension Wealth and Household Savings in Europe: Evidence from SHARELIFE <i>by Rob Alessie, Viola Angelini and Peter van Santen</i>	2013:265
Long-Term Relationship Bargaining <i>by Andreas Westermarck</i>	2013:266
Using Financial Markets To Estimate the Macro Effects of Monetary Policy: An Impact-Identified FAVAR* <i>by Stefan Pitschner</i>	2013:267
DYNAMIC MIXTURE-OF-EXPERTS MODELS FOR LONGITUDINAL AND DISCRETE-TIME SURVIVAL DATA <i>by Matias Quiroz and Mattias Villani</i>	2013:268
Conditional euro area sovereign default risk <i>by André Lucas, Bernd Schwaab and Xin Zhang</i>	2013:269
Nominal GDP Targeting and the Zero Lower Bound: Should We Abandon Inflation Targeting?*	2013:270
<i>by Roberto M. Billi</i>	
Un-truncating VARs* <i>by Ferre De Graeve and Andreas Westermarck</i>	2013:271
Housing Choices and Labor Income Risk <i>by Thomas Jansson</i>	2013:272
Identifying Fiscal Inflation* <i>by Ferre De Graeve and Virginia Queijo von Heideken</i>	2013:273
On the Redistributive Effects of Inflation: an International Perspective* <i>by Paola Boel</i>	2013:274
Business Cycle Implications of Mortgage Spreads* <i>by Karl Walentin</i>	2013:275
Approximate dynamic programming with post-decision states as a solution method for dynamic economic models <i>by Isaiah Hull</i>	2013:276
A detrimental feedback loop: deleveraging and adverse selection <i>by Christoph Bertsch</i>	2013:277
Distortionary Fiscal Policy and Monetary Policy Goals <i>by Klaus Adam and Roberto M. Billi</i>	2013:278
Predicting the Spread of Financial Innovations: An Epidemiological Approach <i>by Isaiah Hull</i>	2013:279

Firm-Level Evidence of Shifts in the Supply of Credit <i>by Karolina Holmberg</i>	2013:280
Lines of Credit and Investment: Firm-Level Evidence of Real Effects of the Financial Crisis <i>by Karolina Holmberg</i>	2013:281
A wake-up call: information contagion and strategic uncertainty <i>by Toni Ahnert and Christoph Bertsch</i>	2013:282
Debt Dynamics and Monetary Policy: A Note <i>by Stefan Laséen and Ingvar Strid</i>	2013:283
Optimal taxation with home production <i>by Conny Olovsson</i>	2014:284
Incompatible European Partners? Cultural Predispositions and Household Financial Behavior <i>by Michael Haliassos, Thomas Jansson and Yigitcan Karabulut</i>	2014:285
How Subprime Borrowers and Mortgage Brokers Shared the Piecial Behavior <i>by Antje Berndt, Burton Hollifield and Patrik Sandås</i>	2014:286
The Macro-Financial Implications of House Price-Indexed Mortgage Contracts <i>by Isaiah Hull</i>	2014:287
Does Trading Anonymously Enhance Liquidity? <i>by Patrick J. Dennis and Patrik Sandås</i>	2014:288
Systematic bailout guarantees and tacit coordination <i>by Christoph Bertsch, Claudio Calcagno and Mark Le Quement</i>	2014:289
Selection Effects in Producer-Price Setting <i>by Mikael Carlsson</i>	2014:290
Dynamic Demand Adjustment and Exchange Rate Volatility <i>by Vesna Corbo</i>	2014:291
Forward Guidance and Long Term Interest Rates: Inspecting the Mechanism <i>by Ferre De Graeve, Pelin Ilbas &amp; Raf Wouters</i>	2014:292
Firm-Level Shocks and Labor Adjustments <i>by Mikael Carlsson, Julián Messina and Oskar Nordström Skans</i>	2014:293
A wake-up call theory of contagion <i>by Toni Ahnert and Christoph Bertsch</i>	2015:294
Risks in macroeconomic fundamentals and excess bond returns predictability <i>by Rafael B. De Rezende</i>	2015:295
The Importance of Reallocation for Productivity Growth: Evidence from European and US Banking <i>by Jaap W.B. Bos and Peter C. van Santen</i>	2015:296
SPEEDING UP MCMC BY EFFICIENT DATA SUBSAMPLING <i>by Matias Quiroz, Mattias Villani and Robert Kohn</i>	2015:297
Amortization Requirements and Household Indebtedness: An Application to Swedish-Style Mortgages <i>by Isaiah Hull</i>	2015:298
Fuel for Economic Growth? <i>by Johan Gars and Conny Olovsson</i>	2015:299
Searching for Information <i>by Jungsuk Han and Francesco Sangiorgi</i>	2015:300
What Broke First? Characterizing Sources of Structural Change Prior to the Great Recession <i>by Isaiah Hull</i>	2015:301



Sveriges Riksbank  
Visiting address: Brunkebergs torg 11  
Mail address: se-103 37 Stockholm

Website: [www.riksbank.se](http://www.riksbank.se)  
Telephone: +46 8 787 00 00, Fax: +46 8 21 05 31  
E-mail: [registratorn@riksbank.se](mailto:registratorn@riksbank.se)