

Welfare effects of monetary policy in South Africa

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Contribution

- Measure the welfare costs of business cycle fluctuations in an emerging economy.
 - Compare this estimate to advanced countries.
 - Confirm/infirm results from the empirical literature (e.g. [1] and [2]) in an estimated model including more observed variables.
- Evaluate potential welfare gains from optimal simple policy rules for policy recommendations
 - Based on easily implementable rules
 - Tailored to developing/emerging countries specificities
 - Bayesian estimation to assess the robustness of policy recommendations to parameters uncertainty

Model

- Foreign economy** is based on standard model [3]
 - Extended with commodity and banking sectors
 - Identify foreign demand, supply, monetary, credit and commodity shocks
- Domestic economy** based on a SOE model [4] including
 - Price and wage stickiness
 - Incomplete exchange rate pass-through
 - External habits in consumption
 - Investment adjustment costs
 - Variable rate of capital utilisation

- Extended with **South African specificities**:
 - Commodity sector [5]
 - Production is exported
 - Price are endogenously determined in the foreign block
 - Imported inputs of intermediate goods [6]
 - Dependence on those inputs in the production process
 - Financial sector
 - Financial accelerator [7] with production as collateral [8].
 - Domestic and foreign banks [9]
 - Loans to impatient households [10] and firms
 - Some excluded households [11], [12]

Motivation

- Business cycle fluctuations generate welfare loss to risk averse agents.
- Consumption fluctuations are more severe in Low and Middle income Countries (LMC).
- Building appropriate stabilisation policies could bring large welfare gains in LMCs.
- Stabilisation policies received a lot attention in developed countries but not in LMCs.

Methodology

- Prerequisite: structural model capable to explain macroeconomic fluctuations in LMCs
 - Dependence on a limited basket of commodities
 - Incomplete financial markets
- Estimated with Bayesian methods.
- Impact of alternative Taylor rules on the variance of key macro variables and on agents welfare.
- Restrict the analysis to the impact of simple and implementable monetary policy rules [20] on welfare.
- Welfare costs are defined along the lines of Lucas (1987) as the share of consumption that agents would be ready to pay at every period to eliminate aggregate fluctuations.
- Welfare is computed with a second order approximation to the policy function [21].

Challenges for Monetary and Fiscal Policies in developing and emerging countries

Empirical Literature

Macroeconomic fluctuations and welfare costs

- Emerging and developing economies experience larger shocks (such as commodity price fluctuations, extreme weather conditions and sudden stops).
- The relative importance of foreign shocks in developing and emerging countries ranges from small but economically meaningful [13] to important [14].
- Supply shocks are relatively important [15].
- Their capacity to cope with those shocks is limited by lower international risk-sharing opportunities, less efficient stabilisations policies and heavier microeconomic regulations [16].
- This translates into sharper consumption fluctuations and higher welfare costs [1], [2].

Monetary Policy in developing and emerging countries

- Gradual move from exchange rate to inflation targeting after the 1980s and 1990s.
- In practice, emerging and developing countries tend to respond to exchange rate fluctuations by "leaning against the wind" [17], [18].
- Their motivations include currency mismatches in balance sheets, the pass-through of exchange rate into prices, the impact of the exchange rate on net exports and large nominal or risk premium shocks among others.

Monetary Policy in South Africa

- The SARB adopted a formal inflation target in 2000. Prior to this date, it used an exchange-rate targeting, discretionary monetary policy, monetary-aggregate targeting and an eclectic approach.
- The SARB tends to respond strongly and consistently to inflation and output fluctuations [19].

Business Cycles in South Africa through the lens of a DSGE model

Sources of business cycles

- Classify shocks according to their types (demand vs supply) and origins (domestic vs foreign vs mixed).
- Foreign shocks and domestic supply shocks bring particular challenges to monetary policy.
- Foreign shocks explain about 30% of the fluctuations in South African GDP.
- Domestic supply shock explain over 20% of the fluctuations in South African GDP.

Table: Variance decomposition

	Foreign		SOE			Domestic	
	CS	AS	AD	UIP	Oths	AS	AD
GDP	8,4	9,1	12,2	4,2	18,6	23,1	23,8
CPI	6,6	4,6	8,5	9,9	15,3	26,9	27,4
R	12,7	4,6	11,8	12,9	6,4	8,2	41,8
NEER	6,1	2,8	7,9	75,4	0,5	0,4	6,0

Foreign shocks

- Foreign aggregate supply shocks impose a trade-off between output gap, and inflation and exchange rate stabilisation in the short run.
- Foreign commodity supply shocks impose a trade-off between output gap and inflation, and exchange rate stabilisation. These shocks additionally have a long lasting effect on output and inflation.

Figure: Foreign AS

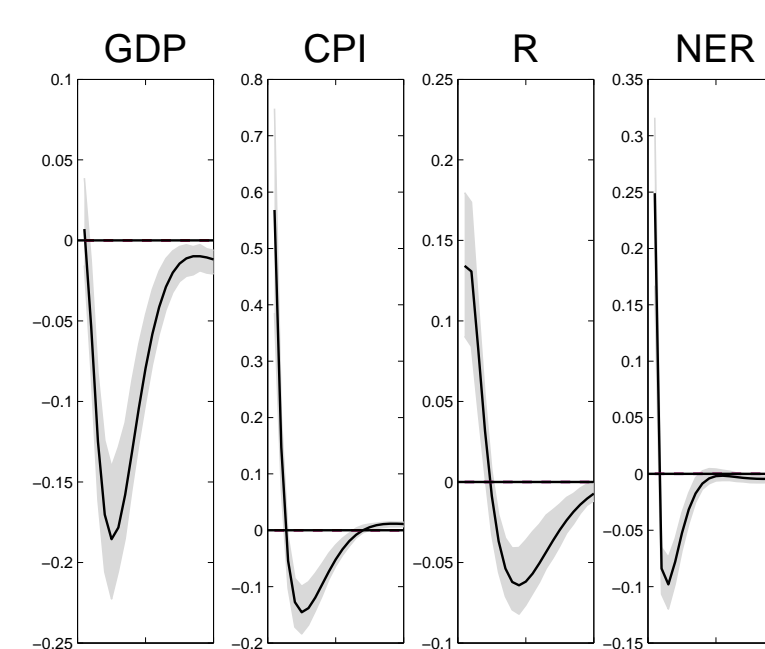
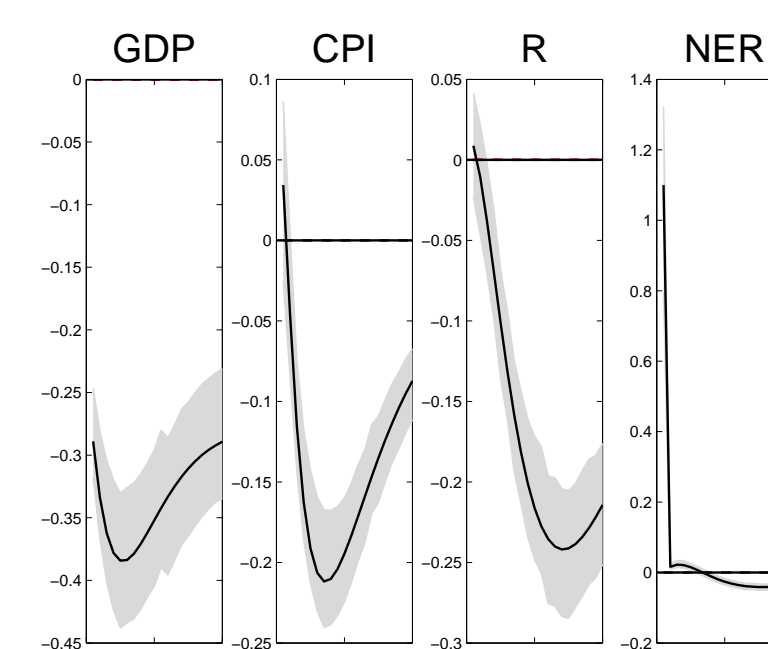


Figure: Foreign CS



Domestic supply shocks

- Domestic aggregate supply shocks impose the traditional inflation/output stabilisation trade-off.
- Domestic commodity supply shocks behave similarly to a demand shock. Their stabilisation would however exacerbate nominal exchange rate fluctuations.

Figure: Domestic AS

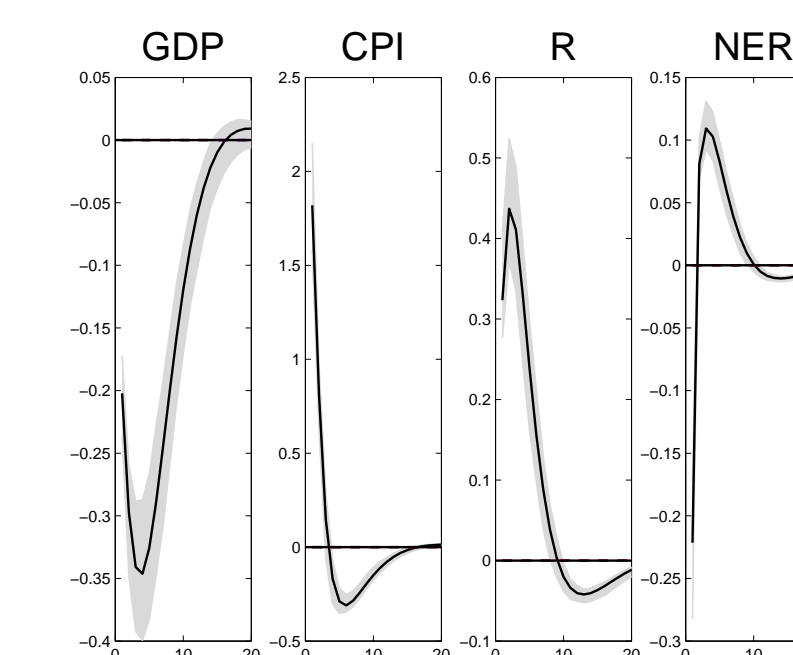
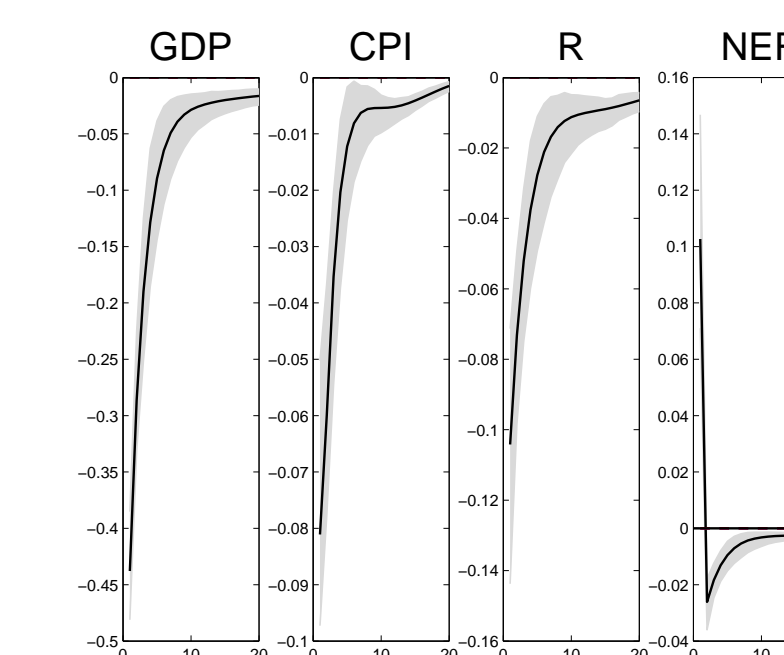


Figure: Domestic CS



Preliminary Results

Alternative Taylor rules

$$R_t = \rho_R R_{t-1} + (1 - \rho_R) \left(R + \tau_\pi (\pi_t^e - \bar{\pi}) + \tau_{\Delta S} \Delta S_t + \tau_{\Delta Y} \Delta Y_t \right)$$

Table: Variance of key variables under alternative Taylor rules

	Baseline	CPI	NEER	GDP
		$\tau_\pi = 3$	$\tau_{\Delta S} = 0.2$	$\tau_{\Delta Y} = 0.5$
GDP	3.432	3.413	3.493	3.183
CPI	1.053	0.841	0.986	1.082
R	0.984	1.188	0.948	1.031
NEER	5.575	5.297	5.120	5.539
C	3.016	3.182	3.090	2.877

Concluding remarks

- The optimal inflation target?
- Backward looking Taylor rules?
- Welfare measures?
- The impact of MP on different types of agents?

References

- R. Housa, "Uncertainty about welfare effects of consumption fluctuations," *European Economic Review*, vol. 59, no. C, pp. 35-62, 2013.
- S. Pallage and M. Robe, "On the welfare cost of economic fluctuations in developing countries," *International Economic Review*, vol. 44, no. 2, pp. 677-698, 2003.
- F. Smets and R. Wouters, "Shocks and frictions in us business cycles: a bayesian dsge approach," Working Paper Series 0722, European Central Bank, 2007.
- M. Adolfson, S. Lasen, J. Linde, and M. Villani, "Bayesian estimation of an open economy dsge model with incomplete pass-through," *Journal of International Economics*, vol. 72, no. 2, pp. 481-511, 2007.
- E. G. Mendoza, "The Terms of Trade, the Real Exchange Rate, and Economic Fluctuations," *International Economic Review*, vol. 36, pp. 101-37, February 1995.
- M. A. Kose, "Explaining business cycles in small open economies: 'how much do world prices matter?'," *Journal of International Economics*, vol. 56, no. 2, pp. 299-327, 2002.
- B. S. Bernanke, M. Gertler, and S. Gilchrist, "The financial accelerator in a quantitative business cycle framework," in *Handbook of Macroeconomics* (J. B. Taylor and M. Woodford, eds.), vol. 1 of *Handbook of Macroeconomics*, ch. 21, pp. 1341-1393, Elsevier, 1999.
- C. Arellano and E. G. Mendoza, "Credit Frictions and 'Sudden Stops' in Small Open Economies: An Equilibrium Business Cycle Framework for Emerging Markets Crises," NBER Working Papers 8880, National Bureau of Economic Research, Inc, Apr. 2002.
- R. Kollmann, "Global Banks, Financial Shocks, and International Business Cycles: Evidence from an Estimated Model," *Journal of Money, Credit and Banking*, vol. 45, no. s2, pp. 159-195, 2013.
- A. Gerali, S. Neri, L. Sessa, and F. M. Signoretti, "Credit and Banking in a DSGE Model of the Euro Area," *Journal of Money, Credit and Banking*, vol. 42, pp. 107-141, 09 2010.
- J. P. Medina and C. Soto, "The Chilean business cycles through the lens of a stochastic general equilibrium model," Working Papers Central Bank of Chile 457, Central Bank of Chile, Dec. 2007.
- L. F. Céspedes, J. Fornero, and J. Galí, "Non-ricardian aspects of fiscal policy in Chile," Working Papers Central Bank of Chile 663, Central Bank of Chile, Feb. 2012.
- C. Raddatz, "Are external shocks responsible for the instability of output in low-income countries?," *Journal of Development Economics*, vol. 84, pp. 155-187, September 2007.
- R. Housa, J. Mohimont, and C. Otrok, "The sources of business cycles in a low income country," *Pacific Economic Review*, 2015.
- J. Frankel, "Monetary Policy in Emerging Markets: A Survey," Working Paper Series rwp11-003, Harvard University, John F. Kennedy School of Government, Jan. 2011.
- N. V. Louyza, R. Rancière, L. Servén, and J. Ventura, "Macroeconomic Volatility and Welfare in Developing Countries: An Introduction," *World Bank Economic Review*, vol. 21, pp. 343-357, October 2007.
- G. A. Calvo and C. M. Reinhart, "Fear of Floating," *The Quarterly Journal of Economics*, vol. 117, no. 2, pp. 379-408, 2002.
- M. S. Mohanty and M. Klati, "Monetary policy rules in emerging market economies: issues and evidence," BIS Working Papers 149, Bank for International Settlements, Mar. 2004.
- A. Ortiz and F. Sturzenegger, "Estimating Sarb's Policy Reaction Rule," *South African Journal of Economics*, vol. 75, pp. 659-680, December 2007.
- S. Schmitt-Grohe and M. Uribe, "Optimal simple and implementable monetary and fiscal rules," *Journal of Monetary Economics*, vol. 54, pp. 1702-1725, September 2007.
- S. Schmitt-Grohe and M. Uribe, "Solving dynamic general equilibrium models using a second-order approximation to the policy function," *Journal of Economic Dynamics and Control*, vol. 28, pp. 755-775, January 2004.