

Current  
Account in  
Chile and New  
Zealand

Medina,  
Munro and  
Soto

Outline  
Motivation  
Overview  
Macroframework  
The Model  
Estimation  
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Summary

# What Drives the Current Account in Commodity Exporting Countries? The Cases of Chile and New Zealand

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- 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

- 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.

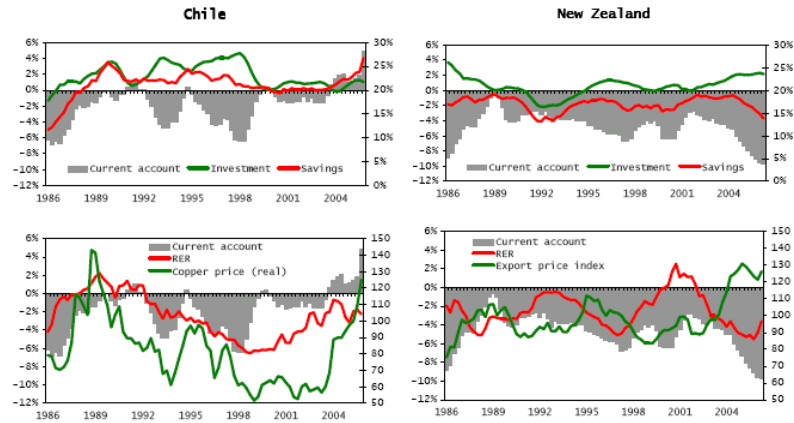
- Foreign financial conditions, investment-specific shocks, and foreign demand shocks account for most the variation of the current account for both countries
- In the case of New Zealand fluctuations in commodity export prices have also been important [7.5-20% of variance]; in Chile  $\sim 1\%$
- Monetary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

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# 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

- Ricardian households
  - maximise NPV of utility from consumption, leisure subject to intertemporal budget constraint (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 ( $\chi_L$ ) or the inflation target ( $1 - \chi_L$ ). Max U st demand, wage setting rule



## Goods Producing Firms

- Monopolistically competitive production of home goods:

$$Y_{H,t} = A_{H,t} [T_t l_t]^{\eta_H} [K_t]^{1-\eta_H},$$

$l_t$  is labor

$K_t$  is physical capital

$\eta_H$  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  $\phi_{H_D}, \chi_{H_D}$
  - home goods for export  $\phi_{H_F}, \chi_{H_F}$
- firms reoptimise with probability  $(1 - \phi)$ . Those who do not reoptimise index to past inflation  $\chi$  or to the inflation target  $(1 - \chi)$
- reoptimising firms max NPV profits s.t. pricing rule, demand
- NK Philips curve

- Imperfect competition
- staggered price setting (Calvo)  $\phi_F, \chi_F$
- 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

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

$\eta_I$  Investment elasticity of substitution between *home* and *foreign* goods  
 $\gamma_I$  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

$$Y_{H,t}^* = \gamma^* \left( \frac{P_{H,t}^*}{P_t^*} \right)^{-\eta^*} Y_t^*,$$

- $\eta^*$  foreign elasticity of sub between domestic exports and foreign goods
- $Y_t^*$  is foreign demand (AR1 subject to shocks)

- AR1 production function based on endowment

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

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

- 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



- 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:

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

- New Zealand:

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

## Fixed Parameters

	<b>Chile</b>	<b>New Zealand</b>
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

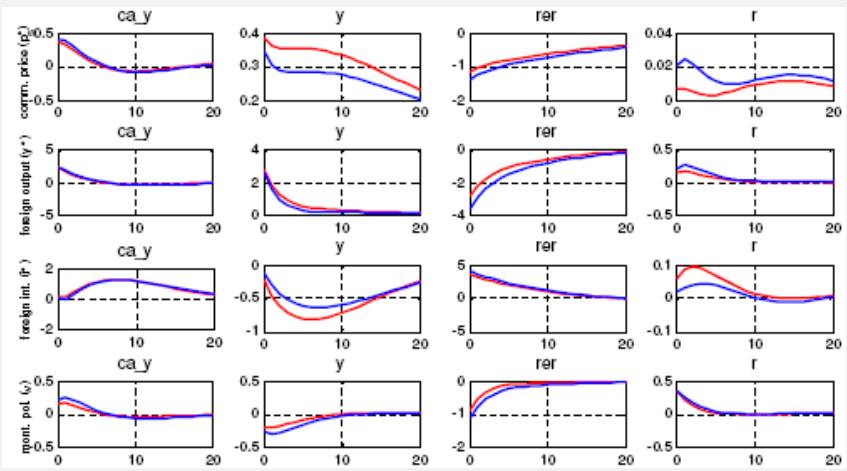
Parameter	Posterior mode		Parameter	Posterior mode	
	Chile	New Zealand		Chile	New Zealand
$\sigma_L$	0.164	0.001	$\rho_{aH}$	0.901	0.69
$h$	0.572	0.813	$\rho_{yS}$	0.642	0.907
$\phi_L$	0.806	0.911	$\rho_{y^*}$	0.736	0.653
$\lambda_L$	0.058	0.102	$\rho_{\xi_C}$	0.227	0.332
$\eta_C$	1.221	1.239	$\rho_{\xi_I}$	0.862	0.412
$\eta_I$	1.107	1.031	$\rho_{\xi_G}$	0.315	-
$\mu_S$	2.288	1.694	$\rho_G$	-	0.393
$\phi_{HD}$	0.486	0.631	$\rho_{i^*}$	0.985	0.923
$\lambda_{HD}$	0.127	0.086	$\rho_T$	0.987	0.156
$\phi_{HF}$	0.966	0.915	$\sigma_{aH}$	1.498	1.915
$\lambda_{HF}$	0.227	0.181	$\sigma_{yS}$	28.418	1.993
$\phi_F$	0.838	0.968	$\sigma_{y^*}$	10.275	8.847
$\lambda_F$	0.806	0.178	$\sigma_{i^*}$	0.332	0.36
$\psi_{i,1}, \psi_i$	0.67	0.897	$\sigma_m$	0.392	0.189
$\psi_{\pi,1}, \psi_\pi$	1.244	1.455	$\sigma_{\xi_C}$	5.032	6.291
$\psi_{y,1}, \psi_y$	0.184	0.389	$\sigma_{\xi_G}$	12.18	-
$\psi_{rer,1}$	0.052	-	$\sigma_g$	-	9.739
$\psi_{i,2}$	0.778	-	$\sigma_{\xi_I}$	7.125	10.291
$\psi_{\pi,2}$	1.632	-	$\sigma_T$	0.19	0.498
$\psi_{y,2}$	0.305	-			
$\eta^*$	0.999	2.007			
$\varrho$	0.016	0.001			

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# Impulse Responses: Chile



— 1990-99 — 2000-05

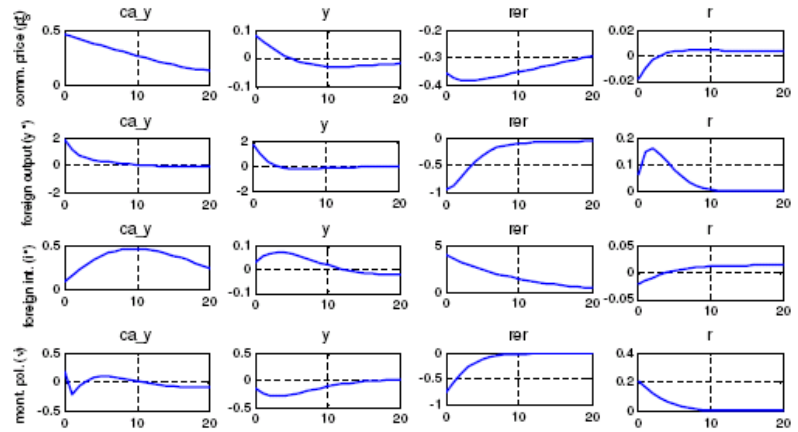


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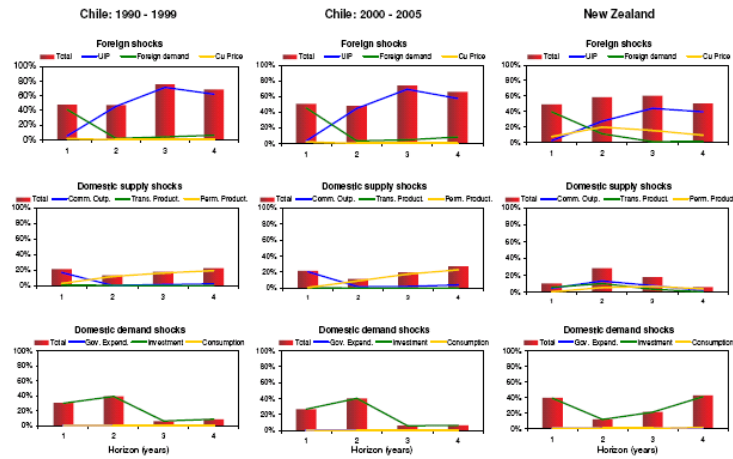
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# Impulse Responses: New Zealand





# Variance Decomposition

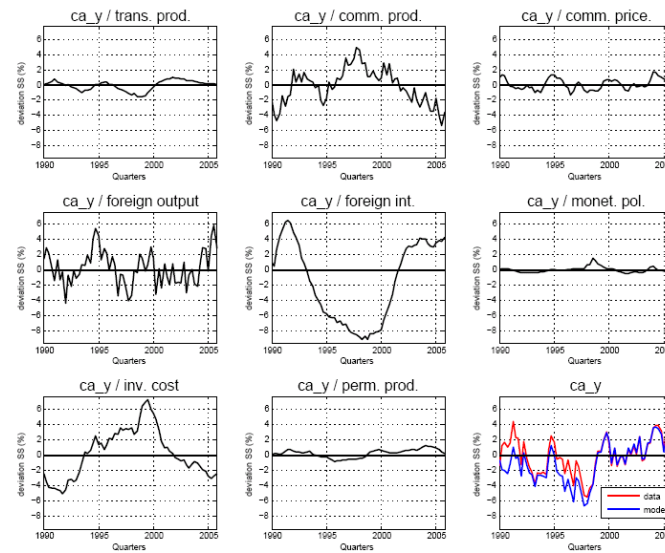


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## Historical Decomposition: Chile

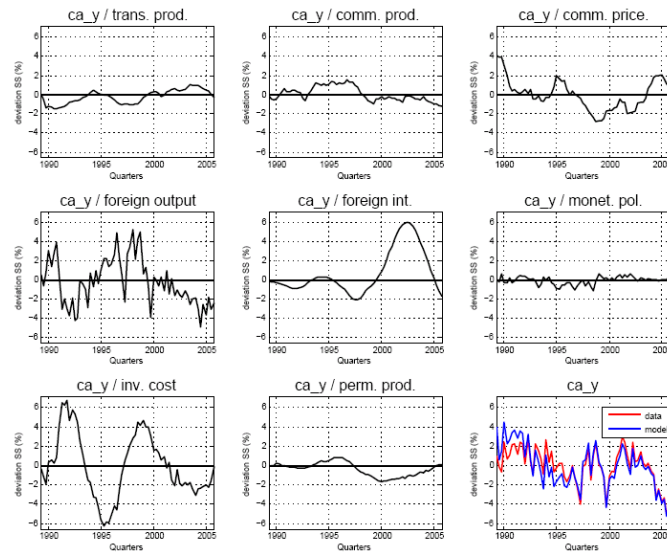


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# Historical Decomposition: New Zealand



- 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.

- 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.

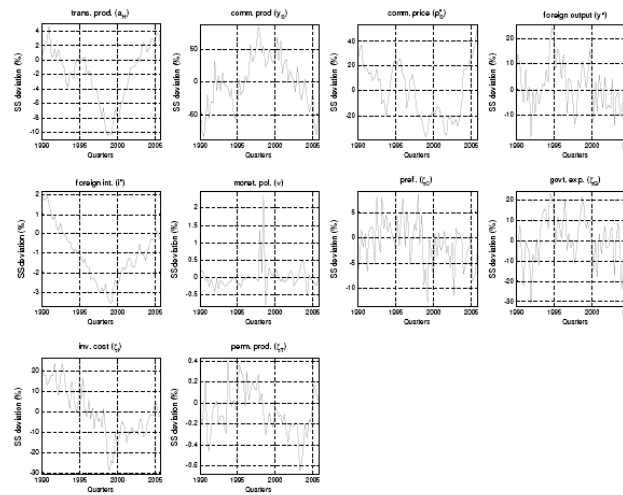
Thank you.

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# Chile Latent Variables

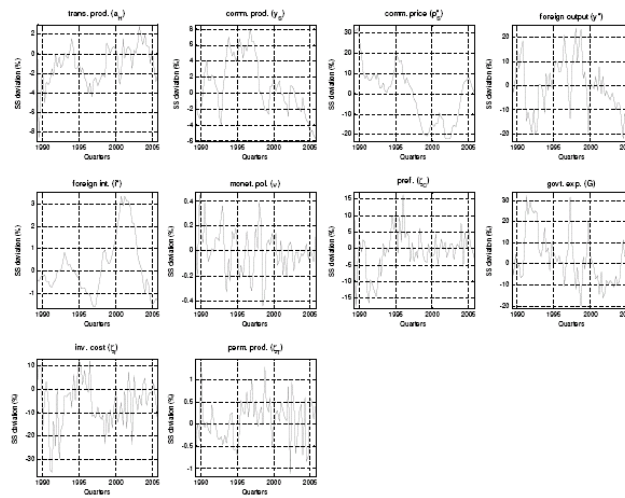


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## New Zealand Latent Variables



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