



Monetary policymaking and inflation expectations: The experience of Latin America

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- 1999: new monetary policy regimes in Brazil, Chile, Colombia and Mexico.
- Inflation targeting with floating exchange rates.
- Questions:
 1. How was monetary policy's persistence affected?
 2. Has monetary policy become more forward looking?
 3. Are other objectives of monetary policy being neglected?
 4. How volatility in key variables has been affected? What was the role of shocks?
 5. Is monetary policy anchoring inflation expectations?
 6. Has interest rate volatility spread into expected inflation volatility ?
- Answering these questions: conventional New Keynesian model (Q1-Q4), cointegrating techniques (Q5) and a multivariate GARCH (Q6).

Conventional New Keynesian model

$$\pi_t = \delta E_t \pi_{t+1} + (1 - \delta) \pi_{t-1} + \lambda y_t + u_{\pi_t} \quad (1)$$

$$y_t = \mu E_t y_{t+1} + (1 - \mu) y_{t-1} - \phi(r_t - E_t \pi_{t+1}) + u_{y_t} \quad (2)$$

$$r_t = \rho r_{t-1} + (1 - \rho)(\beta E_t \pi_{t+1} + \gamma y_t) + \tau e_t + u_{r_t} \quad (3)$$

Estimation Results

	Brazil			Chile		Colombia		Mexico	
	1 1996:1 to 1998:12	2A 1999:1 to 2006:2	2B 1999:7 to 2006:2	1 1996:1 to 1999:9	2 1999:10 to 2006:2	1 1996:1 to 1999:9	2 1999:10 to 2006:2	1 1996:1 to 1998:12	2 1999:1 to 2006:2
δ	0.49** (0.235)	0.50*** (0.054)	0.54*** (0.083)	0.48*** (0.167)	0.51*** (0.076)	0.60*** (0.084)	0.52*** (0.088)	0.49*** (0.066)	0.50*** (0.078)
λ	0.00 (0.008)	0.00 (0.003)	0.00 (0.004)	-0.02 (0.142)	-0.12 (0.123)	0.00 (0.001)	0.00 (0.002)	0.00 (0.009)	0.00 (0.010)
μ	0.44*** (0.122)	0.47*** (0.065)	0.46*** (0.066)	0.52*** (0.134)	0.51*** (0.120)	0.40** (0.172)	0.53*** (0.113)	0.56*** (0.087)	0.50*** (0.079)
ϕ	1.85 (5.960)	1.59 (1.376)	1.20 (2.168)	-0.48 (0.751)	0.00 (0.352)	-1.95 (26.619)	-10.70 (10.774)	1.19 (1.351)	-0.72 (1.278)
ρ	0.03 (0.299)	0.66*** (0.071)	0.61*** (0.057)	0.30 (0.547)	0.63*** (0.085)	0.29* (0.169)	0.56*** (0.092)	0.10 (0.090)	0.11 (0.097)
β	0.54 (1.883)	0.14 (0.192)	0.19** (0.088)	0.02 (0.072)	0.11** (0.046)	0.24 (0.219)	-0.12 (0.223)	0.29 (0.302)	0.15 (0.139)
γ	0.01 (0.031)	0.01 (0.007)	0.01** (0.003)	-0.02 (0.049)	-0.02 (0.051)	0.01*** (0.002)	0.00 (0.004)	0.03** (0.012)	0.01 (0.006)
τ	5.08 (22.921)	0.47*** (0.105)	0.02 (0.080)	-0.40 (1.138)	-0.16 (0.277)	-0.24 (0.240)	-0.13 (0.325)	2.85*** (0.491)	3.75*** (0.630)

1. Expected values are measured by one-period-ahead values in the relevant variables. Standard errors are reported in parentheses. (***), (**) and (*) denote, respectively, statistical significance at the 1, 5 and 10% levels.

Source: Data available from the central banks of Brazil, Chile, Colombia and Mexico; and authors' estimations.

Answer to questions 1-3:

Persistence has increased in Brazil, Chile and Colombia.

Monetary policy has become more forward looking in Brazil and Chile.

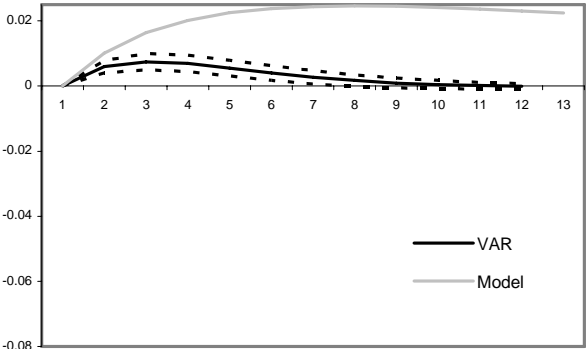
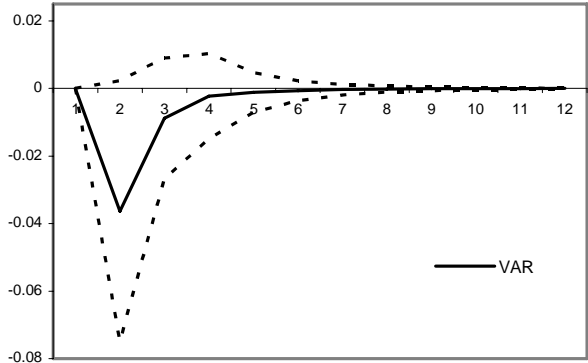
Monetary policy has become more countercyclical in Brazil but less so in Colombia and Mexico.

Monetary response to an inflationary shock

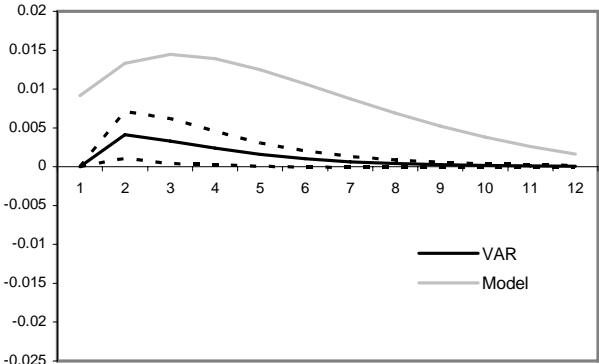
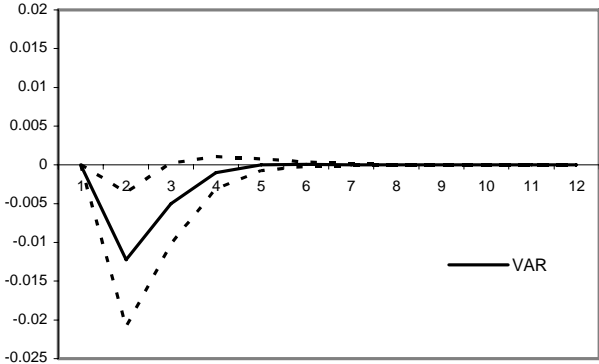
Monetary regime 1

Monetary regime 2

A. Brazil



B. Chile

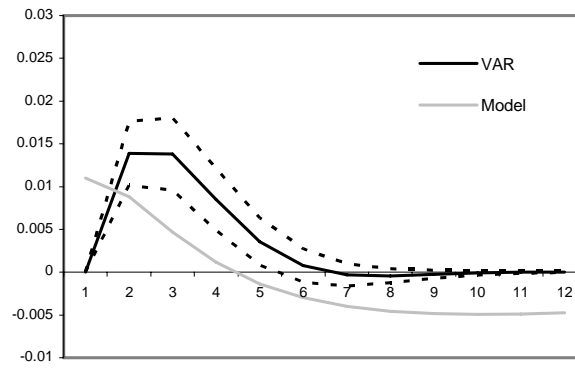
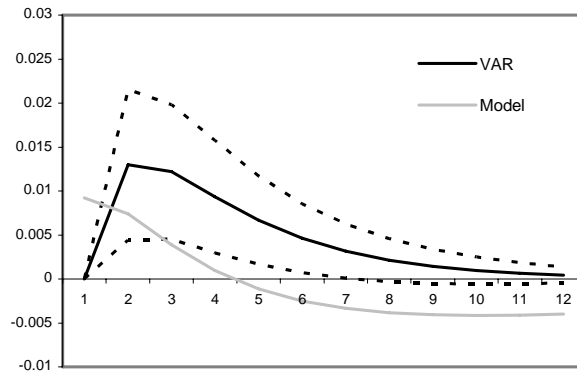


Monetary response to an inflationary shock

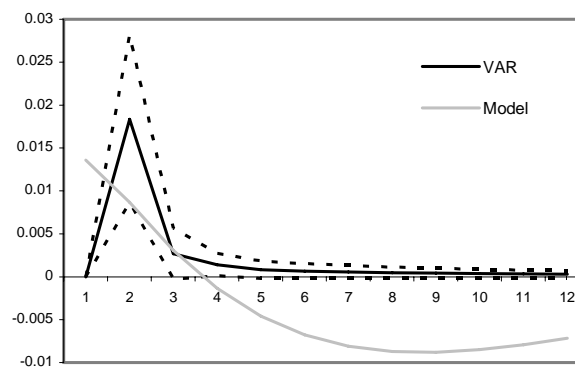
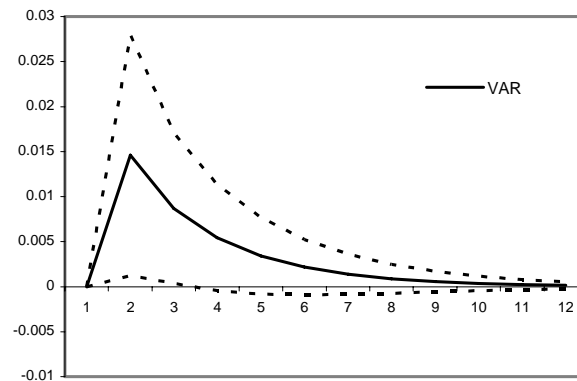
Monetary regime 1

Monetary regime 2

C. Colombia



D. Mexico



Counterfactual analysis (Q4)

- *What role for shocks and monetary policy?*

$$H_0^1 : \sigma_X^2(P_1, S_1) / \sigma_X^2(P_2, S_2)$$

$$H_0^2 : \sigma_X^2(P_1, S_1) / \sigma_X^2(P_1, S_2)$$

$$H_0^3 : \sigma_X^2(P_2, S_1) / \sigma_X^2(P_2, S_2)$$

Counterfactual analysis (Q4)

- *Real interest rate volatility has been reduced in Brazil, Colombia and Mexico.*
- *Output volatility has been reduced in Colombia.*

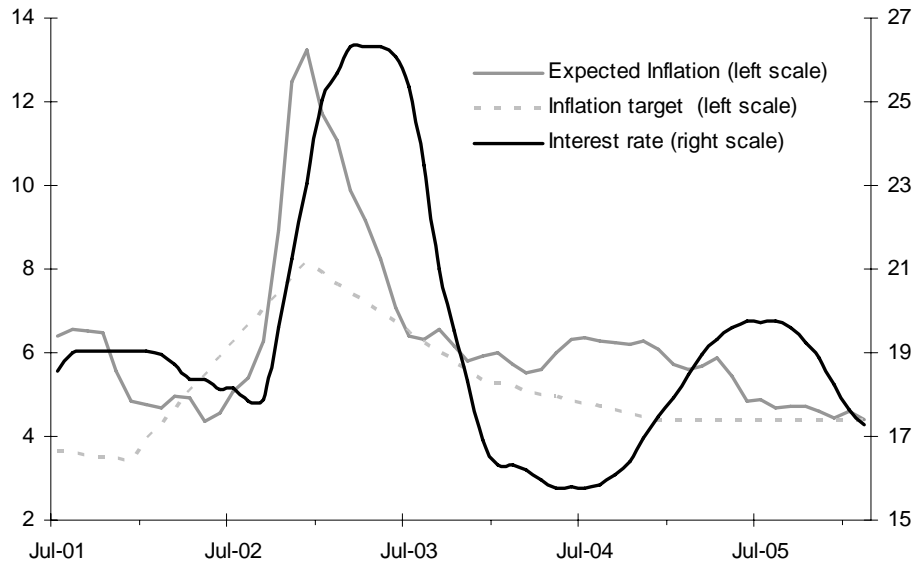
Answer to question 4:

The reduction in real interest rate volatility has to do with shocks in Brazil, Colombia and Mexico.

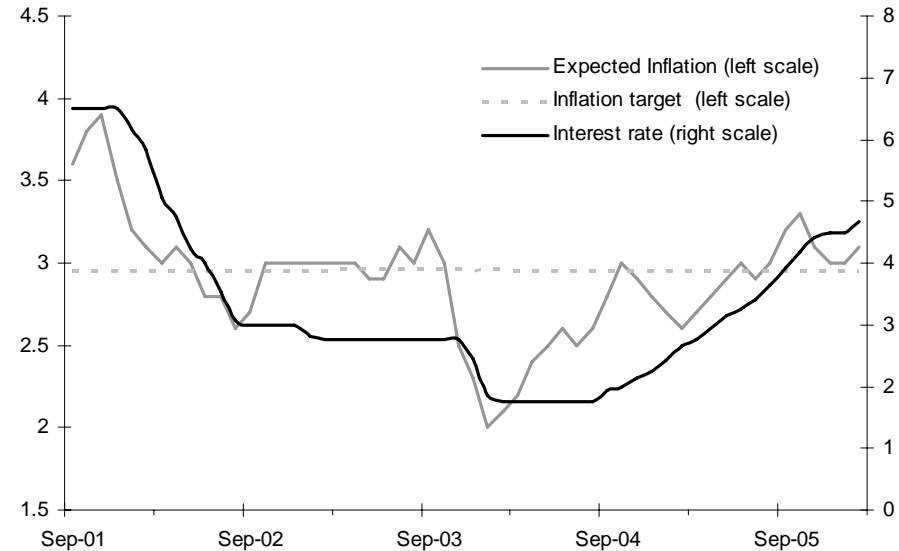
The reduction in output volatility has to do with shocks in Colombia.

Is monetary policy anchoring inflation expectations? (Q5)

Brazil

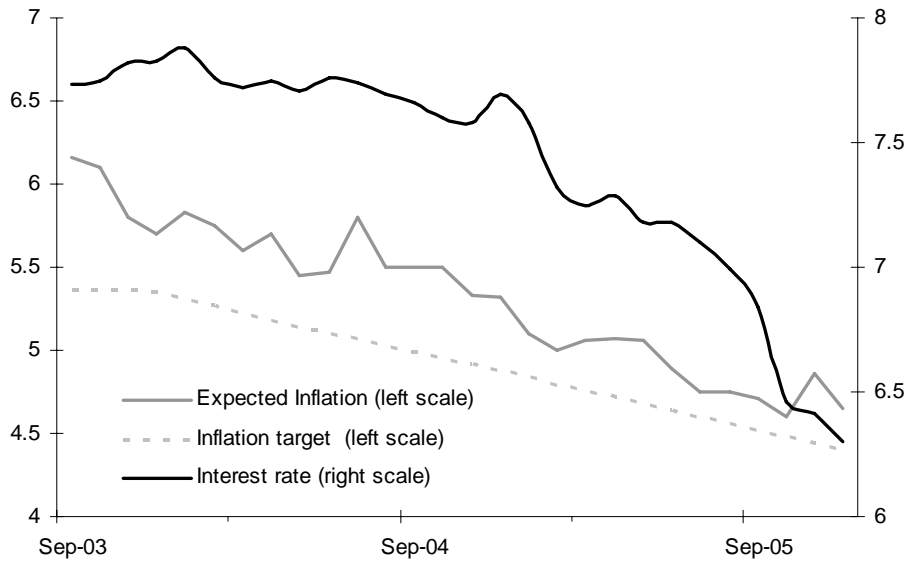


Chile

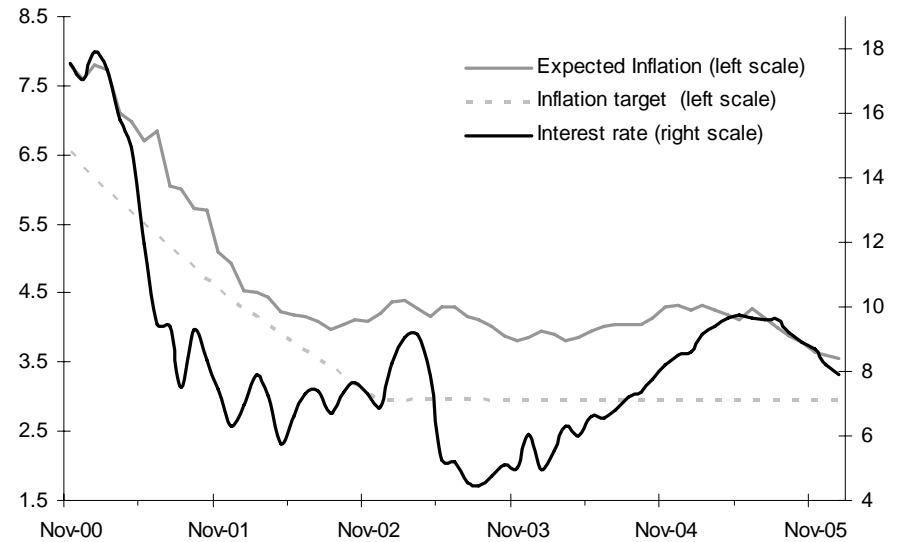


Is monetary policy anchoring inflation expectations? (Q5) (cont.)

Colombia



Mexico



Co-integration analysis

- **Brazil:**

$$E_t \pi_{t+12} = -0.74 - 0.04 * r_t + 1.5 * \pi_{t+12}^*$$

$$r_t = 15.25 + 0.49 E_t \pi_{t+12} + 0.1 * \pi_{t+12}^*$$

- **Chile:**

$$r_t = -12.69 + 5.53 E_t \pi_{t+12}$$

- **Mexico:**

$$E_t \pi_{t+12} = 0.01 * t - 0.04 * r_t + 2.96 * \pi_{t+12}^*$$

$$r_t = 0.18 * t + 1.87 E_t \pi_{t+12} + 0.88 * \pi_{t+12}^*$$

Answer to question 5:

There are long-term relationships between the interest rate, expected inflation and the inflation target, suggesting that monetary policy has been conducted in a forward-looking manner and helped anchor inflation expectations.

Monetary policy and inflation expectations: Are there volatility spillovers? (Q6)

$$r_t = a_{10} + a_{11}r_{t-1} + a_{12}(E_t \pi_{t+12} - \pi_{t+12}^*)_{t-1} + a_{13}e_{t-1} + a_{14}y_{t-1} + \varepsilon_{1t} \quad (4)$$

$$(E_t \pi_{t+12} - \pi_{t+12}^*)_t = a_{20} + a_{21}r_{t-1} + a_{22}(E_t \pi_{t+12} - \pi_{t+12}^*)_{t-1} + a_{23}e_{t-1} + a_{24}y_{t-1} + \varepsilon_{2t} \quad (5)$$

$$h_{11,t} = c_1 + b_{11}^2 \varepsilon_{1,t-1}^2 + 2b_{11}b_{21} \varepsilon_{1,t-1} \varepsilon_{2,t-1} + b_{21}^2 \varepsilon_{2,t-1}^2 \quad (6)$$

$$h_{12,t} = h_{21,t} = c_2 + b_{11}b_{21} \varepsilon_{1,t-1}^2 + (b_{12}b_{21} + b_{11}b_{22}) \varepsilon_{1,t-1} \varepsilon_{2,t-1} + b_{12}b_{22} \varepsilon_{2,t-1}^2 \quad (7)$$

$$h_{22,t} = c_3 + b_{12}^2 \varepsilon_{1,t-1}^2 + 2b_{12}b_{22} \varepsilon_{1,t-1} \varepsilon_{2,t-1} + b_{22}^2 \varepsilon_{2,t-1}^2 \quad (8)$$

MGARCH Results

Monetary reaction function and inflation expectations: M-GARCH analysis of volatility spillover effects

	Brazil		Chile		Colombia		Mexico	
	r_t	$(E_t \pi_{t+12} - \pi_{t+12}^*)$	r_t	$(E_t \pi_{t+12} - \pi_{t+12}^*)$	r_t	$(E_t \pi_{t+12} - \pi_{t+12}^*)$	r_t	$(E_t \pi_{t+12} - \pi_{t+12}^*)$
r_{t-1}	0.79 (24.12)***	-0.43 (-6.19)***	0.62 (9.64)***	0.06 (0.75)	-0.11 (-0.84)	-0.58 (-2.89)***	-0.03 (-0.32)	0.04 -1.35
$(E_t \pi_{t+12} - \pi_{t+12}^*)_{t-1}$	-0.03 (-1.10)	0.86 (33.60)***	0.19 (2.36)**	0.42 (3.96)***	-0.19 (-2.91)***	0.16 (0.87)	1.68 (4.06)***	-0.12 (-1.14)
e_{t-1}	0.01 (2.81)***	0.03 (6.21)***					-0.01 (-0.58)	0.00 (2.05)**
y_{t-1}	0.07 (4.04)***	0.16 (6.15)***	0.04 (2.15)**	0.09 (3.46)***	0.01 (6.63)***	0.01 (2.58)**	0.13 (2.03)**	0.04 (3.00)***
ECT (t-1)			-0.00 (-0.18)	0.07 (4.95)***				
Variance equations								
C_{11}		0.41 (4.15)***		0.07 (0.48)		0.02 (0.06)		0.84 (8.87)***
C_{12}		0.48 (9.37)***		0.00 (0.01)		-0.06 (-2.08)**		0.01 (0.52)
C_{22}		0.10 (0.35)		0.11 (1.04)		0.07 (0.21)		0.07 (0.25)
B_{11}		0.48 (1.43)		0.89 (3.63)***		1.32 (6.2)***		0.09 (0.04)
B_{21}		0.07 (0.54)		0.21 (1.24)		0.03 (0.25)		2.11 (2.04)**
B_{12}		-1.28 (-5.33)***		0.27 (1.15)		1.08 (2.66)**		-0.18 (-4.47)***
B_{22}		-0.59 (-2.32)***		0.13 (0.73)		-0.70 (-1.71)*		0.15 (1.04)
Diagnostic tests								
Log-likelihood		-42.83		-177.10		-111.33		-78.13
AIC		-3.04		-8.97		-7.86		-4.96
SBC		-2.74		-8.51		-7.58		-4.68
Normality test (KS)	0.11	0.11*	0.11*	0.06	0.09	0.14	0.07	0.07
LB(6)	3.59	6.24	6.12	1.90	0.84	3.14	8.44	4.30
ARCH(6)	1.42	1.02	4.41	8.70	5.83	1.16	5.42	7.55

The numbers in parentheses are t statistics. AIC and SBC are the Akaike and Schwarz Bayesian information criteria, respectively. KS is the Kolmogorov-Smirnov test of the null hypothesis of normality. LB (6) and ARCH(6) are the Ljung-Box test for autocorrelation and the Lagrange Multiplier (LM) test for heteroscedasticity up to 6 lags, respectively, performed on the univariate standardised residuals. In the case of Chile, $(E_t \pi_{t+12} - \pi_{t+12}^*)$ refers to expected inflation. ECT = error-correction term. (*), (**) and (***) denote statistical significance at the 10%, 5% and 1% levels, respectively. The samples are: 2001:7 to 2006:1 for Brazil, 2001:9 to 2006:1 for Chile, 2003:9 to 2005:12 for Colombia and 2000:11 to 2006:1 for Mexico.

Answer to question 6:

Greater volatility in the monetary stance has lead to higher volatility in expected inflation in Brazil, Colombia and Mexico.

No volatility spillover effect was detected in the case of Chile



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