Universität St.Gallen

Announcements of Interest Rate Forecasts: Do Policymakers Stick to Them?

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Motivation

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

Past announcements might constrain future policy if:

- markets interpret forecasts as commitments to future action
  - Mishkin (2004), Kohn (2008)
- central banks value the predictability of policy
  - Svensson (2009), Geraats (2009), Goodhart (2009), Gersbach and Hahn (2011)

The big question:

- Do policymakers *actually* adhere to their forecasts?

Our Approach

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

- Derive the policy rule for a “forecast adhering” central bank
  - Deviations from previous forecasts are costly
- The rule can nest a broad range of interest rate rules
  - “Preferred” policy stance
- Fit the actual policy rates of:
  - The Reserve Bank of New Zealand
  - The Central Bank of Norway

Main Findings

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

Policymakers appear constrained by their most recent forecasts (1-quarter-ahead forecasts).

We model the preferred policy rate using the estimated rules:

- Institution-specific policy rules
- Clarida, Galí and Gertler (1998)
- “Calvo rule” of Levine, McAdam and Pearlman (2007)

But also using the front-end of the interest rate path:

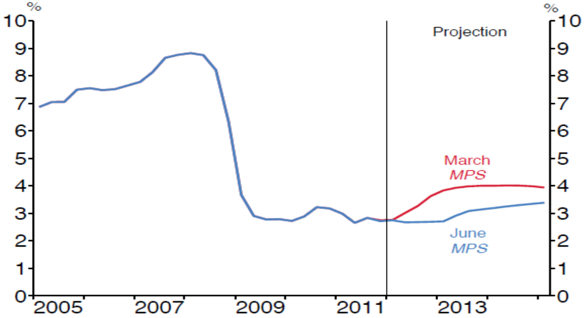
- Announced interest rate “nowcasts”

How do Forecasts get Published?
RBNZ

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

Example from June 2012

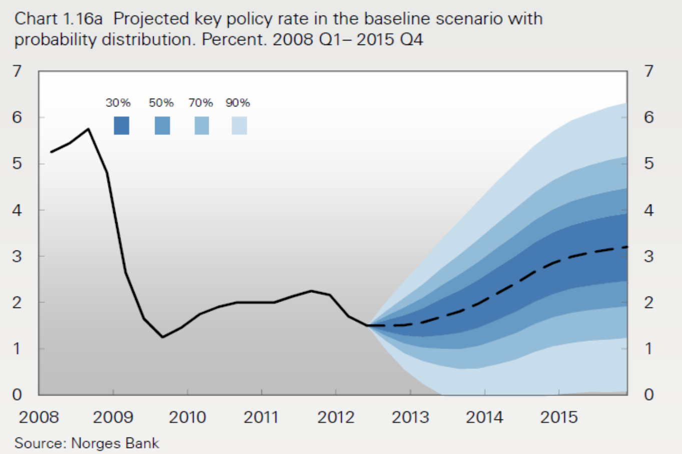
Figure 2.5
90-day interest rate



Source: RBNZ estimates.

How do Forecasts get Published?
Norges Bank

Example from June 2012



Model of Interest Rate Adherence

Loss Function

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

The central bank sets i_t, $i^p_{t,t+s}$ and $i^p_{t,t+l}$ to minimize:

$$\mathcal{L}_t = \frac{1}{2} E_t \sum_{k=0}^{\infty} \delta^k \left[\left(i_{t+k} - i^*_{t+k}\right)^2 \right]$$

Model of Interest Rate Adherence
Loss Function

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

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Model of Interest Rate Adherence
Loss Function

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Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

Model of Interest Rate Adherence
Loss Function

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

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FOC for the optimal interest rate i_t:

$$\begin{array}{c} i_t - i^*_t - E_t \sum_{k=0}^{\infty} \delta^k \left[\left(i_{t+k} - i^*_{t+k}\right) \frac{\partial i^*_{t+k}}{\partial i_t} \right] \\ +\varphi\left(i_t - i_{t-1}\right) - \delta\varphi\left(E_t i_{t+1} - i_t\right) \\ +\kappa_s \left(i_t - i^p_{t-s,t}\right) + \kappa_l \left(i_t - i^p_{t-l,t}\right) = 0 \end{array}$$

Model of Interest Rate Adherence

Loss Function

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

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FOC for the optimal interest rate i_t:

$$\begin{array}{c} i_t - i^*_t - E_t \sum_{k=0}^{\infty} \delta^k \left[\left(i_{t+k} - i^*_{t+k}\right) \frac{\partial i^*_{t+k}}{\partial i_t} \right] \\ +\varphi \left(i_t - i_{t-1}\right) - \delta\varphi \left(E_t i_{t+1} - i_t\right) \\ +\kappa_s \left(i_t - i^p_{t-s,t}\right) + \kappa_l \left(i_t - i^p_{t-l,t}\right) = 0 \end{array}$$

FOC for the optimal interest rate $i^p_{t,t+j}$ for $j = s, l$:

$$\kappa_j \delta^j \left(E_t i_{t+j} - i^p_{t,t+j}\right) = 0$$

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

Testable Reaction Function:

$$i_t = \Omega^* \begin{bmatrix} 1 & \varphi & \delta\varphi & \kappa_s & \kappa_l \end{bmatrix} \begin{bmatrix} i_t^* \\ i_{t-1} \\ E_t i_{t+1} \\ i_{t-s,t}^p \\ i_{t-l,t}^p \end{bmatrix}$$

where:

$$\Omega^* = \frac{1}{1 + \varphi(1+\delta) + \kappa_s + \kappa_l}$$

Setting $\delta = \kappa_s = \kappa_l = 0$ in (1) yields the Clarida et al. (1998) rule:

$$i_t = \Omega^\varphi i_t^* + (1 - \Omega^\varphi) i_{t-1}$$

where:

$$\Omega^\varphi = \frac{1}{1 + \varphi}$$

Specifications of the Policy Rules

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

- Institution-specific interest rate rules
- Clarida, Galí, Gertler (1998) - CGG
- Levine, McAdam and Pearlman (2007) - “Calvo” rule

Testing for the "Forecast Adherence"

Estimation

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

WLOG we estimate:

$$i_t = \Omega^* \begin{bmatrix} 1 & \varphi & \delta\varphi & \kappa_s & \kappa_l \end{bmatrix} \begin{bmatrix} \gamma^\pi E_t \pi_{t+1} + \gamma^y E_t y_{t+1} \\ i_{t-1} \\ E_t i_{t+1} \\ i^p_{t-s,t} \\ i^p_{t-l,t} \end{bmatrix} + \varepsilon^i_t$$

where ε^i_t is an AR(1) process in line with Rudebusch (2002):

$$\varepsilon^i_t = \lambda \varepsilon^i_{t-1} + \zeta_t$$

and $\zeta_t \sim N(0, \sigma^\zeta)$

Estimated Policy Rules (1Q-ahead Forecasts)

RBNZ from 1999 - 2011

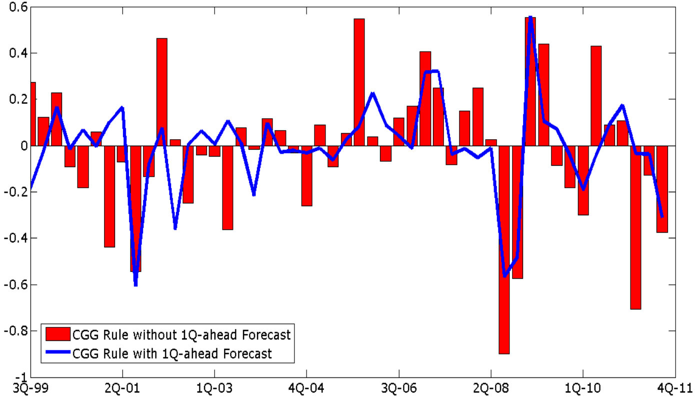
Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

	KITT		CGG		Calvo	
	-	$s = 1$	-	$s = 1$	-	$s = 1$
γ^{π}	3.356	4.450	3.754	6.294	2.330	0.861
	(2.442)	(1.803)	(3.740)	(0.158)	(2.333)	(1.092)
γ^{y}			1.619	1.455	1.001	0.342
			(1.209)	(0.543)	(1.559)	(0.709)
φ	2.237	1.848	5.084	4.454	3.071	3.026
	(8.641)	(2.026)	(1.611)	(8.502)	(1.751)	(1.952)
δ					0.109	0.266
					(0.204)	(1.941)
κ_s		**1.157**		**2.612**		**3.637**
		(3.388)		(6.274)		(2.062)
λ	0.896	0.378	0.607	0.446	0.608	0.168
	(3.020)	(1.033)	(1.101)	(0.302)	(2.325)	(0.806)

Residuals from the Clarida et al. (1998) rule

RBNZ

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion



Example: 2Q-2002

Estimated Policy Rules (1Q-ahead Forecasts)

Norges Bank from 2005 - 2011

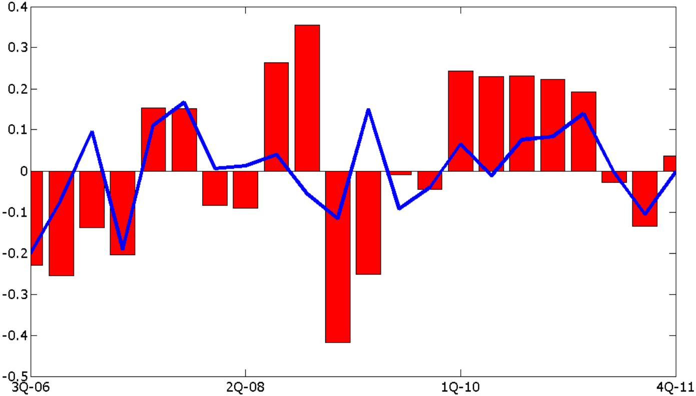
Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

	B		CGG		Calvo	
	-	$s = 1$	-	$s = 1$	-	$s = 1$
γ^{π}	0.453	3.054	1.369	5.887	0.645	0.586
	(0.803)	(1.180)	(1.386)	(4.556)	(0.825)	(1.120)
γ^{int}	0.822	0.327				
	(2.924)	(0.232)				
γ^{w}	0.345	3.647				
	(0.594)	(1.983)				
γ^{y}	0.584	3.831	0.961	6.110	0.695	0.526
	(2.570)	(2.532)	(2.943)	(5.819)	(3.026)	(3.021)
φ	0.370	5.961	0.627	7.866	0.560	1.071
	(3.395)	(1.734)	(1.887)	(2.854)	(2.243)	(6.831)
δ					0.495	1.056
					(1.597)	(5.825)
κ_s		**5.527**		**5.973**		**0.746**
		(3.311)		(8.322)		(7.407)
λ	0.898	0.253	0.367	0.280	0.389	0.440
	(2.865)	(0.376)	(0.437)	(0.949)	(0.658)	(0.803)

Residuals from the Clarida et al. (1998) rule

Norges Bank

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion



Longer-Term Forecasts

RBNZ from 1999 - 2011 (1Q & 2Q Forecasts)

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

	KITT	CGG	Calvo
	$s=1, l=2$	$s=1, l=2$	$s=1, l=2$
γ^{π}	1.975	5.341	0.934
	(1.007)	(0.752)	(2.070)
γ^{y}		1.350	0.350
		(0.516)	(0.827)
φ	1.807	4.230	3.002
	(3.066)	(2.668)	(3.028)
δ			0.274
			(2.233)
κ_s	**2.400**	**3.474**	**3.781**
	(2.885)	(2.436)	(2.272)
κ_l	-0.240	-1.504	-0.272
	(-1.049)	(-0.484)	(-0.670)
λ	-0.162	0.233	-0.111
	(-0.334)	(0.240)	(-0.223)

Longer-Term Forecasts

Norges Bank from 2005 - 2011 (1Q & 2Q Forecasts)

	B	CGG	Calvo
	$s=1, l=2$	$s=1, l=2$	$s=1, l=2$
γ^{π}	0.721	3.883	0.597
	(1.181)	(4.489)	(1.591)
γ^{int}	0.057		
	(0.207)		
γ^{w}	0.796		
	(1.774)		
γ^{y}	0.813	3.790	0.512
	(2.816)	(4.073)	(3.024)
φ	1.313	5.016	1.056
	(2.165)	(2.989)	(6.201)
δ			1.035
			(6.391)
κ_s	**0.550**	**1.574**	**0.525**
	(2.028)	(5.231)	(2.835)
κ_l	-0.107	1.847	0.178
	(-0.365)	(1.443)	(0.993)
λ	0.263	0.285	0.434
	(0.295)	(0.647)	(0.537)

Preferred Policy Rate
Using the Announced Interest Rate "Nowcasts"

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

Issue 1: Interest rate rules as a simple description of the actual policy conduct:

- Omitted variable problem
- Judgment

Preferred Policy Rate

Using the Announced Interest Rate “Nowcasts”

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

Issue 1: Interest rate rules as a simple description of the actual policy conduct:

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Issue 2: What if the 1-quarter-ahead forecasts are simply “good” forecasts of the policy rate?

Preferred Policy Rate

Using the Announced Interest Rate "Nowcasts"

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

Issue 1: Interest rate rules as a simple description of the actual policy conduct:

- Omitted variable problem
- Judgment

Issue 2: What if the 1-quarter-ahead forecasts are simply "good" forecasts of the policy rate?

Use the "nowcasts" as the preferred policy rate.

We estimate:

$$i_t = \widetilde{\Omega}\widetilde{i}_t + \widetilde{\varkappa}_1 i^p_{t-1,t} + \varepsilon_t$$

or

$$i_t = \widetilde{\Omega}\widetilde{i}_t + \widetilde{\varkappa}_1 \varepsilon^{p,1}_t + \varepsilon_t$$

Preferred Policy Rate

Using the Announced Interest Rate “Nowcasts” (cont’d)

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

	RBNZ		Norges Bank	
	$i^p_{t,t+1}$	$\varepsilon^{p,1}_t$	$i^p_{t,t+1}$	$\varepsilon^{p,1}_t$
$\widetilde{\Omega}$	1.065	1.001	0.875	1.010
	(2.545)	(0.404)	-(1.667)	(2.301)
$\widetilde{\varkappa}_1$	**-0.063**	**0.108**	**0.133**	0.018
	-(2.594)	(2.264)	(1.681)	(1.601)
DW Statistic	1.548	1.715	1.723	2.207
Adjusted R^2	0.998	0.998	0.994	0.993
N.Obs.	55	55	24	24

Robustness Checks

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

- Does our empirical strategy “cry wolf”? Type I Error
- Avoiding policy surprises Policy Surprises
- Sub-sample analysis for the RBNZ Sub-Samples

Conclusion

Summary
Data
Interest Rate Forecasts
Model
Loss Function
Policy Rules
Estimation
Results
RBNZ
Norges Bank
Long-Term Forecasts
Preferred Rate
Robustness Checks
Conclusion

Key finding:

- Policymakers appear constrained by their forecasts (1Q-ahead forecasts)

Future research:

- What are the **normative aspects** of the constraint?
  - Monetary policy less responsive
  - Announced forecasts as a commitment tool (Gersbach and Hahn, 2011; Woodford, 2012)
- Measure adherence by using **interest rate forecasts** only

Summary

Data
- Interest Rate Forecasts

Model
- Loss Function
- Policy Rules
- Estimation

Results
- RBNZ
- Norges Bank
- Long-Term Forecasts
- Preferred Rate
- Robustness Checks

Conclusion

Thank you for attention.

What Happened in 2Q of 2002?
RBNZ

Recommendations from the policy rules:

- CGG suggests 4.91
- CGG augmented with the 1Q-ahead forecast suggests 5.25

	Change	Policy rate	1Q-ahead Forecast
20th March 2002		5.00	**5.41**
17th April 2002	+0.25	5.25	
15th May 2002	+0.25	5.50	

back

New Keynesian Model

Does Our Empirical Strategy “Cry Wolf”?

Simulate data from the standard New Keynesian model of Gersbach and Hahn (2011)

- Phillips curve

$$\pi_t = \delta E_t[\pi_{t+1}] + \lambda y_t + \chi_t$$

- Cost-push shock as an AR(1)

$$\chi_t = \rho_\chi \chi_{t-1} + \varepsilon_t^\chi$$

- Dynamic IS curve

$$y_t = E_t[y_{t+1}] + \sigma\left(i_t - E_t[\pi_{t+1}]\right) + \omega_t,$$

- Demand shock as an AR(1)

$$\omega_t = \rho_\omega \omega_{t-1} + \varepsilon_t^\omega$$

New Keynesian Model (cont'd)

Does Our Empirical Strategy "Cry Wolf"?

- Central Bank's loss function

$$\mathcal{L}_t = \frac{1}{2} E_t \sum_{k=0}^{\infty} \delta^j \left[\begin{array}{c} \pi_{t+k}^2 + a y_{t+k}^2 \\ +b(\pi_{t+k} - \pi_{t-1+k,t+k}^P)^2 \\ +c(i_{t+k} - i_{t-1+k,t+k}^P)^2 \end{array} \right]$$

Calibration	
NK Phillips Curve:	$\delta = 0.99$
	$\lambda = 0.3$
IS curve:	$\sigma = 1$
Cost-Push Shock:	$\rho_\chi = 0.9$
	$\sigma_\chi = 1$
Demand Shock:	$\rho_\omega = 0.9$
	$\sigma_\omega = 1$
Loss-Function:	$a = 0.3$
	$b = 0.2$

Estimated Policy Rules for Different “c”

Does Our Empirical Strategy “Cry Wolf”?

Simulate: 3,000 samples of 60 data points

Estimate: $i_t^{sim} = \gamma^{\pi} \pi_t^{sim} + \rho_1 i_{t-1,t}^{P,sim} + \vartheta_t$ (misspecified)

	$c = 10^{-}7$		$c = 0.1$		$c = 0.2$	
	without	with	without	with	without	with
γ^{π}	0.715	0.716	0.639	0.637	0.578	0.570
	(5.844)	(5.792)	(5.741)	(5.656)	(5.135)	(5.064)
ρ_1		-0.017		0.061		**0.125**
		-(0.115)		(0.711)		(2.071)
λ	0.888	0.889	0.918	0.925	0.919	0.935
	(13.18)	(12.78)	(17.15)	(19.07)	(17.17)	(21.39)

Robustness Checks

Single Episodes
Type I Error
Policy Surprises
Sub-samples

The preference for minimizing surprises in the policy rate: (see Svensson, 2003 and Rudebusch, 2008)

$$\mathcal{L}_t = \frac{1}{2} E_t \sum_{k=0}^{\infty} \delta^k \left[\begin{array}{c} \left(i_{t+k} - i^*_{t+k}\right)^2 + \varphi_E \left(i_{t+k} - i_{t+k-1}\right)^2 \\ \kappa_1^E \left(i_{t+k} - E_{t+k-1} i_{t+k}\right)^2 \end{array} \right]$$

Do Policymakers Avoid Surprising the Markets?

Alternative Explanation of the Main Result

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Our results capture such preferences if:

Assumption 1: Announced forecasts and market expectations are *perfectly* aligned.

Assumption 2: Policymakers *adopt* market expectations as their own.

Do Policymakers Avoid Surprising the Markets?

Alternative Explanation of the Main Result

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Our results capture such preferences if:

Assumption 1: Announced forecasts and market expectations are *perfectly* aligned.

Assumption 2: Policymakers *adopt* market expectations as their own.

If only “Assumption 1” holds, **adherence vs. surprises**:

- complementary explanations *in-sample*
- possible to separate *before* the announcements started

Placebo Test

For the Norges Bank 1999 - 2004

Single Episodes
Type I Error
Policy Surprises
Sub-samples

Do policymakers “adhere” to market expectations?

- 3-month forward rate as a proxy for market expectations
- Bank of England as a central bank that might be reluctant to surprise markets

Estimate:

$$i_t = \Omega_E^* \begin{bmatrix} 1 & \varphi_E & \kappa_1^E \end{bmatrix} \begin{bmatrix} \gamma^\pi E_t \pi_{t+1} + \gamma^y E_t y_{t+1} \\ i_{t-1} \\ E_{t-1} i_t \end{bmatrix} + \varepsilon_t^E$$

where:

$$\Omega_E^* = \frac{1}{1 + \varphi_E + \kappa_1^E}$$

Placebo Test

For the Norges Bank 1999 - 2004 (cont'd)

	Bank of England		Norges Bank	
	without	with	without	with
γ^{π}	0.090	0.038	3.845	3.554
	(0.899)	(0.220)	(5.035)	(3.227)
γ^{y}	0.216	0.702	0.771	0.447
	(2.724)	(1.077)	(0.752)	(0.627)
φ	0.991	1.012	2.922	2.107
	(16.124)	(6.266)	(2.782)	(5.330)
κ_1^E		**0.487**		0.132
		(2.808)		(1.355)
λ	-0.006	-0.386	0.151	0.098
	(-0.055)	(-0.425)	(0.125)	(0.122)
N.Obs.	34	34	23	23

Robustness Checks

Sub-Sample Analysis
The RBNZ

Single Episodes
Type I Error
Policy Surprises
Sub-samples

	1999 - 2005		2005 - 2011	
	without	with	without	with
γ^{π}	3.835	5.622	1.296	4.493
	(2.662)	(4.910)	(2.408)	(0.184)
γ^{y}	0.702	1.007	2.113	1.436
	(0.719)	(0.962)	(4.630)	(1.788)
φ	1.618	2.165	5.250	3.593
	(2.224)	(3.086)	(5.179)	(7.667)
κ_1		**0.979**		**1.963**
		(3.368)		(2.099)
λ	0.787	0.727	0.562	0.960
	(1.444)	(2.019)	(2.128)	(3.692)

Robustness Checks