What Drives the Current Account in Commodity Exporting Countries?

The Cases of Chile and New Zealand

Juan Pablo Medina[1] Anella Munro[2] Claudio Soto[1]

[1]Central Bank of Chile

[2]Bank for International Settlements

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Motivation

- Current account allows borrowing/lending to smooth expenditure, but large deficit may increase risks
- To help assess risks we want to understand the forces that drive current account developments and the role of policy
- Reduced forms do not reveal causality
- Endogeneity, forward-looking variables make time series analysis difficult
- Time series tests of simple intertemporal model (PVM): typically fails, cannot explain CA dynamics empirically
- Potential gains from a structural approach

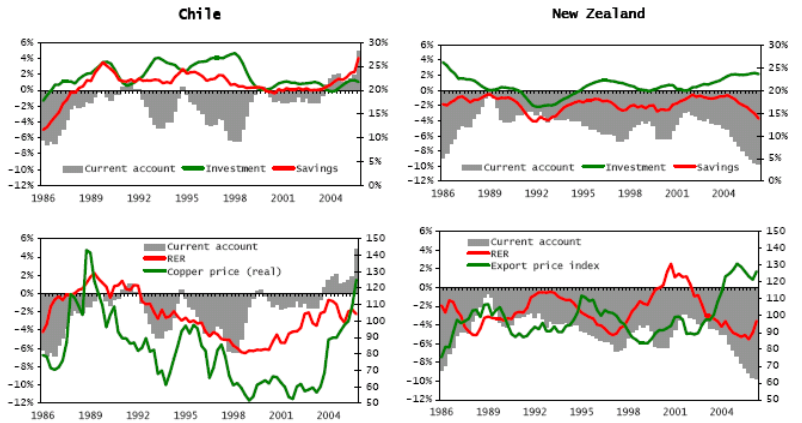
This Paper

- Look at CA through lense of a small open economy DSGE model with features relevant CA dynamics, eg
  - consumption smoothing motive,
  - capital accumulation,
  - intra temporal substitution effects
  - exchange rate valuation effects on debt and debt service,
  - monetary and fiscal policy responses
- ...and relevant exogenous shocks, eg
  - terms of trade,
  - foreign demand,
  - foreign cost of capital,
  - technology
- Construct IRFs and variance and historical decompositions of CA to better understand sources of CA fluctuations.

Main Results

- Foreign financial conditions, investment-specific shocks, and foreign demand shocks account for most the variation of the current account for both countries
- In the case of New Zealand fluctuations in commodity export prices have also been important [7.5-20% of variance]; in Chile ~ 1%
- Monetary and fiscal policy shocks (deviations from policy rules) have small effects on the CA (potential for counterfactual experiments)

Current account, RER, and commodity price



Macro Framework in Chile and New Zealand

- Similarities:
  - Trade and financial openness
  - Domestic financial liberalization
  - Commodity intensive exports
  - Inflation-targeting monetary policy
  - Fiscal Responsibility Acts
- Differences:
  - GDP per capita (1:2.5), income distribution
  - Ownership of commodity sector
  - Trade diversification
  - Debt position and denomination
  - Pension systems
  - Fiscal rules

Households

- Ricardian households
  - maximise NPV of utility from consumption, leisure subject to intertemporal budget contraint (consumption smoothing motive for CA):
    - Income from wages, profits, bonds
    - Spend on consumption, taxes, domestic or foreign bonds
  - habit in consumption (permanent shocks affect CA)
  - staggered wage setting
- Non-Ricardian households (important for fiscal policy):
  - consume all after tax income
  - receive average wage

Ricardian Household Optimality Conditions

Choice variables: C_t, I_t, B_t, w_t

- Inter-temporal:
  - Cost of foregone consumption = expected discounted utility of additional consumption tomorrow
  - Expected discounted cost of debt repayment = marginal utility of additional consumption today
- Intra-temporal:
  - UIP: expected return on domestic and foreign bonds is equal measured in the same currency

$$\frac{1+i_t}{(1+i_t^*)\,\Theta\left(\frac{B_t}{P_t Y_t}\right)} = E_t\left(\frac{\epsilon_{t+1}}{\epsilon_t}\right)$$

  - staggered wage setting (Erceg et al 2000): probability $1-\phi_L$ of reoptimising wage. Non-optimising HH index to past inflation (χ_L) or the inflation target ($1-\chi_L$). Max U st demand, wage setting rule

Goods Producing Firms

- Monopolistically competitive production of home goods:

$$\mathbf{Y}_{H,t} = A_{H,t} \left[T_t l_t \right]^{\eta_H} \left[K_t \right]^{1-\eta_H},$$

l_t is labor
K_t is physical capital
η_H is labour share
$A_{H,t}$ is a transitory productivity shock
T_t is a stochastic trend in labor productivity, common to all firms

Capital Accumulation

Law of motion of the capital stock, subject to adjustment costs.

$$K_{t+1} = (1-\delta) K_t + \zeta_{I,t} S\left(\frac{I_t}{I_{t-1}}\right) I_t,$$

Important rigidity for CA dynamics
$\zeta_{I,t}$ is an investment cost shock

Price Setting: home goods

- Staggered price setting (Calvo) subject to consumption and investment demands for
  - goods produced for home market ϕ_{H_D}, χ_{H_D}
  - home goods for export ϕ_{H_F}, χ_{H_F}
- firms reoptimise with probability $(1-\phi)$.Those who do not reoptimise index to past inflation χ or to the inflation target $(1-\chi)$
- reoptimising firms max NPV profits s.t. pricing rule, demand
- NK Philips curve

Price Setting: imports

- Imperfect competition
- staggered price setting (Calvo) ϕ_F, χ_F
- Importing firms max NPV profit subject to pricing rule and domestic demand for foreign goods
- imperfect passthrough from import cost to domestic price

Final Goods Assembly

- Constant elasticity of substitution (CES) technology combines home goods and imports into consumption goods and investment goods
- Profit maximisation gives demands for home and foreign goods responsive to relative prices

$$I_{H,t} = \gamma_I \left(\frac{P_{H,t}}{P_{I,t}} \right)^{-\eta_I} I_t, \qquad I_{F,t} = (1-\gamma_I) \left(\frac{P_{F,t}}{P_{I,t}} \right)^{-\eta_I} I_t,$$

η_I Investment elasticity of substitution between *home* and *foreign* goods
γ_I share of home goods in investment.

- Investment and consumption prices a weighted average of the prices of home goods and imports.

NonCommodity Exports

- Foreign demand for home goods

$$Y^*_{H,t} = \gamma^* \left(\frac{P^*_{H,t}}{P^*_t} \right)^{-\eta^*} Y^*_t,$$

- η^* foreign elasticity of sub between domestic exports and foreign goods
- Y^*_t is foreign demand (AR1 subject to shocks)

Commodity Exports

- AR1 production function based on endowment

$$Y_{S,t} = \left[\frac{T_t}{T_{t-1}} Y_{S,t-1}\right]^{\rho_{y_S}} \left[T_t Y_{S,0}\right]^{1-\rho_{y_S}} e^{\varepsilon_{y_S,t}}$$

- no capital or labour inputs
- all output exported
- commodity production shock, commodity price shock

Fiscal Policy

- Chile: structural rule
  - $\frac{P_{G,t} G_t}{P_{Y,t} Y_t}$ should be consistent with long run copper price and target level of debt
  - additional income from copper revenues should be mainly saved
  - if fiscal position improves(i^* or B^* is lower), current expenditure may rise
- New Zealand: simple rule
  - $G_t / \bar{Y}$ is a constant, subject to AR1 shocks
- fiscal shocks represent departures from the estimated rule

Monetary Policy

- Chile (real, includes exchange rate prior to 1999q4)

$$r_t = \varphi_i r_{t-1} + (1-\varphi_i)\left[\varphi_\pi \widehat{\pi}_{C,t} + \varphi_y \widehat{y}_t + \varphi_{rer} \widehat{rer}_t\right] + \zeta_{m,t}$$

- New Zealand (nominal)

$$i_t = \varphi_i i_{t-1} + (1-\varphi_i)\left[\varphi_\pi \widehat{\pi}_{C,t} + \varphi_y \widehat{y}_t\right] + \zeta_{m,t}$$

- monetary policy shocks represent departures from the estimated rules

Current Account Identity

- current account = - capital account (no reserves accumulation)
- trade balance
  - = exports of goods and commodities
    – imports of investment and consumption goods
- investment income deficit:
  - = debt service
    + foreign share of profits from commodity sector
    (60% in Chile; 10% in New Zealand)
- valuation effects on the stock of debt and debt service (Chile)

10 exogenous shocks

- Foreign Shocks
  - foreign financial conditions (UIP)
  - foreign demand shock
  - commodity price shock
- Domestic Shocks
  - permanent productivity shock
  - transitory productivity shock
  - commodity production shock
  - investment specific shock
  - consumption preference shock
  - monetary policy shock
  - fiscal policy shock

Estimation Approach

- Model estimated using Bayesian methods
- Observable variables and data:
  - Chile:

$$\mathbf{y}_t^{CH} = \left\{ \Delta \ln Y_t, \Delta \ln C_t, \Delta \ln INV_t, \frac{G_t}{Y_t}, \hat{r}_t, \hat{\pi}_t, \widehat{rer}_t, \frac{CA_t}{P_{Y,t} Y_t}, \Delta \ln \left(\frac{W_t}{P_{C,t}} \right), \hat{pr}^*_{S,t} \right\}$$

  - New Zealand:

$$\mathbf{y}_t^{NZ} = \left\{ \Delta \ln Y_t, \Delta \ln C_t, \Delta \ln INV_t, \Delta ln Y_{S,t}, \hat{i}_t, \hat{\pi}_t, \widehat{rer}_t, \frac{CA_t}{P_{Y,t} Y_t}, \Delta \ln \left(\frac{W_t}{P_{C,t}} \right), \hat{pr}^*_{S,t} \right\}$$

Fixed Parameters

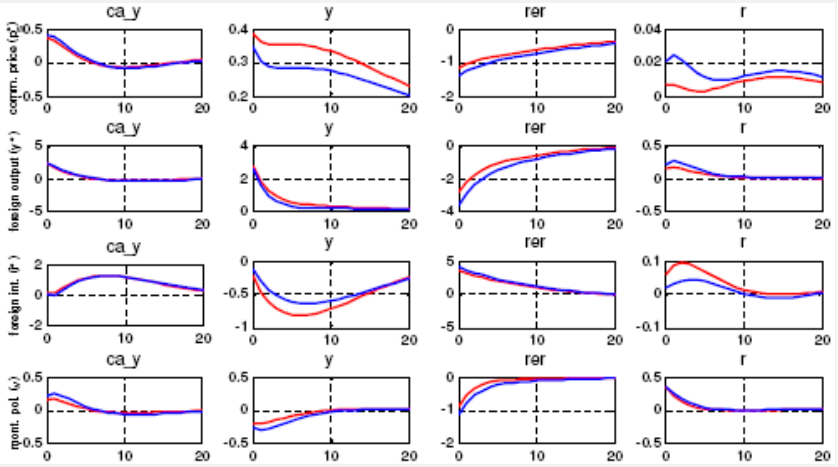
	Chile	**New Zealand**
Commodity rents	gov't 40% foreign investor 60%	households 90% foreign investor 10%
Type of HH	Ricardian & Non-Ricardian	Ricardian
Debt denomination	Foreign currency	Domestic currency
Monetary policy	Real Structural break	Nominal
Fiscal policy	Structural balance rule	Balanced budget rule

Estimated Parameters

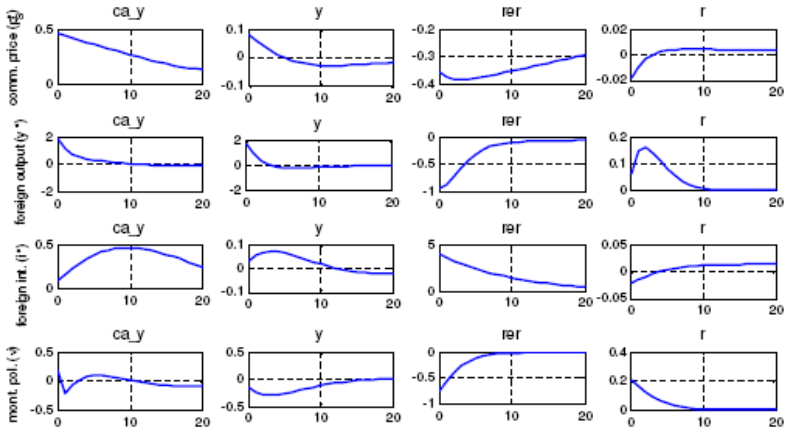
Table: Posterior Distributions

Parameter	Posterior mode		Parameter	Posterior mode	
	Chile	New Zealand		Chile	New Zealand
σ_L	0.164	0.001	ρ_{a_H}	0.901	0.69
h	0.572	0.813	ρ_{y_S}	0.642	0.907
ϕ_L	0.806	0.911	ρ_{Y^*}	0.736	0.653
χ_L	0.058	0.102	ρ_{ζ_C}	0.227	0.332
η_C	1.221	1.239	ρ_{ζ_I}	0.862	0.412
η_I	1.107	1.031	ρ_{ζ_G}	0.315	–
μ_S	2.288	1.694	ρ_G	–	0.393
ϕ_{H_D}	0.486	0.631	ρ_{i^*}	0.985	0.923
χ_{H_D}	0.127	0.086	ρ_T	0.987	0.156
ϕ_{H_F}	0.966	0.915	σ_{a_H}	1.498	1.915
χ_{H_F}	0.227	0.181	σ_{y_S}	28.418	1.993
ϕ_F	0.838	0.968	σ_{Y^*}	10.275	8.847
χ_F	0.806	0.178	σ_{i^*}	0.332	0.36
$\psi_{i,1}, \psi_i$	0.67	0.897	σ_m	0.392	0.189
$\psi_{\pi,1}, \psi_\pi$	1.244	1.455	σ_{ζ_C}	5.032	6.291
$\psi_{y,1}, \psi_y$	0.184	0.389	σ_{ζ_G}	12.18	–
$\psi_{rer,1}$	0.052	-	σ_g	–	9.739
$\psi_{i,2}$	0.778	-	σ_{ζ_I}	7.125	10.291
$\psi_{\pi,2}$	1.632	-	σ_T	0.19	0.498
$\psi_{y,2}$	0.305	-			
η^*	0.999	2.007			
ϱ	0.016	0.001			

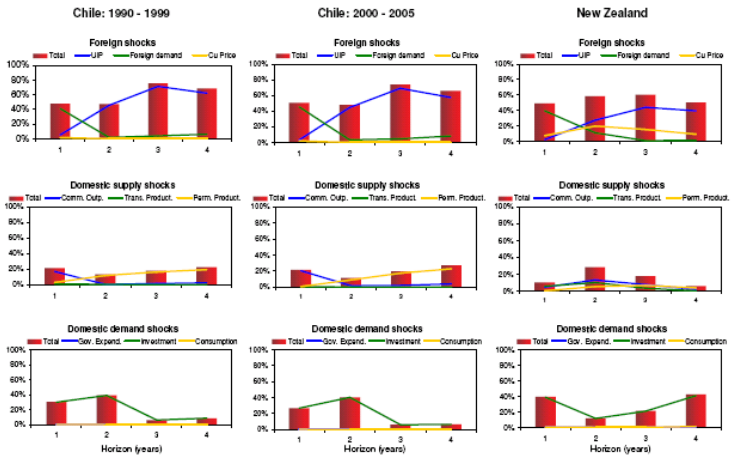
Impulse Responses:Chile



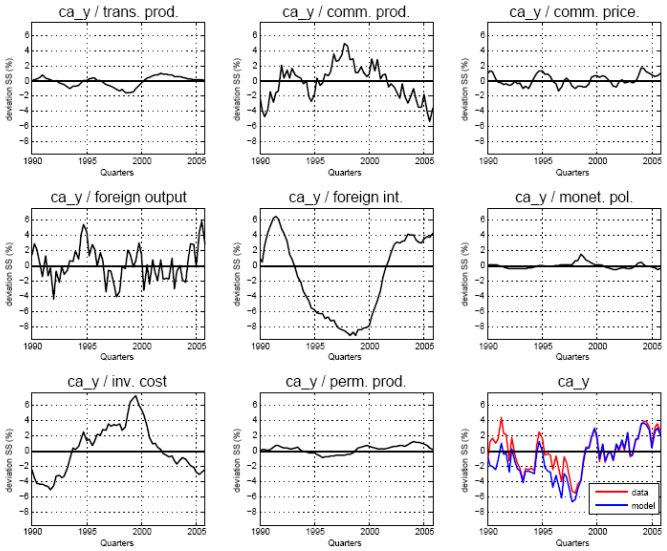
Impulse Responses: New Zealand



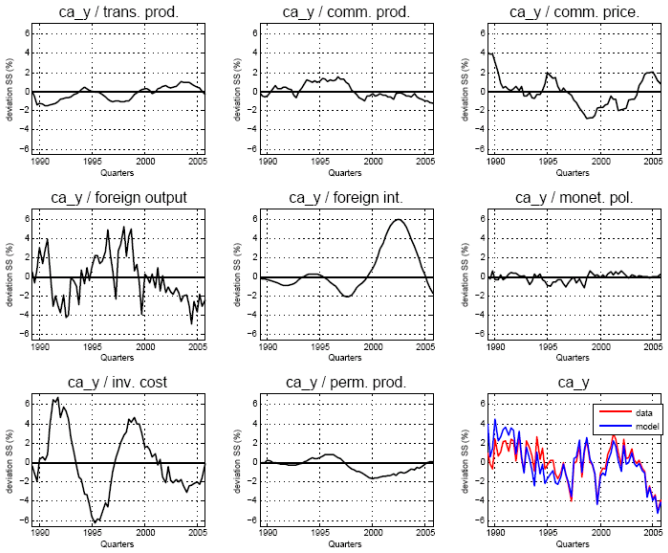
Variance Decomposition



Historical Decomposition: Chile



Historical Decomposition: New Zealand



Summary

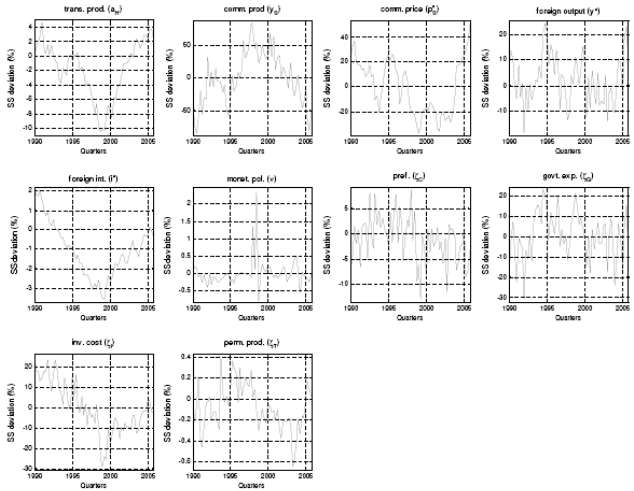
- The main sources of CA variation are:
  - *Foreign financial conditions*
    - exchange rate effects not explained by domestic interest rate or risk premium. e.g., capital flows (pension fund outflows in Chile, carry trade in NZ).
    - rational response to cheap foreign capital
  - *Investment-specific shocks*
    - things that drive a wedge between investment in new capital and its productive value e.g., credit constraints investment booms
    - consumption smoothing motive
  - *Foreign demand shocks*
  - *Commodity export price shocks*
    - Partially stabilising institutional setup in Chile
    - In New Zealand, large windfall gain to HH.

Summary cont...

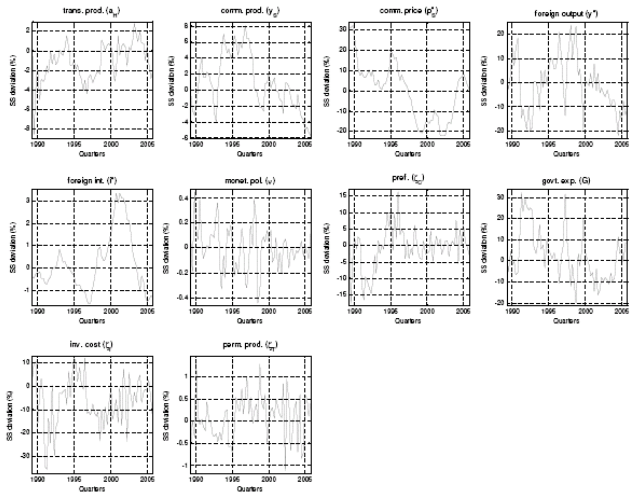
- Foreign shocks account for about half or more of current account variance. Consistent with results from a smaller 4-shock model for NZ.
- In our model the current account plays a useful shock absorbing role in response to both domestic and foreign shocks.

Thank you.

Chile Latent Variables



New Zealand Latent Variables



Extra Slides

		Chile	New Zealand
Wages	reoptimise	20%	9%
	index to π_{t-1}	5%	9%
	index to $\bar{\pi}$	75%	82%
Home Goods	reoptimise	51%	37%
	index to π_{t-1}	6%	5%
	index to $\bar{\pi}$	42%	58%
Exports	reoptimise	3%	9%
	index to π_{t-1}	22%	17%
	index to $\bar{\pi}$	75%	75%
Imports	reoptimise	16%	3%
	index to π_{t-1}	68%	17%
	index to $\bar{\pi}$	16%	80%