

# Financial Integration, Financial Deepness and Global Imbalances

Enrique G. Mendoza   Vincenzo Quadrini   José-Víctor Ríos-Rull

University of Maryland, IMF and NBER  
University of Southern California, CEPR and NBER  
University of Minnesota, Penn, Mpls Fed, CAERP, CEPR and NBER

Federal Reserve Bank of New York  
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# Two Mysteries Concerning the U.S. Foreign Imbalance

**Fact 1: Large Global Imbalances.** The US has experienced current account and trade deficits since the beginning of the 1980s: By now, foreign asset liabilities are about 30% of GDP.

A 25 years sustained trade deficit is a **saving** issue not a trade issue:

$$Investment = \mathbf{Saving} - NetExport$$

**Fact 2: Large differences in foreign asset composition.** The U.S. still receives net positive capital income payments.

Net foreign indebtedness & positive capital income is a **portfolio** issue.

# Observations to link these facts with financial differences and financial liberalization

- 1 Measures of financial development or financial deepness differ sharply across countries, even across industrialized countries. Moreover, these differences have changed little during the past 10 years.
- 2 The net foreign asset position of the country with the highest level of financial development—the United States—shows a secular decline that began at roughly the same time as the major financial liberalization reforms in industrialized and emerging economies
- 3 Net exports and current account balances, as a share of GDP, are negatively correlated with proxies for the degree of financial markets development.

# We ask three questions

- 1 If countries involved in the process of financial integration are characterized by different financial structures, can we expect to see the type of imbalances observed in the data?

YES

- 2 Are these imbalances temporary or permanent?

Their Development can take a long time

- 3 Are policies aiming at reverting the imbalances desirable?

Not necessarily, but important welfare issues arise.

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# What do we do?

- We construct a multiple country model where countries differ in the degree of financial development and where in each country there are many households that are subject to two types of idiosyncratic risks: endowment (labor) and investment.
- We then look at what happens and we find that the introduction of financial integration leads to
  - With only endowment risks:  $\Rightarrow$  **Fact 1**
  - With only investment risks:  $\Rightarrow$  **Fact 2**
  - With both endowment and investment risks:  $\Rightarrow$  **Facts 1 & 2**

# Features of the model

- In addition to the risky individual endowment that agents have there is a productive asset in fixed supply, traded at price  $P_t$ , that can be used in production by each individual agent via a stochastic production function with decreasing returns.

$$y_{t+1} = z_{t+1}k_t^\nu$$

- There is a limited amount of contingent claims. The limit is country specific. We provide a theory of these limits based on country specific enforceability constraints.
- An important feature of these limits is that they pertain to residents and not to production. Hence Americans that engage in economic activity abroad can use the American legal system.

# MODEL

- There are  $I$  countries with a continuum of agents maximizing:

$$E_0 \sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\sigma}}{1-\sigma}$$

- Agents receive a stochastic idiosyncratic endowment  $w_t$ .
- There is a productive asset in fixed supply, traded at price  $P_t$ .
- The asset can be used in production by each individual agent:

$$y_{t+1} = z_{t+1} k_t^\nu$$

$z_{t+1}$  = Idiosyncratic investment shock

$k_t$  = Asset used in production

- The transition probability for the shocks,  $s \equiv (w, z)$ , is  $g(s_t, s_{t+1})$ .

# Financial structure

- There are contingent claims. The budget constraint is

$$a_t = c_t + k_t P_t^i + \sum_{s_{t+1}} b(s_{t+1}) q_t^i(s_t, s_{t+1})$$

$$a(s_{t+1}) = w_{t+1} + k_{t+1} P_{t+1}^i + z_{t+1} k_t^\nu + b(s_{t+1})$$

- There are restrictions to the set of feasible contingent claims:

$$a(s_j) - a(s_1) \geq (1 - \phi^i) \cdot [w_j - w_1 + (z_j - z_1) k_t^\nu]$$

$$a(w_j) \geq 0$$

- $\phi^i$  characterizes the financial structure of the country and it applies to residents not production.  $\phi^i = 1$  is complete markets;  $\phi^i = 0$  no contingencies.

# REMARK

The restrictions are derived endogenously from an environment in which:

- 1 Endowments are observable but not verifiable.
- 2 Agents can divert a fraction  $(1 - \phi^i)$  of the endowment.
- 3 There is limited liability.

# OPTIMIZATION PROBLEM

$$V_t^i(s, a) = \max_{c, k, b(s')} \left\{ U(c) + \beta \sum_{s'} V_{t+1}^i(s', a'(s')) g(s, s') \right\}$$

subject to

$$a = c + kP_t^i + \sum_{s'} b(s') q_t^i(s, s')$$

$$a'(s') = w' + kP_{t+1}^i + z'k^\nu + b(s')$$

$$a'(s_j) - a'(s_1) \geq \phi^i \cdot [w_j - w_1 + (z_j - z_1)k_t^\nu], \quad a(s_j) \geq 0$$

# Equilibria

- We look at equilibria under autarky (two different set of market clearing conditions, two prices for the asset and two interest rates). This we do in St St.
- Under capital mobility there is only one set of market clearing conditions, one price for the asset and one interest rate. This we do in St St.
- We look at an equilibria with capital mobility with the initial conditions that hold in the St St of autarky (transition).



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# 1. Autarky St St with only Endowment Shocks

$\phi = \text{large enough}$

$$U'(c) = \beta(1 + r_t) U'[c(w')], \quad \forall w'$$

$$U'(c) = \beta R_t(k, \bar{z}) E\{U'[c(w')]\}$$

So constant consumption,  $r = \frac{1}{\beta} - 1$  and all have the same capital.

$\phi = 1$

$$U'(c) = \beta(1 + r_t) E\{U'[c(w')]\}$$

$$U'(c) = \beta R(k, \bar{z}) E\{U'[c(w')]\}$$

Consumption varies,  $r < \frac{1}{\beta} - 1$  and all have the same capital.

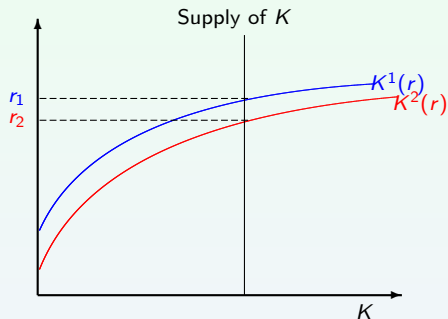
# 1. Steady State Under Autarky

- Under autarky, interest rates and the total value of assets differ across countries.
- The country with worse financial development (reduced set of contingent claims) holds more wealth and has a lower interest rate, (essentially for precautionary reasons; in our environment this means that the asset is more expensive).

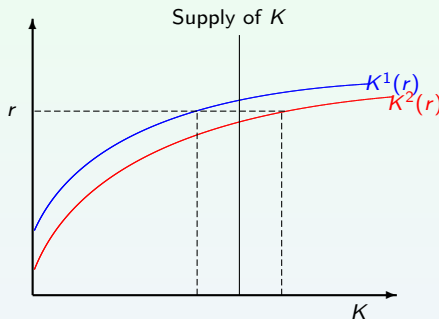
## 2. Steady State with Capital Mobility

- Under capital mobility there market clears globally: there is one price for the asset and one interest rate.
- Because of a riskier environment in the country with less financial development, its households hold more wealth than those in the more financially developed country.

# GRAPHICAL INTUITION



a) Autarky



b) Mobility

## Quantitative Application (the US is the financially developed country)

- Financially developed country is 30% of financially underdeveloped (does not matter how).
- World-wide wealth to income ratio with capital mobility is 3.5.
- Risk-aversion  $\sigma = 2.5$ .
- Endowments: Storesletten Telmer and Yaron measurements.
- Production. Fluctuations on individual returns between -6% and 15%.
- Financial structure,  $\phi^1 = 0.64$ ,  $\phi^2 = 0$

# Steady state with only endowment shocks

	<b>Autarky</b>		<b>Capital mobility</b>	
	<i>Financ dev</i>	<i>Financ underd</i>	<i>Financ dev</i>	<i>Financ underd</i>
Asset price	3.08	3.44		
Interest rate	3.66%	3.27%		
Foreign asset position %	-	-		
Net exports	-	-		
Net factor payments	-	-		



# Steady state with only endowment shocks

	<b>Autarky</b>		<b>Capital mobility</b>	
	<i>Financ dev</i>	<i>Financ underd</i>	<i>Financ dev</i>	<i>Financ underd</i>
Asset price	3.08	3.44	3.33	3.33
Interest rate	3.66%	3.27%	3.38%	3.38%
Foreign asset position %	-	-		
Net exports	-	-		
Net factor payments	-	-		

# Steady state with only endowment shocks

	Autarky		Capital mobility	
	<i>Financ dev</i>	<i>Financ underd</i>	<i>Financ dev</i>	<i>Financ underd</i>
Asset price	3.08	3.44	3.33	3.33
Interest rate	3.66%	3.27%	3.38%	3.38%
Foreign asset position %	-	-	<b>-45.85%</b>	19.65%
Net exports	-	-	1.55%	-0.66%
Net factor payments	-	-	-1.55%	0.66%

- The model with only endowment shocks captures **Fact 1** (large imbalances) but it does not capture **Fact 2** (positive factor payments).

# Steady state with only investment shocks

	<b>Autarky</b>		<b>Capital mobility</b>	
	<i>Financ dev</i>	<i>Financ underd</i>	<i>Financ dev</i>	<i>Financ underd</i>
Asset price	1.23	1.17		
Interest rate	8.31%	7.02%		
Return on risky asset	12.18%	12.66%		
Foreign asset position	-	-		
Foreign bonds	-	-		
Foreign risky asset	-	-		
Net exports	-	-		
Net factor payments	-	-		

# Steady state with only investment shocks

	<b>Autarky</b>		<b>Capital mobility</b>	
	<i>Financ dev</i>	<i>Financ underd</i>	<i>Financ dev</i>	<i>Financ underd</i>
Asset price	1.23	1.17	1.20	1.20
Interest rate	8.31%	7.02%	7.58%	7.58%
Return on risky asset	12.18%	12.66%	11.54%	12.99%
Foreign asset position	-	-		
Foreign bonds	-	-		
Foreign risky asset	-	-		
Net exports	-	-		
Net factor payments	-	-		

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	Autarky		Capital mobility	
	<i>Financ dev</i>	<i>Financ underd</i>	<i>Financ dev</i>	<i>Financ underd</i>
Asset price	1.23	1.17	1.20	1.20
Interest rate	8.31%	7.02%	7.58%	7.58%
Return on risky asset	12.18%	12.66%	11.54%	12.99%
Foreign asset position	-	-	<b>-17.78%</b>	7.51%
Foreign bonds	-	-	<b>-62.43%</b>	26.36%
Foreign risky asset	-	-	<b>44.64%</b>	-18.85%
Net exports	-	-	-0.42%	0.18%
Net factor payments	-	-	0.42%	-0.18%

- 1 The financially developed country has a negative asset position.
- 2 The financially developed country has a positive position in the foreign productive asset.

# Steady state with endowment and investment shocks

	<b>Autarky</b>		<b>Capital mobility</b>	
	<i>Financ dev</i>	<i>Financ underd</i>	<i>Financ dev</i>	<i>Financ underd</i>
Asset price	2.60	3.25		
Interest rate	3.44%	1.71%		
Return on risky asset	5.70%	4.47%		
Foreign asset position	-	-		
Foreign bonds	-	-		
Foreign risky asset	-	-		
Current account	-	-		
Net exports	-	-		
Net factor payments	-	-		

# Steady state with endowment and investment shocks

	<b>Autarky</b>		<b>Capital mobility</b>	
	<i>Financ dev</i>	<i>Financ underd</i>	<i>Financ dev</i>	<i>Financ underd</i>
Asset price	2.60	3.25	2.89	2.89
Interest rate	3.44%	1.71%	2.69%	2.69%
Return on risky asset	5.70%	4.47%	4.75%	5.63%
Foreign asset position	-	-		
Foreign bonds	-	-		
Foreign risky asset	-	-		
Current account	-	-		
Net exports	-	-		
Net factor payments	-	-		

## Steady state with endowment and investment shocks

	Autarky		Capital mobility	
	<i>Financ dev</i>	<i>Financ underd</i>	<i>Financ dev</i>	<i>Financ underd</i>
Asset price	2.60	3.25	2.89	2.89
Interest rate	3.44%	1.71%	2.69%	2.69%
Return on risky asset	5.70%	4.47%	4.75%	5.63%
Foreign asset position	-	-	<b>-43.4%</b>	42.6%
Foreign bonds	-	-	<b>-143.0%</b>	140.6%
Foreign risky asset	-	-	<b>99.6%</b>	-98.0%
Current account	-	-	0.0%	0.0%
Net exports	-	-	-0.9%	0.9%
Net factor payments	-	-	0.9%	-0.9%

- The model with endowment and investment shocks captures both
  - **Fact 1** (negative foreign asset position) and
  - **Fact 2** (positive factor payments).



# What about the transition from autarky towards financial integration?

- It takes a long time.
- There are there are interesting welfare properties:

# First the Aggregate Welfare Numbers

**Table:** Equally weighted welfare gains (percent of consumption).

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	Financ dev	Financ underd
Economy with both risks	2.71	-1.00
Economy with endowment risks	2.86	-1.33
Economy with investment risks	0.47	-0.18

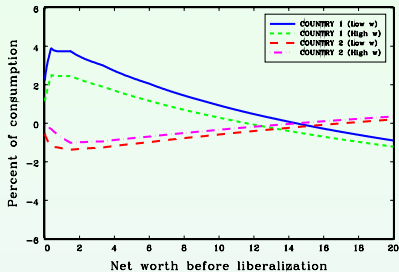
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There are two things that change.

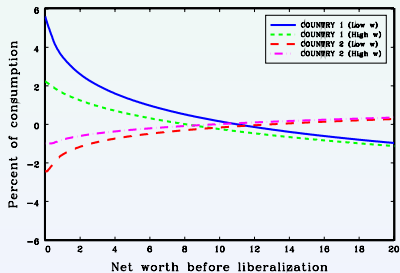
- 1 The price of the asset. Capital Gains and capital losses.
- 2 The relative prices of consumption (interest rates). When they increase it favors the wealth rich/labor poor households. When they decrease they favor the labor rich/wealth poor households.

So let's look at the cross section.

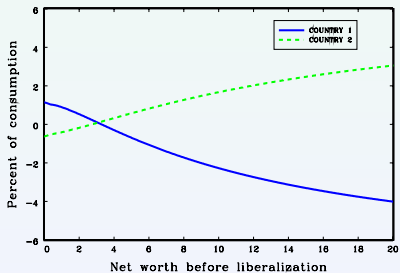
### Both Shocks



### Endowment Shocks Only



### Investment Shocks Only



# Conclusions

- Capital markets liberalization may result in large and persistent global imbalances when countries have heterogeneous financial characteristics.
- Financial markets differences also affect the composition of the portfolio of foreign assets.
- These patterns are consistent with the US imbalance since the beginning of the 1980s.
- There are reasons to argue for sustaining capital controls.

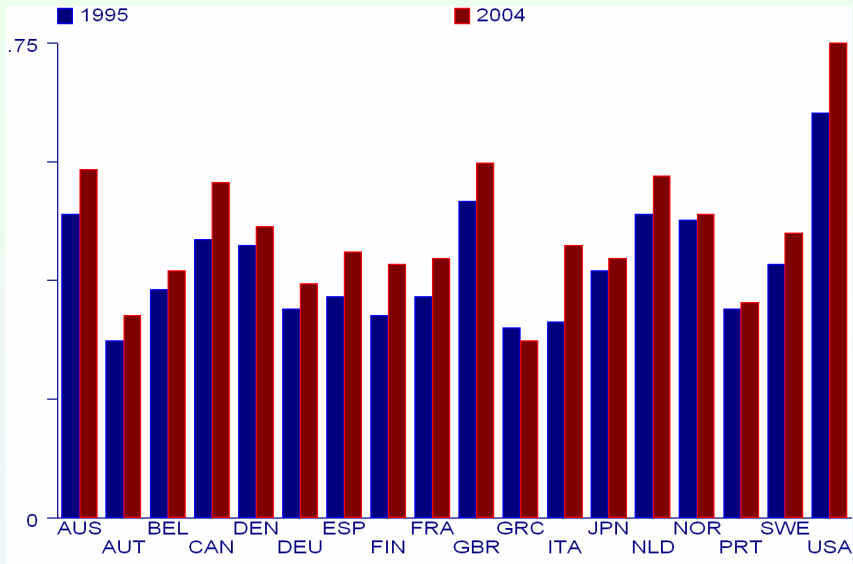


Figure: 1. Financial index score for advanced economies. IMF(2006), Ch 4.

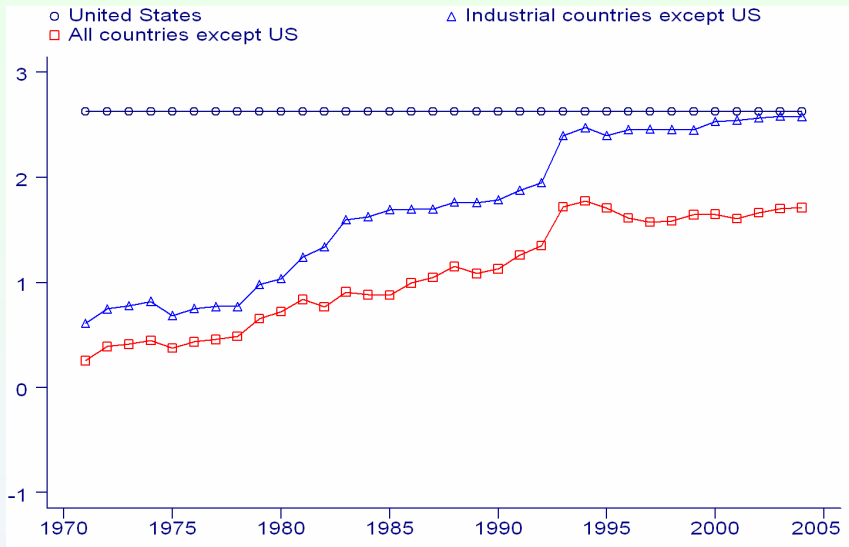


Figure: 2. Financial openness index, 1970-2004. Source Chinn and Ito (2005) and [www.ssc.wisc.edu/~mchinn/research.html](http://www.ssc.wisc.edu/~mchinn/research.html).

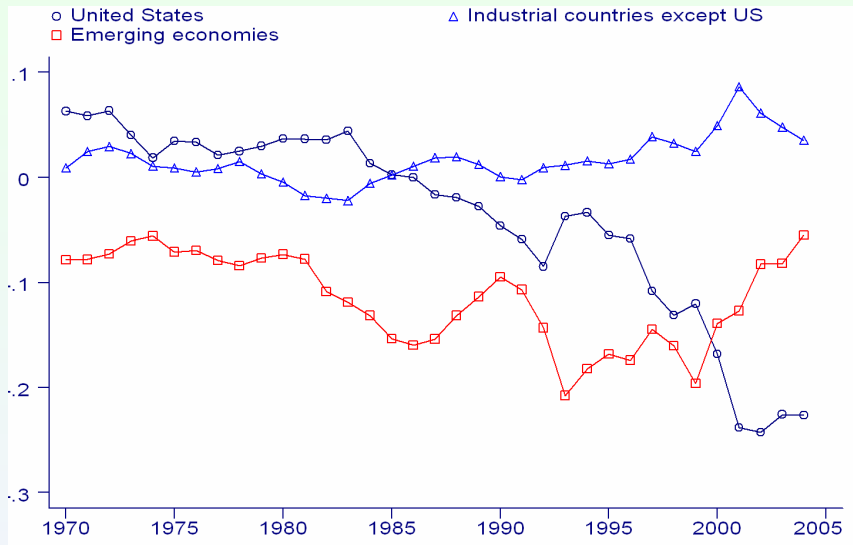


Figure: 3. Net foreign asset position relative to GDP, 1970-2004. Source: Lane and Milesi-Ferretti (2006).

coef =  $-.05976515$ , se =  $.00878629$ , t =  $-6.8$

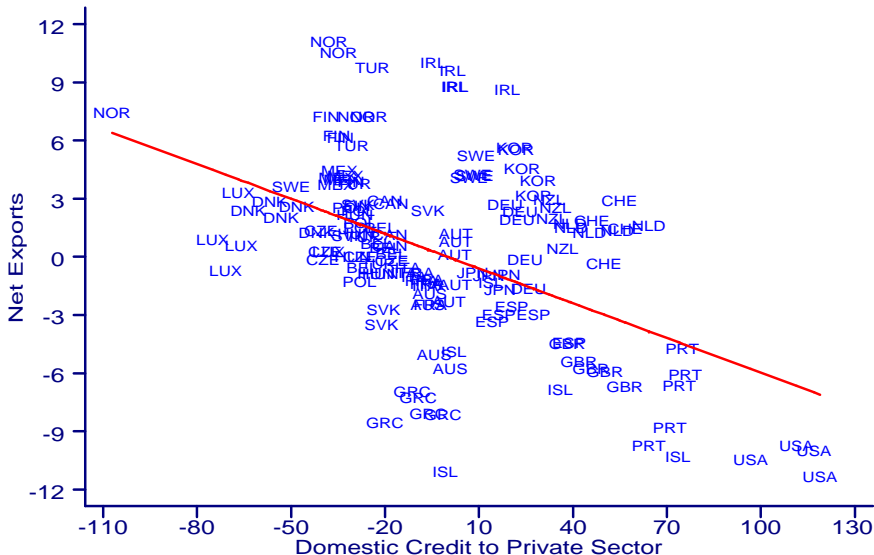


Figure: 4. Net exports and domestic credit in OECD countries, 2000-2004.



## 2. Autarky St St with only Investment Shocks

$\phi = \text{large enough}$

$$U'(c) = \beta (1 + r_t) U'[c(z')], \quad \forall z'$$

$$U'(c) = \beta E\{R_t(k, z') U'[c(z')]\}$$

So constant consumption,  $r = \frac{1}{\beta} - 1$  and all have the same capital.

$\phi = 0$

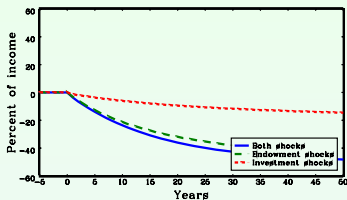
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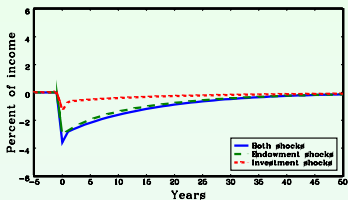
$$(1 + r_t)EU'[c(z')] = E R_t(k, z') E U'[c(z')] + \text{Cov}\left(R_t(k, z'), U'(c(z'))\right)$$

Consumption and capital vary: Second term is negative so there is a risk premium.

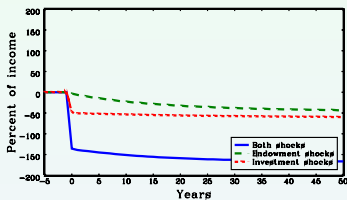
Net Foreign Asset Position



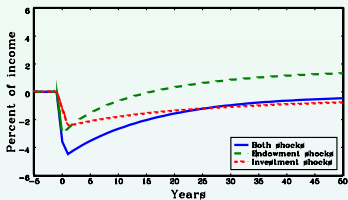
Current Account



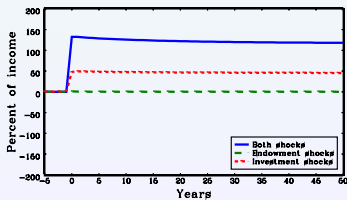
Foreign Bonds



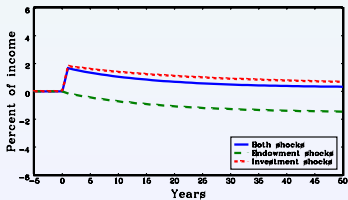
Net Exports

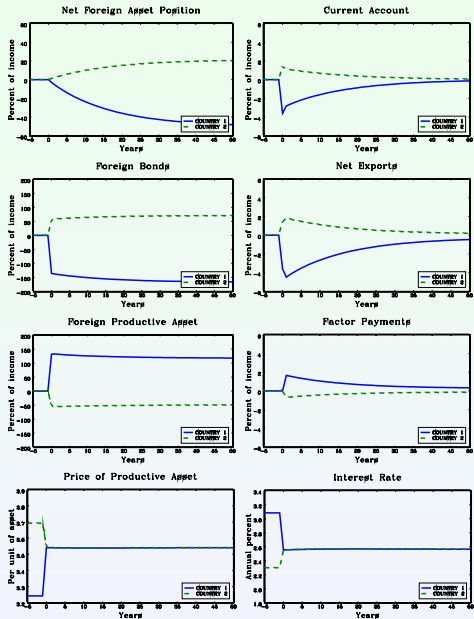


Foreign Productive Asset



Factor Payments





# SOME SUGGESTIVE EVIDENCE

$$NEX_{it} = \alpha_0 + \alpha_1 \cdot CREDIT_{it} + \alpha_2 \cdot CGDP_{it} + \varepsilon_{it}$$

- NEX* = Net exports or current account, in percentage of GDP  
*CREDIT* = Domestic credit to the private sector, in percentage of GDP  
*CGDP* = Per-capita GDP

# Pooled regression

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	Net Exports			Current Account		
	2000-2004	1995-2004	1990-2004	2000-2004	1995-2004	1990-2004
<i>CREDIT</i>	-0.0598 (0.0088)*	-0.0509 (0.0068)*	-0.0457 (0.0056)*	-0.0349 (0.0099)*	-0.0269 (0.0069)*	-0.0224 (0.0055)*
<i>CGDP</i>	0.00063 (0.00004)*	0.00058 (0.00003)*	0.00054 (0.00003)*	0.00041 (0.00005)*	0.00039 (0.00004)*	0.00035 (0.00003)*
<i>CONSTANT</i>	-8.287 (0.950)*	-7.589 (0.688)*	-6.867 (0.539)	-7.053 (1.121)*	-6.713 (0.722)*	-6.073 (0.538)*
$R^2$	0.633	0.525	0.468	0.353	0.318	0.285
Obs.	144	289	432	145	289	428

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coef = -.05976515, se = .00878629, t = -6.8

