Does financial repression affect current account adjustment?

Sergi Lanau (IMF) and Tomasz Wieladek (Barclays, Research completed at BoE)

Conference on 'Financial Liberalisation: Past, Present and Future'

Cambridge, March 29th 2016

Overview

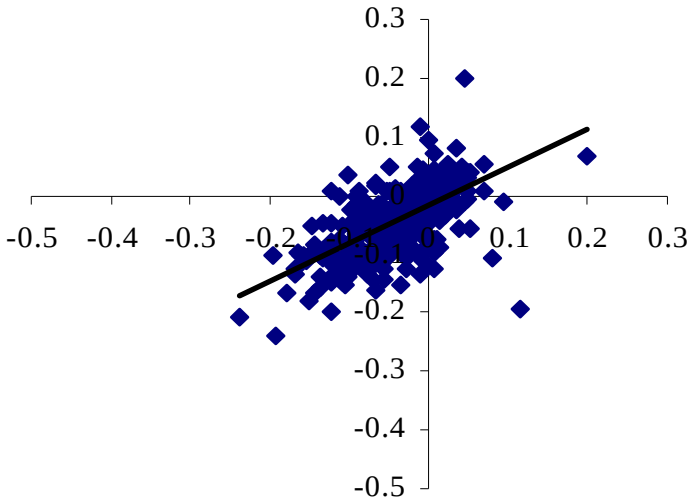
- In the Intertemporal model of the current account liquidity constraints (financial liberalisation) affect the size/persistence response of the current account to net output shocks

- We test this hypothesis with an interacted Bayesian panel VAR model estimated on a sample on 79 countries from 1973-2005

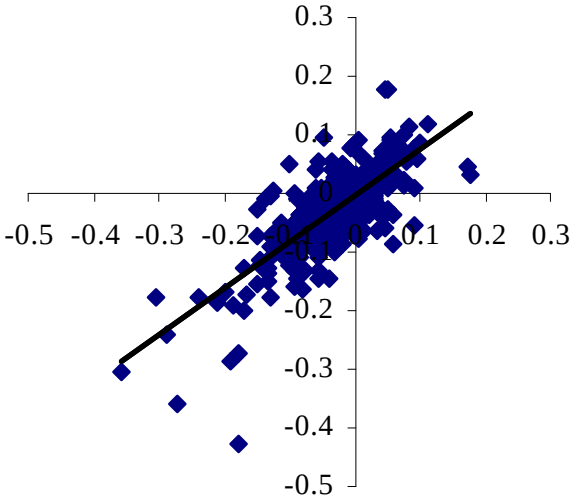
- Our results suggest that financial liberalisation is an important determinant of current account adjustment
  - ➔ Greater liberalisation leads to a larger and more persistent current account response to the same size shocks

CA balances became more persistent…

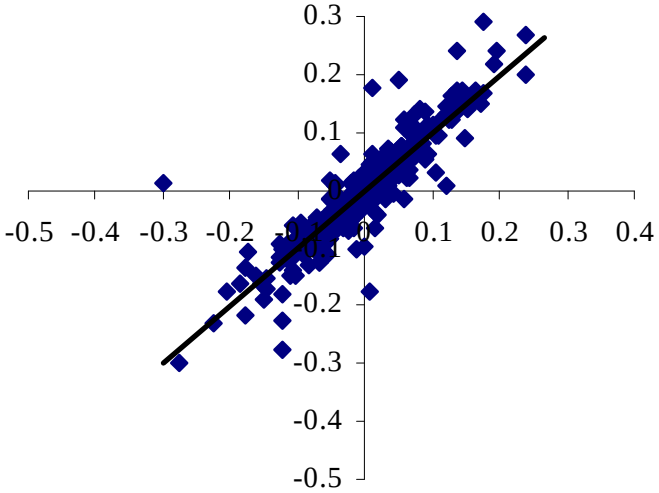
y = 0.6515x - 0.0156 1973-1982



y = 0.7958x - 0.0037 1983-1992



y = 0.9969x - 0.0018 2003-2007

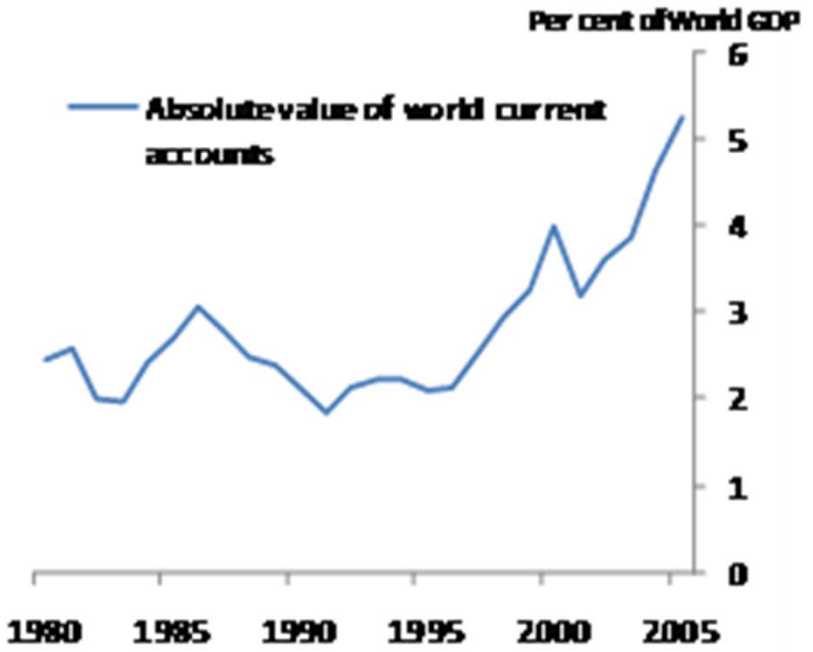


An AR(1) of CA/GDP on itself estimated on annual data suggests that persistence (AR(1) coefficient) has risen over time

…and larger over time.

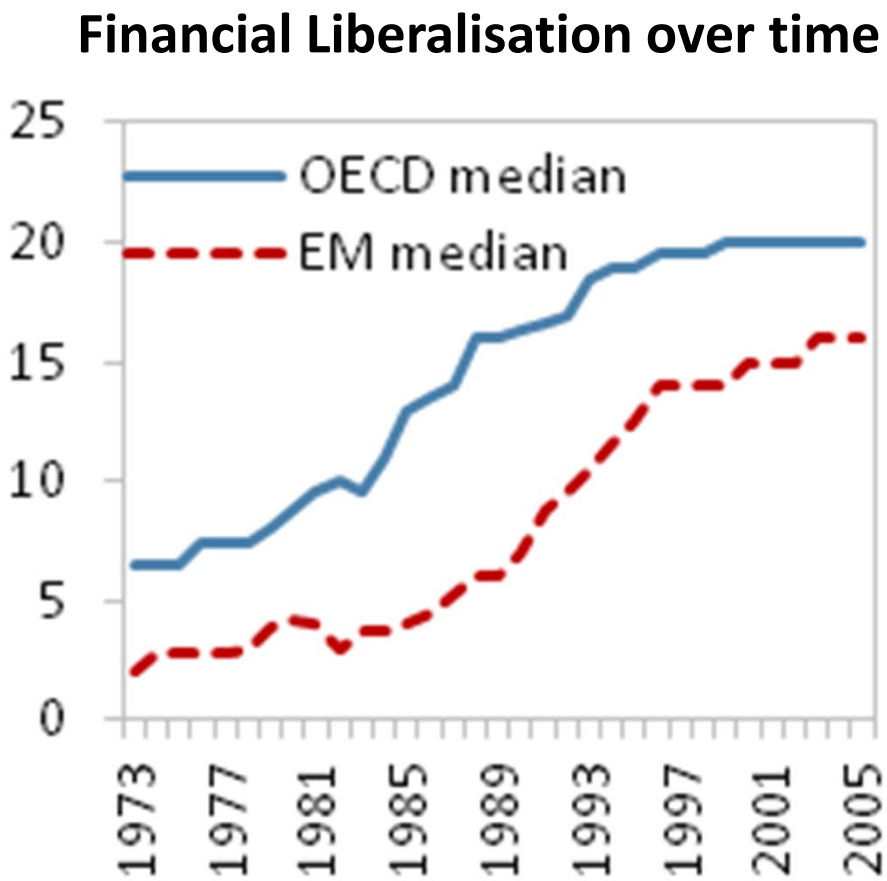
- Conventional explanation relies on FX regimes (Friedman, 1953)
  - See also IMF WEO (2007)
- Chinn & Wei (2013) challenge this conventional wisdom
  - Little evidence for an impact of FX Regime on CA persistence

Absolute value of CA over time



Could Financial Liberalisation be an explanation?

- Borio and Disyatat (2011) suggest that international financial system could have become more 'elastic' over time
- Idea dates back Jevons (1875)



First paper to examine fin. liberalisation as a determinant of ca adjustment

- Use interacted panel VAR model
  - Coefficients are a function of FX Regime, financial liberalisation, Capital Account & Trade Openness
  - Compare current account response to domestic shocks in financially liberalised vs repressed economies

- Allow for cross-sectional dependence and dynamic heterogeneity
  - See Imbs, Mumtaz, Ravn and Rey (2005) on the PPP puzzle
  - See Giannone and Lenza (2010) → Feldstein-Horioka puzzle

The intertemporal model of the current account (Sachs, 1981)

- A Ricardian agent solves

$$U_t = E_0 \sum_{t=0}^{\infty} \beta^t U(C_t^R - hC_{t-1})$$

$$B_{t+1} = (1 + r_t)B_t + Y_t - I_t - T_t - C_t^R$$

where C_t^R is current ricardian agent consumption, C_{t-1} is past aggregate consumption, B_{t+1} is net stock of international bonds at the end of time t, Y_t/ I_t/ T_t is output/investment/taxes

- h → habits necessary for this model to fit the data (Gruber, 2004)

The intertemporal model of the current account - II

- Model financial liberalisation as a liquidity constraint.
- γ fraction of agents are liquidity constrained:

$$C_t^{NR} = NO_t$$
$$NO_t = Y_t - I_t - G_t$$

where NO_t is net output

Studies that examine the impact of financial liberalisation on the domestic economy find that it tends to loosen the liquidity constraint

Bayoumi (1993a) – Economic Journal
Bayoumi (1993b) – ReStat
Japelli and Pagano (1994) - QJE
Lewis (1997) - European Economic Review
Bandiera et al (2000) - ReStat

Intertemporal model of the current account - III

- With assumptions of external habits and constant world real interest rate, model can be solved as:

$$\widetilde{ca}_t = (1-\gamma)h\widetilde{ca}_{t-1} - (1-hk)(1-\gamma)\sum_{i=0}^{\infty} k^i E_t\{\Delta \ln \widetilde{NO}_{t+i}\}$$

$$+(1-\gamma)\Delta \ln \widetilde{NO}_t - hk(1-\gamma)\sum_{i=0}^{\infty} k^i (E_t - E_{t-1})\{\Delta \ln \widetilde{NO}_{t+i}\} + f_t$$

Where $ca_t = \frac{CA_t}{NO_t}$, $CA_t \equiv B_{t+1} - B_t$, $\tilde{X}_t \equiv X_t - \bar{X}$

Intertemporal model of the current account - IV

- Need to make assumption for $\Delta \ln \widetilde{NO}_t$:
  - $\ln \widetilde{NO}_t = \rho \ln \widetilde{NO}_{t-1} + \varepsilon_t$
  - $\Delta \ln \widetilde{NO}_t = \rho \Delta \ln \widetilde{NO}_{t-1} + v_t$
  - To show that:

Impact of shock	Impact of γ
$\frac{\partial \widetilde{ca}_t}{\partial \varepsilon_t} > 0$	$\frac{\partial \widetilde{ca}_t}{\partial \varepsilon_t \partial \gamma} < 0$
$\frac{\partial \widetilde{ca}_t}{\partial v_t} < 0$	$\frac{\partial \widetilde{ca}_t}{\partial v_t \partial \gamma} > 0$

  - Consumption smoothing implies that temporary shock to $\ln \widetilde{NO}_t$ ($\Delta \ln \widetilde{NO}_t$) leads to a CA surplus (deficit)
  - Reaction becomes smaller with larger γ
    - With external habits, **persistence is smaller** as well

Empirical model

- Theory suggests that the degree of financial liberalisation (fraction of γ in the economy) should affect the current account response to shocks

- Test this idea with an interacted panel VAR model
  - Coefficients are a function of economic structure: FX regime; financial liberalisation index, KA and Trade openness
    - Can compare impulse responses for fin. liberalised vs repressed economy
  - Identification restrictions derived from intertemporal model of the current account

Empirical model

$$\overbrace{\begin{bmatrix} 1 & 0 \\ \alpha_{0,c,t}^{2,1} & 1 \end{bmatrix}}^{A_{0,c,t}} Y_{c,t} = \sum_{k=1}^{L} \overbrace{\begin{bmatrix} \alpha_{k,c,t}^{1,1} & \alpha_{k,c,t}^{1,2} \\ \alpha_{k,c,t}^{2,1} & \alpha_{k,c,t}^{2,2} \end{bmatrix}}^{A_{k,c,t}} Y_{c,t-k} + \begin{bmatrix} d_{1,c} & 0 \\ 0 & d_{2,c} \end{bmatrix} F_t + U_{c,t} \quad (\mathbf{1})$$

- Where $Y_{c,t} = [\frac{CA_t}{NO_t} \ \Delta \ln NO_t]$; $U_{c,t}$ is residual
- F_t is unobserved common factor (accounts for latent global factors/cross-sectional dependence);

- Country-specific time-average removed from $Y_{c,t}$
- Model estimated with Bayesian methods on annual data from 1973-2005 for 79 countries

Empirical model (II)

- VAR coefficients depend on economic structure:
- $\alpha_{k,c,t}^{i,j} = \beta_{k,c,1}^{i,j} + \beta_{k,c,2}^{i,j} * FL_{c,t} + \beta_{k,c,3}^{i,j} * KA_{c,t} + \beta_{k,c,4}^{i,j} * FXR_{c,t} + \beta_{k,c,5}^{i,j} * TR_{c,t}$ **(2)**
  - $FL_{c,t}$ ➔ Financial liberalisation (Abiad et al, 2010)
  - $KA_{c,t}$ ➔ Chinn-Ito Capital account index
  - $FXR_{c,t}$ ➔ Exchange Rate Regime (Ilzetzki, Reinhart and Rogoff, 2013; IMF AER)
  - $TR_{c,t}$ ➔ 5 year moving average of (Imports+Exports)/GDP

Empirical Model (III)

- Plugging (2) in to (1) yields:

$$Y_{c,t} = \sum_{w=1}^{W}\sum_{k=1}^{L} \overbrace{\begin{bmatrix} \beta_{k,c,w}^{1,1} & \beta_{k,c,w}^{1,2} \\ \beta_{k,c,w}^{2,1} & \beta_{k,c,w}^{2,2} \end{bmatrix}}^{B_{w,k,c}} Y_{c,t-k} Z_{c,t}(w) + \sum_{w=1}^{W} \overbrace{\begin{bmatrix} 0 & 0 \\ \beta_{0,c,w}^{2,1} & 0 \end{bmatrix}}^{G_{w,c}} Y_{c,t} Z_{c,t}(w) + \sum_{w=2}^{W} H_w Z_{c,t}(w) + D_c F_t + U_{c,t}$$

- $Z_{c,t} = [1 \;\; FL_{c,t} \; FXR_{c,t} \; KA_{c,t} \; TR_{c,t}]$
- Previous work pools (I.e. $B_{w,k,c}$=$B_{w,k}$)
  - Estimates may suffer from dynamic heterogeneity bias (Pesaran and Smith, 1995)
- We assume that $B_{w,k,c} \sim N(B_{w,k}, \lambda L_c)$
  - λ (degree of dynamic heterogeneity) – sampled from inverse-Gamma distribution as in Jarocinski (2010)

Identification

- Recall that theory implies:

Impact of shock '$\widetilde{\ln NO_t}$' shock	Impact of shock '$\Delta\widetilde{\ln NO_t}$' shock
$\frac{\partial \widetilde{ca}_t}{\partial \varepsilon_t} > 0$	$\frac{\partial \widetilde{ca}_t}{\partial v_t} < 0$

  - Which can easily be translated into sign identification restrictions (Uhlig, 2005; Canova and De Nicolo, 2002):

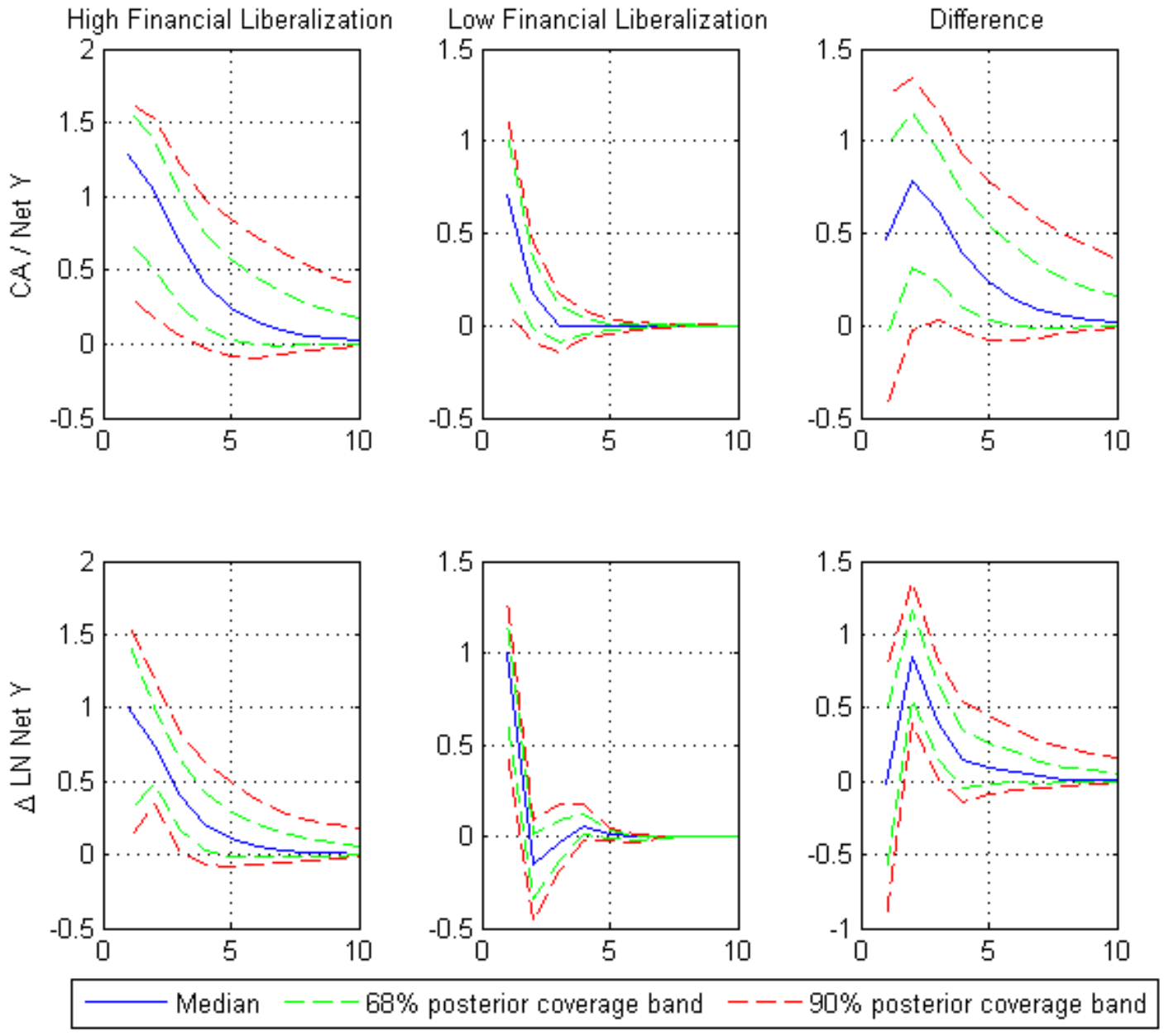
Variable	Level LN NO shock	Difference LN NO shock
$\Delta \ln NO_t$	≥ 0	≥ 0
$\frac{CA_t}{NO_t}$	≥ 0	≤ 0

  - Restrictions also consistent with output and CA response following temporary (growth rate) productivity shock [See Fourier and Koske, 2010; Enders and Mueller, 2009].

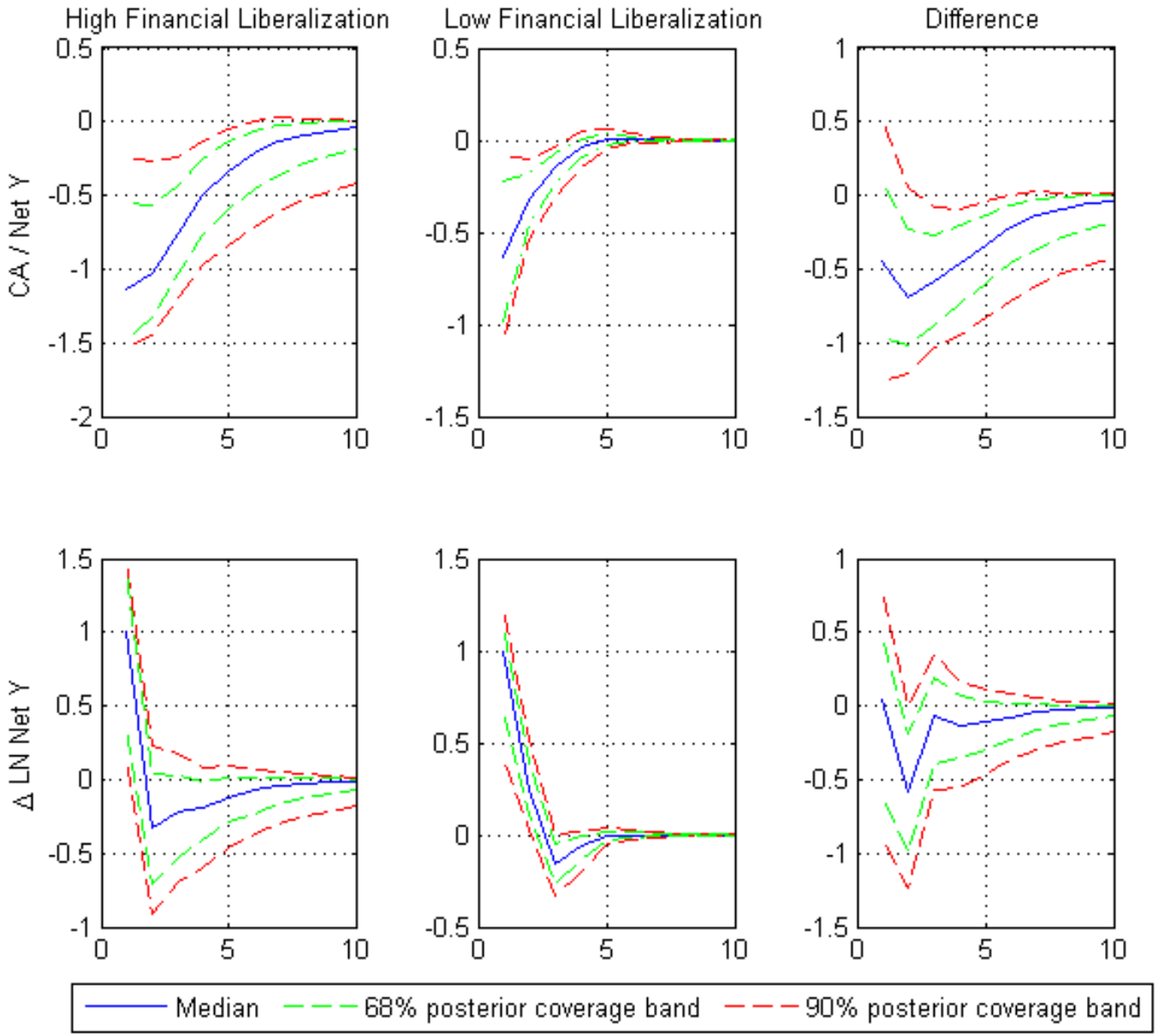
Inference

- To answer: Does Financial liberalisation affect the reaction of CA to Net Output shocks?
- Approach:
  - 1) Obtain VAR Coefficients for financially liberalised economy:
    $$\alpha_{k,c,t}^{i,j,FinLib} = \beta_{k,c,1}^{i,j} + \beta_{k,c,2}^{i,j} * FL_{c,t}^{High} + \beta_{k,c,3}^{i,j} * KA_{c,t}^{Mean} + \beta_{k,c,4}^{i,j} * FXR_{c,t}^{Mean} + \beta_{k,c,5}^{i,j} * TR_{c,t}^{Mean}$$
    - Compute impulse responses to both types of shocks
  - 2) Obtain VAR Coefficients for financially repressed economy:
    $$\alpha_{k,c,t}^{i,j,FinRep} = \beta_{k,c,1}^{i,j} + \beta_{k,c,2}^{i,j} * FL_{c,t}^{Low} + \beta_{k,c,3}^{i,j} * KA_{c,t}^{Mean} + \beta_{k,c,4}^{i,j} * FXR_{c,t}^{Mean} + \beta_{k,c,5}^{i,j} * TR_{c,t}^{Mean}$$
    - Compute impulse responses to both types of shocks
  - Compare distribution of impulse responses from 1) and 2) to asses if current account reaction changes
    - Net output shocks always normalised to 1 upon impact.

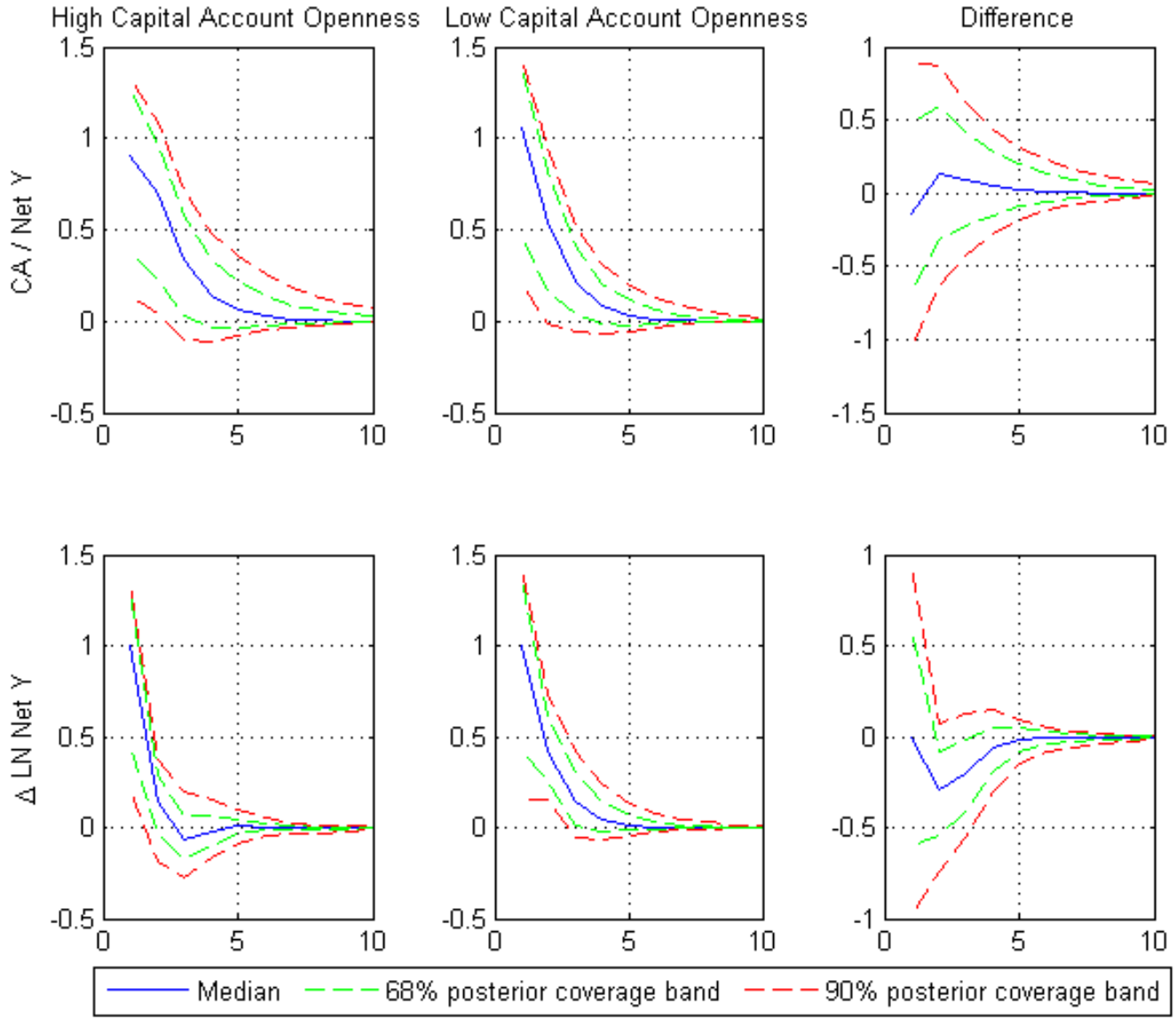
Results – Financial Lib./ Level LN NO shock



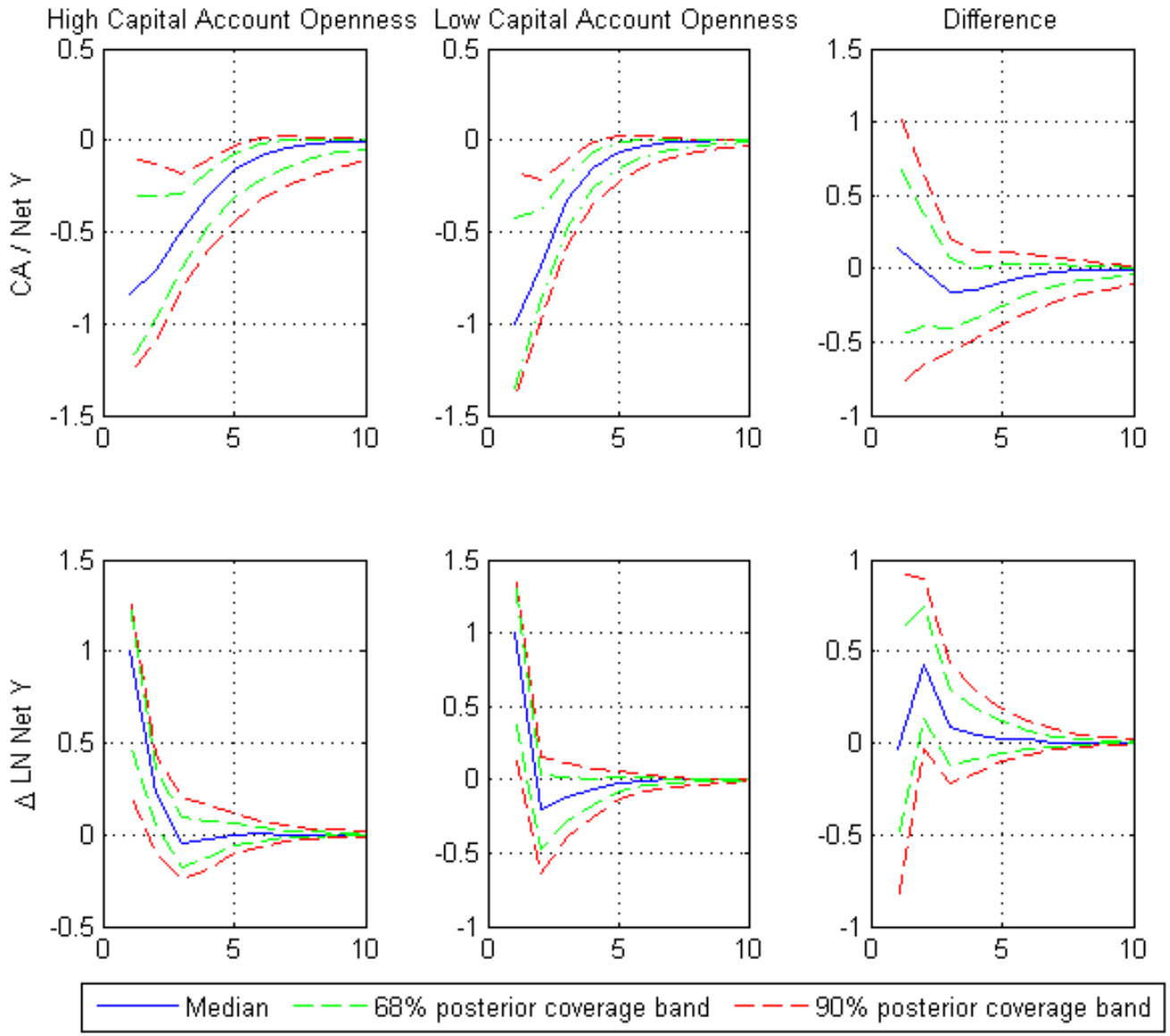
Results – Financial Lib./ Diff. LN NO shock



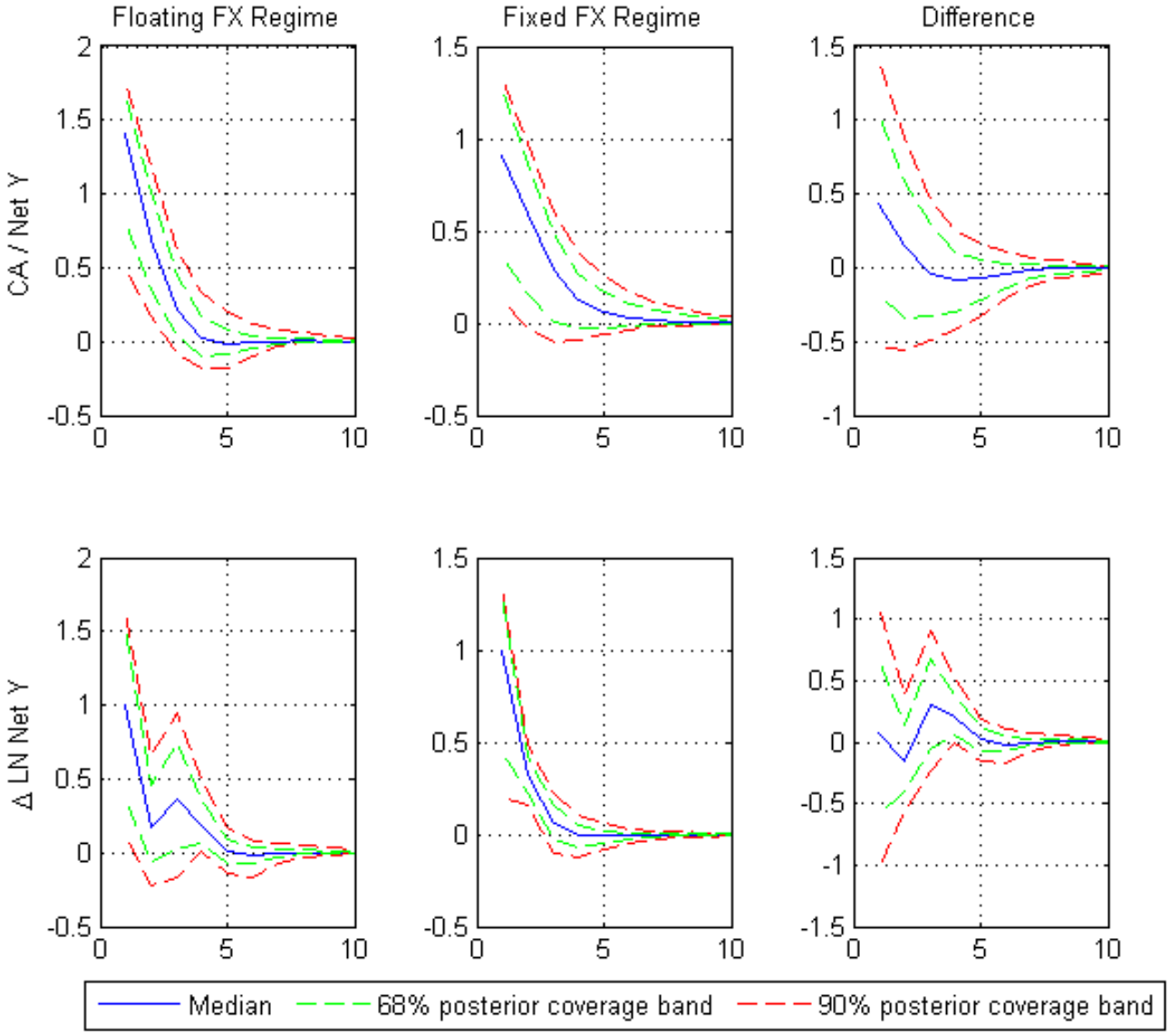
Results – KA OPEN/ Level LN NO shock



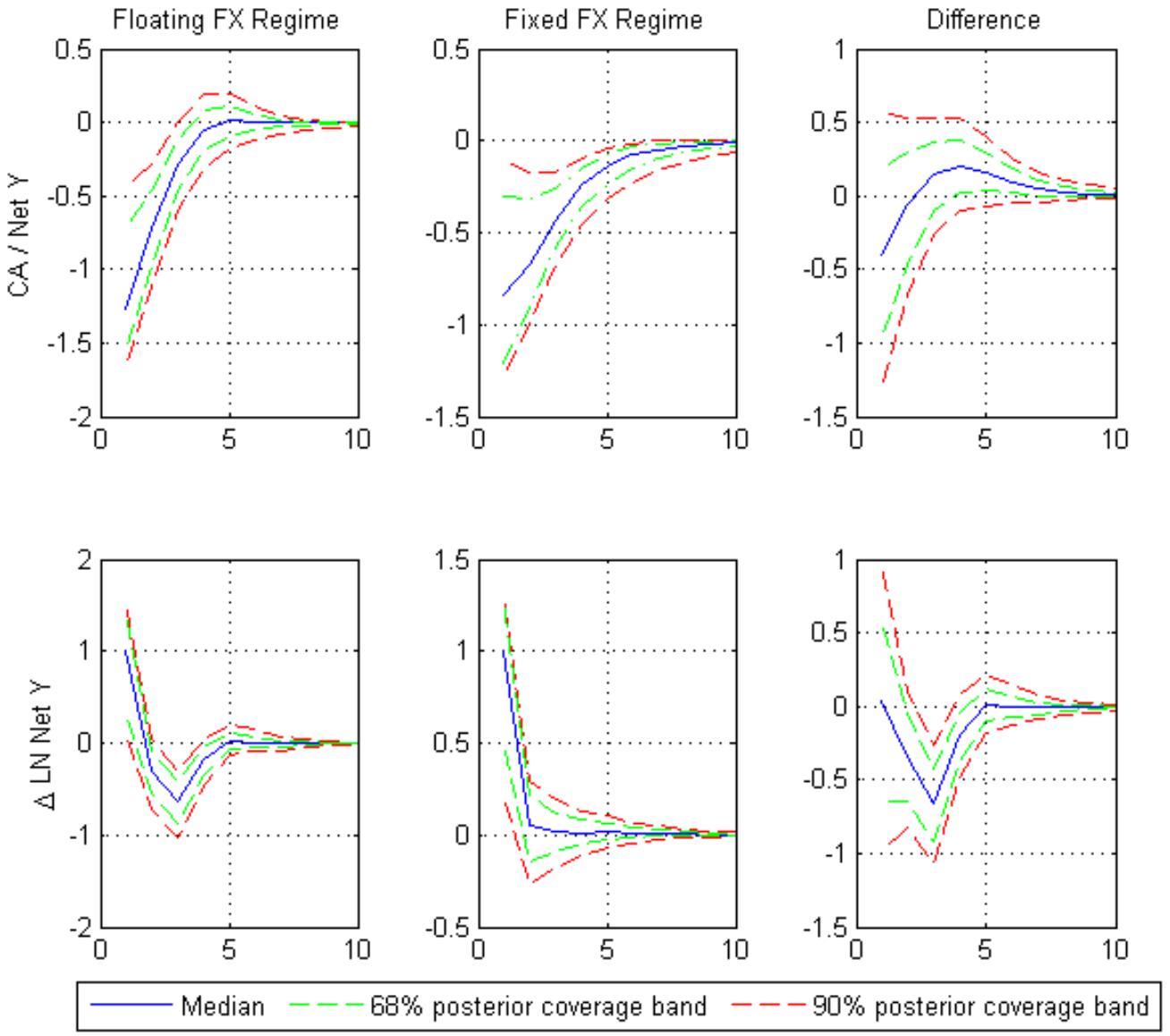
Results – KA OPEN/ Diff. LN NO shock



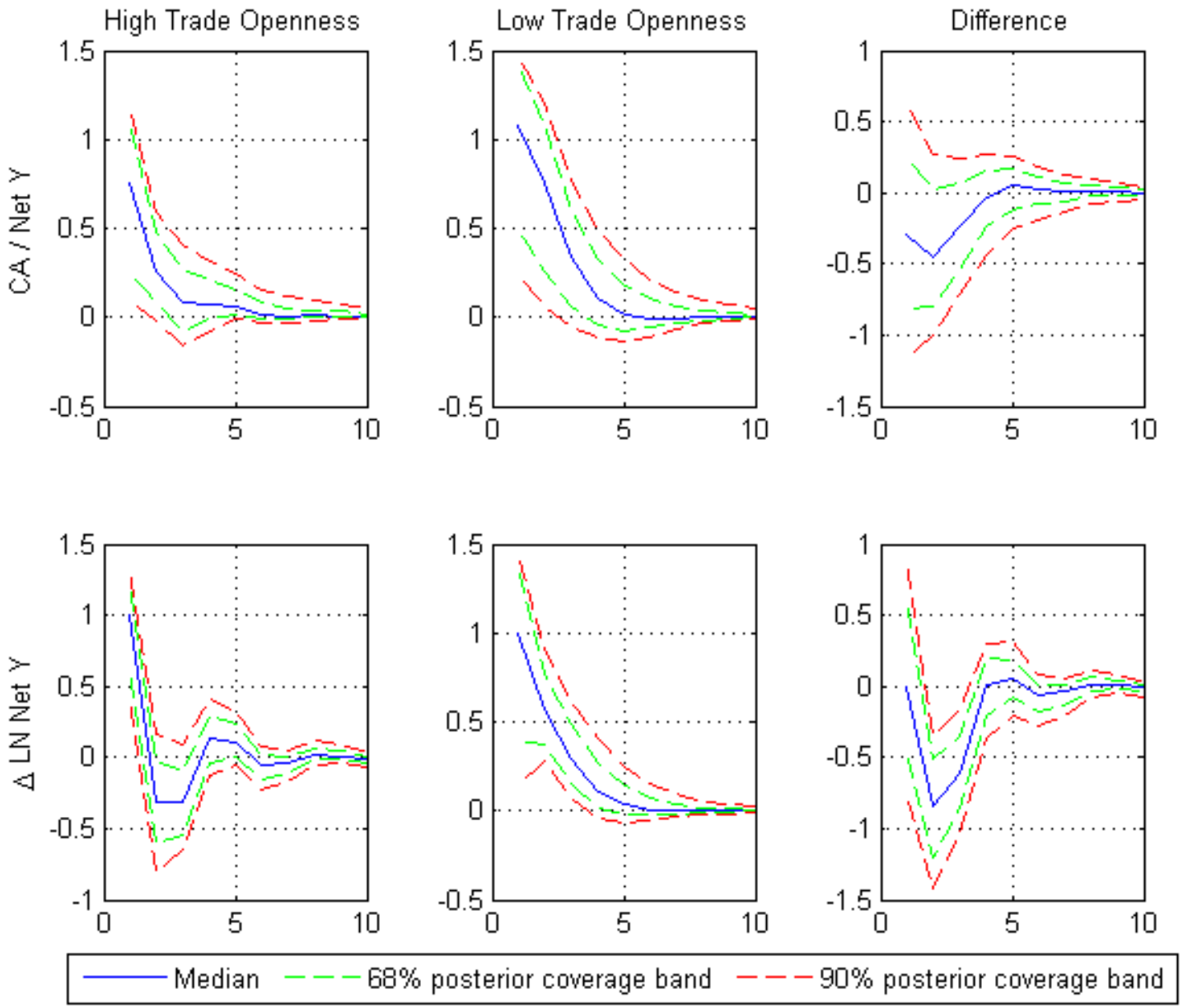
Results – FX Regime/ Level LN NO shock



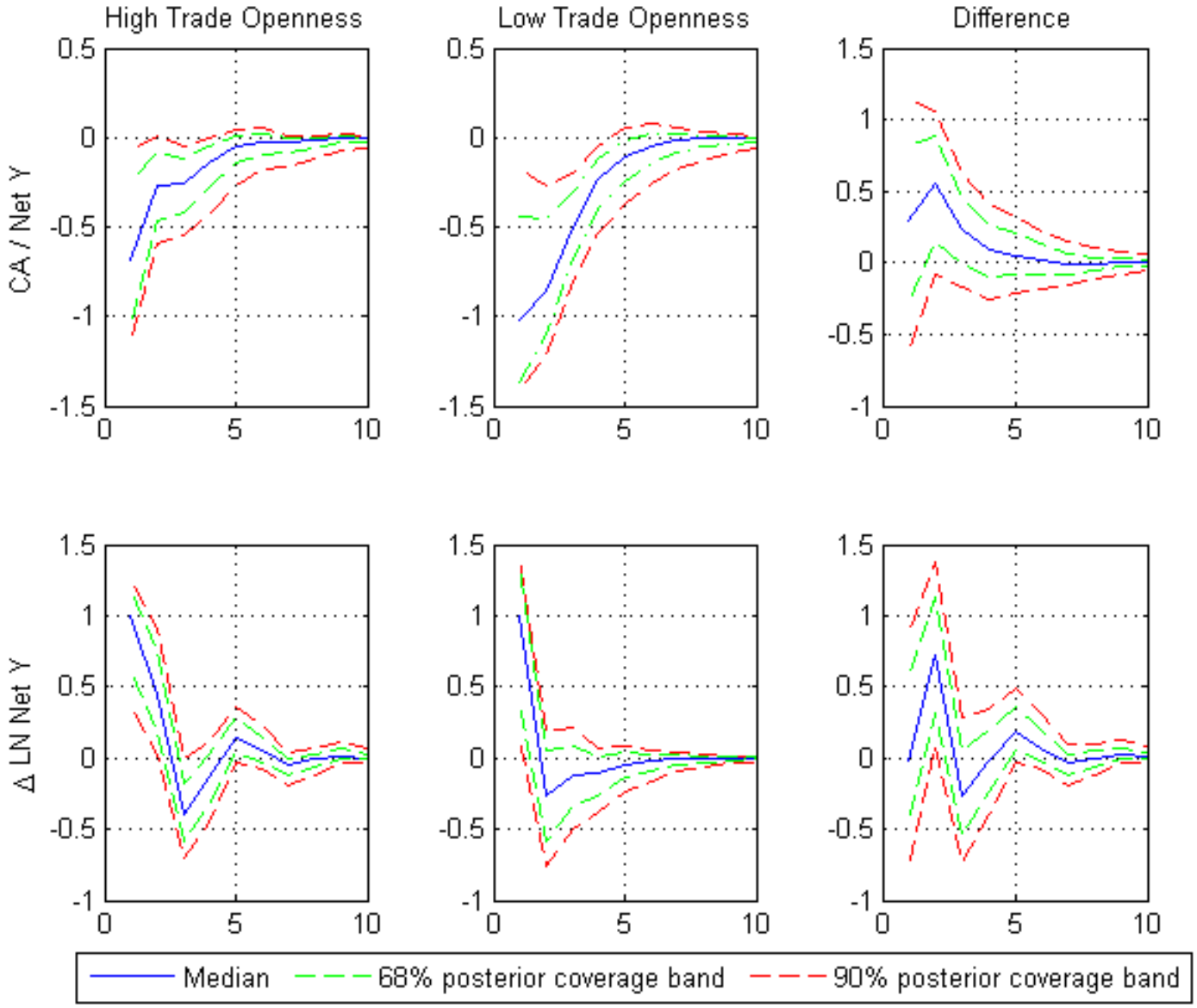
Results – FX Regime/ Diff. LN NO shock



Results – Trade Open/ Level LN NO shock



Results – Trade Open/ Diff. LN NO shock



Robustness

- Results are robust to:
  - Use different FX Regime classification (IRR– Raw vs Fine Classification/ IMF AER)
  - Including Financial development (credit/GDP) as additional economic structure variable
  - Assuming Cross-sectional independence [leads to larger CA/NO responses]
  - Pooling [leads to more persistent responses]

Conclusion

- We explore various determinants of current account adjustment following domestic shocks
- An interacted panel VAR model suggests that in financially liberalised economies, current account response is larger and more persistent
- Any comments would be very welcome.