



**Comments to:  
Model for Analysis and Simulations: a small  
open economy DSGE for the Chilean economy  
by Juan P. Medina and Claudio Soto**

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## What is MAS?

- MAS is a state of the art, micro-founded DSGE model for the Chilean economy. Its main features are:
  - Multi-sector economy: households, firms assembling final goods, firms producing intermediate goods, import goods retailers, **commodity (copper) sector**, and a Government conducting monetary and fiscal policies.
  - Nominal rigidities: Staggered price and wage setting à la Calvo (1983). Wages and prices are partially indexed to past inflation.
  - Real Rigidities: Adjustment cost for investment subject to a stochastic shock.
  - Imperfect pass-through of exchange rate movements into prices due to local currency (LCP) price setting.
  - A risk premium with two components:
    - i.- mean zero disturbance term that captures deviations from UIP and,
    - ii.- a component that is a function of the net foreign asset position.
  - Monetary policy rule is conducted through a real interest rate rule responding to deviations from dynamic targets for inflation and trend GDP.



## What does the paper do?

- The main objective of the paper is to use MAS for policy analysis and serve as a tool for forecasting key macroeconomic variables on a medium-term horizon. Besides developing the model, the paper does three things:
  - The model is taken to the data for the period 1990:1 – 2005:4, and is estimated using Bayesian estimation (system with 13 observation variables).
  - Properties of the model are analysed using impulse responses to three shocks:
    - An increase in the price of the commodity export.
    - An increase in foreign output.
    - A contractionary policy shock.
  - Finally, historical decompositions are reported to evaluate the contribution of different shocks to the evolution of the endogenous variables of the model.



## Overall

- I liked the model, I think Juan Pablo and Claudio have made an excellent job.
- The exercises they report are illustrative of the quality of their paper.
- It is obvious that the authors have taken careful attention to the main features of the Chilean economy. This is reflected in the introduction of a commodity export sector, considerations about the real interest rate as the policy instrument, imperfect pass-through and the degree of indexation.
- However, although I like the paper it is my job today to highlight possible areas in which the model can improve or areas that deserve some careful thought about what they imply.



## Main comments

My comments will focus on two points:

- How is the transmission mechanisms of the exchange rate operating in the model.
- The historical decompositions: how good are they? In particular, why are external factors not explaining the business cycle in Chile?

In both cases, my main concern is whether the modelling strategy is correct and about its implications for the overall results.

- Finally, I will provide some thoughts. What would I change or done differently?



## How is the exchange rate operating in the model?

- Chile is a small open economy. In this economy the exchange rate plays an important role. In the model there are two main mechanisms through which the exchange rate operates:
  - Expenditure-switching effect.
  - Consumption smoothing effect operating via the risk premium.
- There is no competitiveness effect associated to the commodity sector ( $\sqrt{\cdot}$ ). Intermediate firms price discriminate so competitiveness effects are limited in the model.
- My main comment is that the current structure of the model may impose a limited role for exchange rate fluctuations and thus for monetary policy reactions to this variable. In other words, the model does not allow a role for Calvo and Reinhart's (2002) "fear of floating". This may be reasonable for Chile, but only in the most recent history.
- Let me focus on the two mechanisms mentioned above.



## The expenditure switching

- The expenditure-switching effect is determined in the model by two parameters:
  - The degree of openness of the economy ( $\gamma_C$  and  $\gamma_I$ ), and
  - The elasticity of substitution between home and foreign goods ( $\eta_C$  and  $\eta_I$ ).
- In most models,  $\eta_C = \eta_I = 1$ . So that the expenditure switching is determined exclusively by the degree of openness of the economy. This parameterization limits the role of terms of trade and real exchange rate volatility thus restricting its role for optimal monetary policy (See Engel and Devereux, 2006 and Sutherland, 2006).
- The parameter estimates reported in the paper indicate a unit-elasticity of substitution (mode  $\eta_C = 0.99$ ; mode  $\eta_I = 1$ ).
- However, the empirical evidence suggests that the elasticity of substitution might be higher. For instance, Obstfeld and Rogoff (2000) use a value of 6 to calibrate its results, and their survey of the empirical literature reports values that go up to 21.4. In this sense priors for estimation seem to be too low.



## Price discrimination

- The model also assumes PTM (LCP) which further limits the relevance of the expenditure-switching effect.
- A key question is whether LCP for imports is a reasonable assumption:  
*“A foreign-based exporter presetting its price in an emerging-market currency would implicitly be acquiring a contingent asset denominated in that currency while issuing a contingent liability denominated in goods. This practice would therefore contradict the observation of “original sin”, which restricts emerging borrowers to issuing liabilities indexed to international currencies. As a result, local – currency pricing of imports is not expected to characterize emerging economies.”*

Obstfeld (2004) “Pricing-to-Market, the interest-rate rule and the exchange rate”



## The cost of borrowing, the risk premium and the business cycle

- Business cycles in emerging economies **are correlated** with the cost of borrowing in international financial markets (Uribe and Yue, 2006).
- The model incorporates a risk premium that affects the cost of borrowing. However, the manner in which it is introduced neglects any magnification effect of unexpected exchange rate fluctuations on firms' balance sheets, on investment and thus on output (Tovar, 2006, Céspedes, Chang and Velasco, 2004).
- Parameter estimates suggest an elasticity of the supply of international funds,  $\rho=0.01$ . That is, this parameter captures the sensitivity of a country interest to changes in net foreign assets. Thus:  
$$0.01 * 20\% \text{ worsening in the net foreign debt} = 0.2$$
- That is the interest rate would decline by 20 bps. I do not have a good sense of whether this is reasonable for the Chilean economy, but certainly it would be worth having an economic interpretation for this parameter. Bergin (2004) estimate for the US is 0.00384 which implies a decrease of its domestic interest rate of 7.68 bps. However Lane and Milesi-Ferretti (2001) report for industrial countries a value of 50 bps. Thus 20 bps seems too low.



## The cost of borrowing, the risk premium and the business cycle

- A key concern that arises with the way in which the risk premium is operating is that the risk premium is found to play no major role in explaining the variation of GDP (Figure 8). This certainly is surprising for Latin America in particular if one takes into account the experience of the late 1990s and early 2000s.
- Furthermore, reported results show that international interest rates play no role for the Chilean business cycle either.
  - I would like to see the impulse response of output ( $\downarrow$ ) and investment ( $\downarrow$ ) to a positive shock in the risk premium.
- The fact that external shocks do not drive the business cycle is not entirely convincing.
  - Evidence reported by Uribe and Yue (2006) suggest that innovations in the US interest rate explain about 20% of the movements in aggregate activity. While country spread shocks explain about 12%. That is external factors explain about a third of the business cycles in emerging economies.
  - However, possibly most important is that country spreads have a significant role in propagating shocks. This mechanism is completely absent in the model as mentioned before.



## The volatility of shocks

- Table 2 reports persistence and standard deviations for each autoregressive shocks. I was surprised by the mode of some of the estimated parameters:
  - Technology shock  $\sigma_{aH}=55.01$
  - Labor supply shock  $\sigma_{\zeta L}=21.14$
  - Government expenditure shock  $\sigma_g=9.70$ .
- I find these parameter estimates to be unusually large.
- Are these unusual values indicative of model misspecification? I do not have an answer but these values are way larger than those reported by other central bank studies (eg Sweden).



## What would I have done different?

- I think the model needs to improve upon the mechanisms through which exchange rate fluctuations operate.
  - A contractionary mechanism is desirable. It may be desirable to incorporate the balance sheet effect. This mitigates the strength of the expenditure switching effect.
  - Incorporating balance sheet effects à la CCV (2004) introduces an important mechanism: the endogenous feedback of the risk premium on investment. This would give external factors a chance to explain the business cycle.
  - However, introducing the balance sheet effect would have to take into account whether adjustment costs on investment are still necessary, as this could introduce too many frictions on investment. For instance, Dib (2006) estimates a model for the US with the financial accelerator, adjustment costs on investment and idiosyncratic shock on investment. He shows that incorporating all these frictions creates too much volatility.



## What would I have done different?

- I have concerns on whether the model is able to cope with important structural changes experienced during the sample period for which the model is estimated.
- As discussed in Tovar (2006) Chile has experienced important changes in the monetary (introduction of an IT regime in 1999-2000) and exchange rate regimes employed (crawling band system and a floating regime). Also in the degree of exchange rate pass-through. On this regard, it is unclear to me whether the specified monetary policy rule can account for all such changes.
- Given that the sample size limits the possibility of testing for parameter stability I would allow for a more general Taylor rule specification, for instance, by allowing the exchange to capture the exchange rate regime in place.



**Thank you!**

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