

2008 | 18

Working Paper

Monetary Policy Department

The price puzzle: Mixing the temporary and permanent monetary policy shocks

by Ida Wolden Bache and Kai Leitemo

Working papers fra Norges Bank kan bestilles over e-post:

tjenestetorget@norges-bank.no

eller ved henvendelse til:

Norges Bank, Abonnementservice

Postboks 1179 Sentrum

0107 Oslo

Telefon 22 31 63 83, Telefaks 22 41 31 05

Fra 1999 og senere er publikasjonene tilgjengelige på www.norges-bank.no.

Working papers inneholder forskningsarbeider og utredninger som vanligvis ikke har fått sin endelige form. Hensikten er blant annet at forfatteren kan motta kommentarer fra kolleger og andre interesserte. Synspunkter og konklusjoner i arbeidene står for forfatternes regning.

Working papers from Norges Bank can be ordered by e-mail:

tjenestetorget@norges-bank.no

or from Norges Bank, Subscription service

P.O.Box. 1179 Sentrum

N-0107Oslo, Norway.

Tel. +47 22 31 63 83, Fax. +47 22 41 31 05

Working papers from 1999 onwards are available on www.norges-bank.no

Norges Bank's working papers present research projects and reports (not usually in their final form) and are intended inter alia to enable the author to benefit from the comments of colleagues and other interested parties. Views and conclusions expressed in working papers are the responsibility of the authors alone.

ISSN 0801-2504 (printed) 1502-8143 (online)

ISBN 978-82-7553-461-1 (printed) 978-82-7553-462-8 (online)

The price puzzle: Mixing the temporary and permanent monetary policy shocks

Ida Wolden Bache
Norges Bank

Kai Leitemo*
Norwegian School of Management BI

November 3, 2008

Abstract

We argue that the correct identification of monetary policy shocks in a vector autoregression requires that the identification scheme distinguishes between permanent and transitory monetary policy shocks. The permanent shocks reflect changes in the inflation target while the transitory shocks represent temporary deviations from the interest rate reaction function. Whereas both shocks may raise the nominal interest rate on impact, the inflation and output responses of the two shocks are different. We show, using a simple simulation experiment, that a failure to distinguish between the two types of shocks can result in a "price puzzle".

Keywords: Monetary policy shocks, VAR modeling, identification, price puzzle.

JEL codes: E47, E52, E61.

*We are grateful for comments from participants at the 1st Oslo Conference and Workshop on Monetary Policy (2006). Views expressed are those of the authors and do not necessarily reflect those of Norges Bank. Address of the corresponding author: Kai Leitemo, Economics Department, Norwegian School of Management (BI), Nydalsveien 37, 0442 OSLO, Norway. E-mail: kai.leitemo@bi.no, tel: +47 99550219.

1 Introduction

A large literature using VAR models to estimate the monetary transmission mechanism assumes that monetary policy shocks can be identified as the deviations of the instrument from an estimated policy rule. This type of identification is often plagued by a so-called "price puzzle": the VAR models suggest that prices tend to increase after a contractionary monetary policy shock (see Sims (1992) and Eichenbaum (1992)). In this paper we argue that one possible explanation for the price puzzle is that the standard identification schemes ignore the presence of persistent shocks to the underlying inflation target. If such shocks are prevalent, an exogenous change in the nominal interest rate can either be due to changes to inflation expectations caused by changes to the inflation target or to temporary monetary policy shocks. The monetary policy shock identified by the recursive identification scheme then represents a mixture of the transitory shock and the shock to the inflation target.¹ If the latter is sufficiently important, the identified shock will produce a "price puzzle" because it is partly contaminated by the shock to the inflation target that produces a price "puzzle" that is no puzzle at all.

Several other explanations for the price puzzle have been proposed in the literature. Sims (1992) called for the use of non-borrowed and borrowed reserves in the VAR model along with a commodity price index. Hanson (2004), investigating different commodity price indices, shows that this approach does not solve the price puzzle in pre-1979 data: there is still a significant increase in prices up to 18 months after a contractionary monetary policy shock. For the post-1982 period, there is no *significant* increase in prices, however, point estimates of the price level response tend to stabilize at a level that is higher than before the contractionary monetary policy shock. Barth and Ramey (2001) and Chowdhury et al. (2006) argue that the price puzzle is not really a puzzle, but reflects the increase in prices due to higher borrowing costs caused by the increase in the interest rate. Giordani (2004) suggests that the price puzzle is due to the VAR model not including a measure of potential output or the output gap. The price puzzle is hence a sign of model misspecification and is therefore distantly related to our explanation.

Section 2 presents a New Keynesian macro model which obeys the recursive contemporary restrictions often used to identify monetary policy in VAR models, but allows for both persistent (changes to the inflation target) and transitory (deviations from the reaction function) shocks to monetary policy. We derive the analytical solution to a simplified version of this model and show the effects of these shocks. In Section 3 we generate artificial data from the theoretical model,

¹See Smets and Wouters (2003), Ireland (2007), Melecky et al. (2008) and Bjørnland and Leitemo (2007) for studies that differentiate between the two monetary policy shocks.

estimate a VAR model on the artificial data and show how a "price puzzle" may appear when the standard recursive identification scheme. Section 4 concludes.

2 A simple theory model

We consider the New Keynesian model with implementation lags (of order j) in pricing and consumption decisions. The model is then given by

$$\begin{aligned}\pi_t &= \beta E_{t-j} \pi_{t+1} + \gamma E_{t-j} x_t + \varepsilon_t \\ x_t &= E_{t-j} x_{t+1} - \sigma^{-1} (E_{t-j} \dot{i}_t - E_{t-j} \pi_{t+1} - \tilde{r}_t)\end{aligned}$$

where π is inflation, x is the output gap, i is the nominal interest rate, β is the discount factor and E_{t-j} is the expectations operator conditional on information in period $t-j$. We assume that the cost-push shock (ε_t) and the natural rate shock (\tilde{r}_t) follow AR(1) processes, i.e.,

$$\begin{aligned}\varepsilon_{t+1} &= \rho_\varepsilon \varepsilon_t + \hat{\varepsilon}_{t+1}, \\ \tilde{r}_{t+1} &= \rho_{\tilde{r}} \tilde{r}_t + \hat{r}_{t+1}.\end{aligned}$$

The model is closed by a rule for the interest rate,

$$i_t = \rho_i i_{t-1} + (1 - \rho_i) (E_t \pi_{t+1} + \theta_\pi [E_t \pi_{t+1} - \pi_t^*]) + m_t,$$

which is a forward-looking "inflation targeting" rule with interest-rate smoothing (see Clarida et al. (2000) and Bernanke and Gertler (2001)). The processes for the inflation target and the transitory monetary policy shock are, respectively,

$$\begin{aligned}\pi_{t+1}^* &= \rho_\pi \pi_t^* + \hat{\pi}_{t+1}, \text{ and} \\ m_{t+1} &= \rho_m m_t + \hat{m}_{t+1}.\end{aligned}$$

2.1 The analytical solution

In order to elicit the impulse responses to the monetary policy shocks we solve a version of the model analytically. Since the intermediate-length impulse responses to the model do not depend on the implementation lags or the smoothing parameter in the Taylor rule, we set $j = 1$ and $\rho_i = 0$

in order to make the problem tractable.

The equilibrium solution takes the form

$$\begin{aligned}\pi_{t+1} &= \phi_\varepsilon \varepsilon_t + \phi_r r_t + \phi_\pi \pi_t^* + \phi_m m_t + \hat{\varepsilon}_{t+1}, \\ x_{t+1} &= v_\varepsilon \varepsilon_t + v_r r_t + v_\pi \pi_t^* + v_m m_t + \sigma^{-1} \hat{r}_{t+1}.\end{aligned}$$

The values of the coefficients can be determined by the minimal state variable solution method and are given by

$$\begin{aligned}\phi_\varepsilon &= \frac{(1 - \rho_\varepsilon)}{A_\varepsilon} > 0, \quad v_\varepsilon = \frac{-\sigma^{-1} \theta_\pi}{A_\varepsilon} < 0, \quad \phi_r = \frac{\gamma \sigma^{-1}}{A_r} > 0, \quad v_r = \frac{(1 - \beta \rho_r) \sigma^{-1}}{A_r} > 0, \\ \phi_\pi &= \frac{\gamma \sigma^{-1} \theta_\pi}{A_\pi \rho_\pi} > 0, \quad v_\pi = \frac{(1 - \beta \rho_\pi) \sigma^{-1} \theta_\pi}{A_\pi \rho_\pi} > 0, \quad \phi_m = \frac{-\gamma \sigma^{-1}}{\rho_m (1 - \beta \rho_m) (1 - \rho_m) + \gamma \sigma^{-1} \theta_\pi} < 0, \\ v_m &= \frac{-(1 - \beta \rho_m) \sigma^{-1}}{\rho_m (1 - \beta \rho_m) (1 - \rho_m) + \gamma \sigma^{-1} \theta_\pi} < 0,\end{aligned}$$

where $A_n \equiv (1 - \beta \rho_n) (1 - \rho_n) + \gamma \sigma^{-1} \theta_\pi$ and $n \in \{\varepsilon, r, \pi\}$. The equilibrium condition for the interest rate takes the form

$$i_t = \eta_\varepsilon \varepsilon_t + \eta_r r_t + \eta_\pi \pi_t^* + \eta_m m_t,$$

where

$$\begin{aligned}\eta_\varepsilon &= \frac{(\rho_\varepsilon + \theta_\pi) (1 - \rho_\varepsilon)}{A_\varepsilon} > 0, \\ \eta_r &= \frac{(\rho_r + \theta_\pi) \gamma \sigma^{-1}}{A_r} > 0, \\ \eta_\pi &= \frac{\theta_\pi (\rho_\pi \gamma \sigma^{-1} - (1 - \beta \rho_\pi) (1 - \rho_\pi))}{A_\pi}, \\ \eta_m &= \frac{(1 - \rho_m) (1 - \beta \rho_m) - \rho_m \gamma \sigma^{-1}}{A_m}.\end{aligned}$$

To determine the signs of η_π and η_m , the coefficients on the shocks to inflation target and the transitory shock in the reaction function, we consider the case where $\rho_\pi \rightarrow 1$ and $\rho_m = 0$, i.e., the shock to the inflation target is permanent (approaches a random walk) and the transitory shock is white noise. Under these assumptions, we have that

$$\begin{aligned}\eta_\pi|_{\rho_\pi \rightarrow 1} &= 1 > 0, \\ \eta_m|_{\rho_m \rightarrow 0} &= \frac{1}{1 + \gamma \sigma^{-1} \theta_\pi} > 0.\end{aligned}$$

The model predicts that realizations of the monetary policy shocks that move the interest rate

in the same direction, will produce opposite effects on inflation and output. An increase in the nominal interest rate caused by an increase in the inflation target will cause inflation and output to increase, whereas a contractionary temporary shock will lower inflation and output.

This result illustrates that aggregating the two shocks is indeed problematic since the shocks have different quantitative and qualitative properties. An identification scheme that do not distinguish between the two shocks will identify a shock that is a mix of the two underlying shocks, potentially producing "puzzling" results.

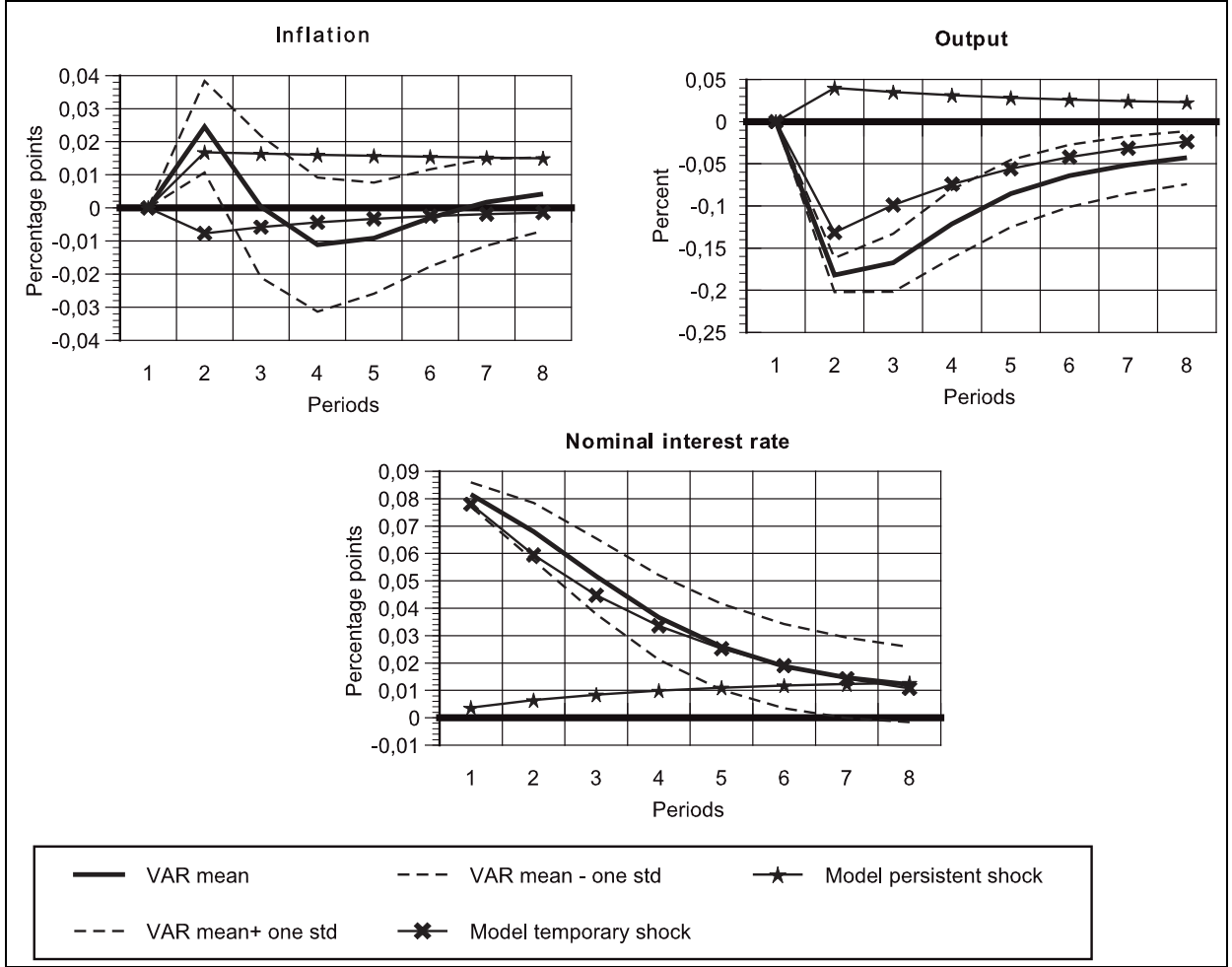
3 A simulation experiment

To illustrate our point we conduct a simple simulation experiment. We generate artificial datasets for inflation, the output gap and the nominal interest rate from the theory model, estimate a VAR on the artificial data and compute the impulse responses to a monetary policy shock using a standard recursive identification scheme. Specifically, we identify the monetary policy shock by placing the interest rate last in a recursive ordering of the variables and use a Choleski decomposition of the estimated variance-covariance matrix of the residuals to recover the impact matrix of the shocks. This identification scheme implies that the nominal interest rate can respond to contemporaneous shocks to inflation and the output gap, while the output gap can respond to contemporaneous shocks in inflation alone. Inflation is assumed not to respond to contemporaneous shocks neither to the interest rate nor to the output gap. Importantly, this identification scheme is consistent with the underlying theoretical model. We set the parameters in the IS- and Phillips curves² to $\gamma = 0.015$, $\beta = 0.99$, $\sigma = 2$, $\rho_\varepsilon = \rho_{\bar{r}} = 0.65$, $\sigma_{\varepsilon} = 0.16$ and $\sigma_{\bar{r}} = 0.30$. which do not seem a priori unreasonable. The parameters in the reaction function are $\theta_\pi = 0.75$ and $\rho_i = 0.78$. Finally, we set $\rho_\pi = 0.99$, $\rho_m = 0.01$, $\sigma_{\hat{\pi}} = 0.017$ and $\sigma_{\hat{m}} = 0.081$ for the processes governing the monetary policy shocks. The standard deviations of the two monetary policy shocks correspond to the estimated posterior mode in Smets and Wouters (2003).

We simulate 1000 datasets consisting of 180 observations from the theory model and estimate a VAR in inflation, the output gap and the nominal interest rate with two lags. The impulse responses from the model are shown in Figure 1. We see from the figure that the VAR model produces a price puzzle in the sense that inflation increases in the first few periods after the shock and then falls. The failure to properly identify the transitory monetary policy shock does not affect the ability of the VAR to identify the effect of the temporary monetary policy shock on the output

²Although the Phillips curve is specified as fully forward looking, we obtain similar results if the model is 'hybrid' and is moderately backward-looking. Cogley and Sbordone (2006) argue, however, that once accounting for changes in the inflation target, the Phillips curve is best described as being fully forward-looking.

Figure 1
Impulse response functions.



The figure shows the impulse responses from the identified monetary policy shock in the VAR model (with one standard deviation bands) and the temporary and persistent monetary policy shocks from the theoretical model.

gap and the interest rate in any significant way. Hence, our explanation for the price puzzle does not imply any other puzzles.

4 Conclusion

We suggest that the presence of a "price puzzle" in VAR models of the monetary transmission mechanism could be due to a failure to differentiate between temporary deviations from the interest rule and persistent changes in the underlying inflation target. An important goal for future research is to present a identification scheme that takes into account the very different propagation mechanisms of the two shocks. A possible solution is to take advantage of the different response of the term structure of interest rates to the two shocks.

References

- Barth, Marvin J., and Valerie A. Ramey, 2001, The cost channel of monetary transmission, in: Ben S. Bernanke, Kenneth Rogoff, eds, NBER Macroeconomic Annual, MIT Press Cambridge, MA 199–239.
- Bernanke, Ben S., and Mark Gertler, 2001, Should central banks respond to movements in asset prices?, *American Economic Review* 91 (2), 253–57.
- Bjørnland, Hilde C., and Kai Leitemo, 2007, Estimating the natural rates in the new keynesian framework, manuscript, Norwegian School of Management BI. Available at <http://www.economics.no/>.
- Chowdhury, Ibrahim, Mathias Hoffmann, and Andreas Schabert, 2006, Inflation dynamics and the cost channel of monetary transmission, *European Economic Review* 50, 995–1016.
- Clarida, Richard, Jordi Gali, and Mark Gertler, 2000, Monetary policy rules and macroeconomic stability: Evidence and some theory, *Quarterly Journal of Economics* 115:1, 147–80.
- Cogley, Timothy, and Argia M. Sbordone, 2006, Trend inflation and inflation persistence in the new keynesian phillips curve, Federal Reserve Bank of New York Staff Reports no 270, forthcoming in the *American Economic Review*.
- Eichenbaum, M., 1992, Comments on 'interpreting the macroeconomic time series facts: The effects of monetary policy', *European Economic Review* 36(5), 1001–1011.
- Giordani, Paolo, 2004, An alternative explanation of the price puzzle, *Journal of Monetary Economics* 51, 1271–1296.
- Hanson, Michael S., 2004, The "prize puzzle reconsidered, *Journal of Monetary Economics* 51, 1385–1413.
- Ireland, Peter N., 2007, Changes in the federal reserve's inflation target: Causes and consequences, *Journal of Money, Credit and Banking*.
- Melecky, Martin, Diego Rodríguez Palenzuela, and Ulf Söderström, 2008, Inflation target transparency and the macroeconomy, in: Klaus Schmidt-Hebbel, Carl E. Walsh, eds, *Monetary Policy under Uncertainty and Learning*, Central Bank of Chile.
- Sims, Christopher, 1992, Interpreting the macroeconomic time series facts: The effects of monetary policy, *European Economic Review* 36(5), 975–1000.

Smets, Frank, and Rafael Wouters, 2003, An estimated dynamic stochastic general equilibrium model of the euro area, *Journal of the European Economic Association* 1, 1123–1175.

WORKING PAPERS (ANO) FROM NORGES BANK 2005-2008

Working Papers were previously issued as Arbeidsnotater from Norges Bank, see Norges Bank's website <http://www.norges-bank.no>

- 2005/1 Q. Farooq Akram
*Efficient consumption of revenues from natural resources –
An application to Norwegian petroleum revenues* Research Department, 33 p
- 2005/2 Q. Farooq Akram, Øyvind Eitrheim and Lucio Sarno
*Non-linear dynamics in output, real exchange rates and real money balances: Norway, 1830-
2003* Research Department, 53 p
- 2005/3 Carl Andreas Claussen and Øistein Røisland
Collective economic decisions and the discursive dilemma Monetary Policy Department, 21 p
- 2005/4 Øistein Røisland
Inflation inertia and the optimal hybrid inflation/price level target
Monetary Policy Department, 8 p
- 2005/5 Ragna Alstadheim
Is the price level in Norway determined by fiscal policy? Research Department, 21 p
- 2005/6 Tommy Sveen and Lutz Weinke
Is lumpy investment really irrelevant for the business cycle? Research Department, 26 p
- 2005/7 Bjørn-Roger Wilhelmsen and Andrea Zaghini
Monetary policy predictability in the euro area: An international comparison
Economics Department, 28 p
- 2005/8 Moshe Kim, Eirik Gaard Kristiansen and Bent Vale
What determines banks' market power? Akerlof versus Herfindahl Research Department, 38 p
- 2005/9 Q. Farooq Akram, Gunnar Bårdsen and Øyvind Eitrheim
Monetary policy and asset prices: To respond or not? Research Department, 28 p
- 2005/10 Eirik Gard Kristiansen
Strategic bank monitoring and firms' debt structure Research Department, 35 p
- 2005/11 Hilde C. Bjørnland
Monetary policy and the illusionary exchange rate puzzle Research Department, 30 p
- 2005/12 Q. Farooq Akram, Dagfinn Rime and Lucio Sarno
Arbitrage in the foreign exchange market: Turning on the microscope
Research Department, 43 p
- 2005/13 Geir H. Bjønnes, Steinar Holden, Dagfinn Rime and Haakon O.Aa. Solheim
"Large" vs. "small" players: A closer look at the dynamics of speculative attacks
Research Department, 31 p
- 2005/14 Julien Garnier and Bjørn-Roger Wilhelmsen
The natural real interest rate and the output gap in the euro area: A joint estimation
Economics Department, 27 p
- 2005/15 Egil Matsen
Portfolio choice when managers control returns Research Department, 31 p
- 2005/16 Hilde C. Bjørnland
Monetary policy and exchange rate interactions in a small open economy
Research Department, 28 p
- 2006/1 Gunnar Bårdsen, Kjersti-Gro Lindquist and Dimitrios P. Tsomocos
Evaluation of macroeconomic models for financial stability analysis
Financial Markets Department, 45 p

- 2006/2 Hilde C. Bjørnland, Leif Brubakk and Anne Sofie Jore
Forecasting inflation with an uncertain output gap Economics Department, 37 p
- 2006/3 Ragna Alstadheim and Dale Henderson
Price-level determinacy, lower bounds on the nominal interest rate, and liquidity traps
Research Department, 34 p
- 2006/4 Tommy Sveen and Lutz Weinke
Firm-specific capital and welfare Research Department, 34 p
- 2006/5 Jan F. Qvigstad
When does an interest rate path „look good“? Criteria for an appropriate future interest rate path Norges Bank Monetary Policy, 20 p
- 2006/6 Tommy Sveen and Lutz Weinke
Firm-specific capital, nominal rigidities, and the Taylor principle Research Department, 23 p
- 2006/7 Q. Farooq Akram and Øyvind Eitrheim
Flexible inflation targeting and financial stability: Is it enough to stabilise inflation and output? Research Department, 29 p
- 2006/8 Q. Farooq Akram, Gunnar Bårdsen and Kjersti-Gro Lindquist
Pursuing financial stability under an inflation-targeting regime Research Department, 29 p
- 2006/9 Yuliya Demyanyk, Charlotte Ostergaard and Bent E. Sørensen
U.S. banking deregulation, small businesses, and interstate insurance of personal income
Research Department, 57 p
- 2006/10 Q. Farooq Akram, Yakov Ben-Haim and Øyvind Eitrheim
Managing uncertainty through robust-satisficing monetary policy Research Department, 33 p
- 2006/11 Gisle James Natvik:
Government spending and the Taylor principle Research Department, 41 p
- 2006/12 Kjell Bjørn Nordal:
Banks' optimal implementation strategies for a risk sensitive regulatory capital rule: a real options and signalling approach Research Department, 36 p
- 2006/13 Q. Farooq Akram and Ragnar Nymoen
Model selection for monetary policy analysis – importance of empirical validity
Research Department, 37 p
- 2007/1 Steinar Holden and Fredrik Wulfsberg
Are real wages rigid downwards? Research Department, 44 p
- 2007/2 Dagfinn Rime, Lucio Sarno and Elvira Sojli
Exchange rate forecasting, order flow and macroeconomic information
Research Department, 43 p
- 2007/3 Lorán Chollete, Randi Næs and Johannes A. Skjeltorp
What captures liquidity risk? A comparison of trade and order based liquidity factors
Research Department, 45 p
- 2007/4 Moshe Kim, Eirik Gaard Kristiansen and Bent Vale
Life-cycle patterns of interest rate markups in small firm finance Research Department, 42 p
- 2007/5 Francesco Furlanetto and Martin Seneca
Rule-of-thumb consumers, productivity and hours Research Department, 41 p
- 2007/6 Yakov Ben-Haim, Q. Farooq Akram and Øyvind Eitrheim
Monetary policy under uncertainty: Min-max vs robust-satisficing strategies
Research Department, 28 p

- 2007/7 Carl Andreas Claussen and Øistein Røisland
Aggregating judgments on dependent variables: an (im)possibility result
Research Department, 17 p
- 2007/8 Randi Næs, Johannes Skjeltorp og Bernt Arne Ødegaard
Hvilke faktorer driver kursutviklingen på Oslo Børs?
Forskningsavdelingen, 68 s
- 2007/9 Knut Are Astveit and Tørres G. Trovik
Nowcasting Norwegian GDP: The role of asset prices in a small open economy
Research Department, 29 p
- 2007/10 Hilde C. Bjørnland, Kai Leitemo and Junior Maih
Estimating the natural rates in a simple new Keynesian framework
Economics Department, 33 p
- 2007/11 Randi Næs and Bernt Arne Ødegaard
Liquidity and asset pricing: Evidence on the role of investor holding period
Research Department, 31 p
- 2007/12 Ida Wolden Bache
Assessing estimates of the exchange rate pass-through
Research Department, 60 p
- 2007/13 Q. Farooq Akram
What horizon for targeting inflation?
Research Department, 45 p
- 2007/14 Q. Farooq Akram, Yakov Ben-Haim and Øyvind Eitrheim
Robust-satisficing monetary policy under parameter uncertainty
Research Department, 33 p
- 2007/15 Ida Wolden Bache and Bjørn E. Naug
Estimating New Keynesian import price models
Research Department, 40 p
- 2008/1 Anne Sofie Jore, James Mitchell and Shaun P. Vahey
Combining forecast densities from VARs with uncertain instabilities
Economics Department, 26 p
- 2008/2 Henrik Andersen
Failure prediction of Norwegian banks: A logit approach
Financial Markets Department, 49 p
- 2008/3 Lorán Chollete, Randi Næs and Johannes A. Skjeltorp
The risk components of liquidity
Research Department, 28 p
- 2008/4 Hilde C. Bjørnland and Kai Leitemo
Identifying the interdependence between US monetary policy and the stock market
Economics Department, 28 p
- 2008/5 Christian Kascha and Karel Mertens
Business cycle analysis and VARMA models
Research Department, 40 p
- 2008/6 Alan S. Blinder
On the design of Monetary policy committees
Norges Bank Monetary Policy, 22 p
- 2008/7 Francesco Furlanetto
Does monetary policy react to asset prices? Some international evidence
Research Department, 44 p
- 2008/8 Christian Huerfman, Francesco Ravazzolo and Chen Zhou
The power of weather. Some empirical evidence on predicting day-ahead power prices through weather forecasts
Research Department, 28 p
- 2008/9 Randi Næs, Johannes A. Skjeltorp and Bernt Arne Ødegaard
Liquidity at the Oslo Stock Exchange
Research Department, 49 p
- 2008/10 Francesco Furlanetto and Martin Seneca
Fiscal shocks and real rigidities
Research Department, 41 p

- 2008/11 Randi Næs, Johannes A. Skjeltop and Bernt Arne Ødegaard
Liquidity and the business cycle Research Department, 45 p
- 2008/12 Q. Farooq Akram
Commodity prices, interest rates and the dollar Research Department, 33 p
- 2008/13 Henrik Andersen, Sigbjørn Atle Berg and Eilev S. Jansen
The dynamics of operating income in the Norwegian banking sector
Financial Markets Department, 27 p
- 2008/14 Lars Fredrik Øksendal
Monetary policy under the gold standard – examining the case of Norway, 1893-1914
Norges Bank's bicentenary project, 103 p
- 2008/15 Hilde C. Bjørnland and Jørn I. Halvorsen
How does monetary policy respond to exchange rate movements? New international evidence
Research Department, 45 p
- 2008/16 Hilde C. Bjørnland
Oil price shocks and stock market booms in an oil exporting country
Research Department, 37 p
- 2008/17 Özer Karagedikli, Troy Matheson, Christie Smith and Shaun Vahey
RBCs and DSGEs: The computational approach to business cycle theory and evidence
Economics Department, 36 p
- 2008/18 Ida Wolden Bache and Kai Leitemo
The price puzzle: Mixing the temporary and permanent monetary policy shocks
Monetary Policy Department, 12 p

KEYWORDS:

Monetary policy shocks

VAR modelling

Identification

Price puzzle