

**ORIGINAL SIN AND DARK MATTER
(STILL) MATTER:
ASSET COMPOSITION AND SOLVENCY**

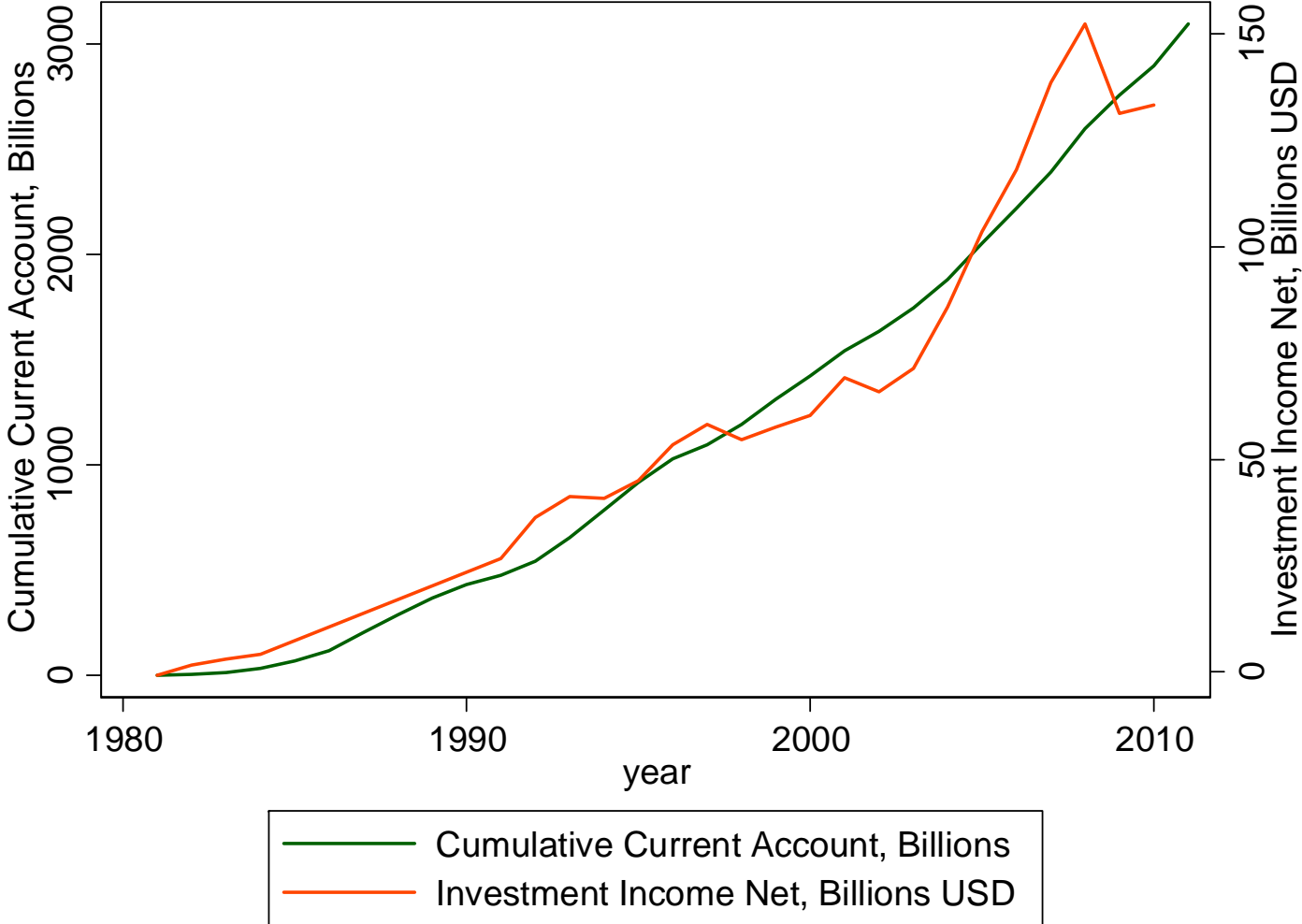
Ricardo Hausmann
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Santa Fe Institute

Why do we care about deficits?

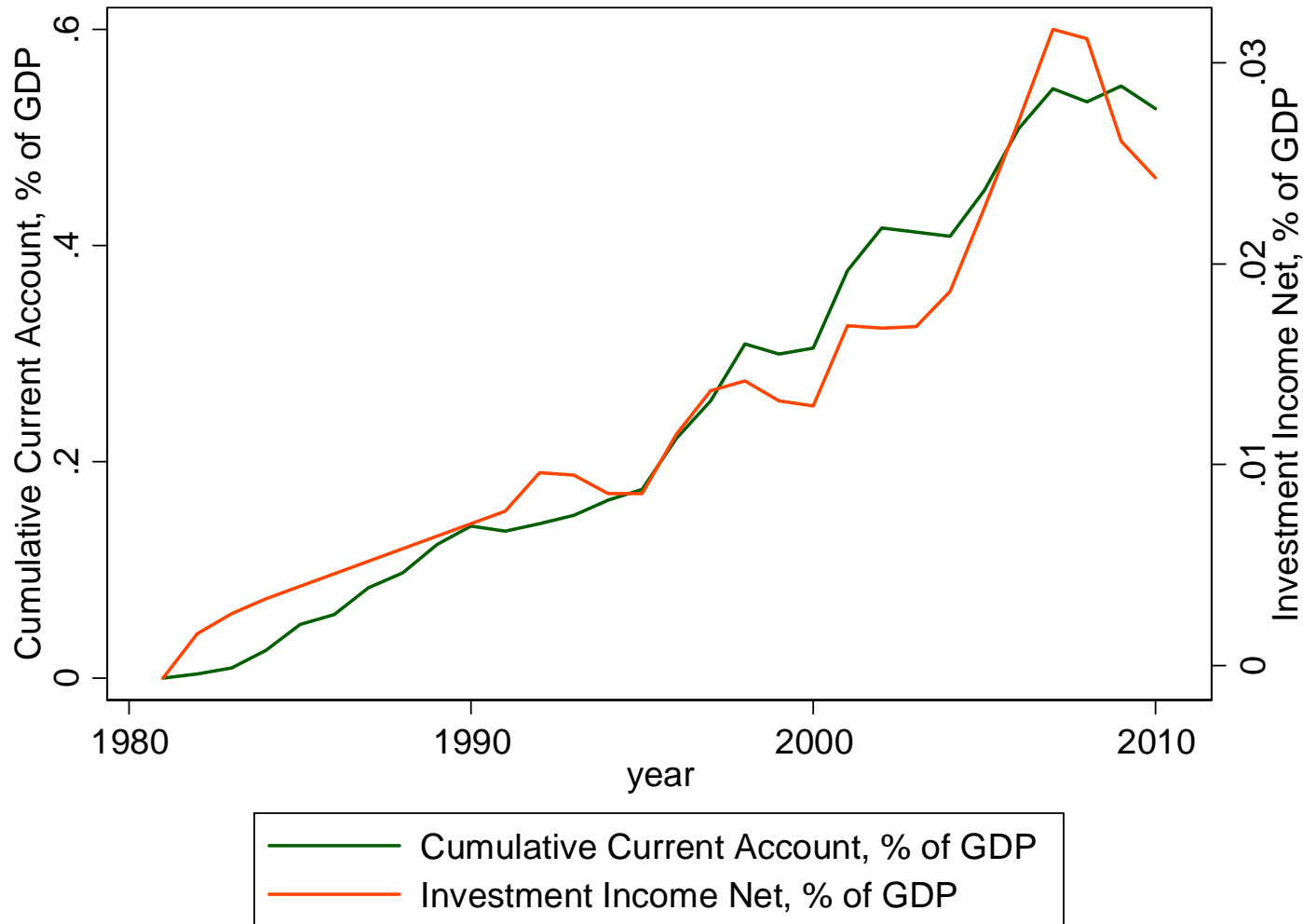
- Because deficits determine the evolution of net financial assets
- Surplus = Δ Net Financial Assets = Δ NFA
- Financial income is a function of financial assets and liabilities
- $\text{Fin.Income} = i * \text{NFA}$
- The higher the debt, the higher the primary surplus needed to be solvent
- Steady State Primary Surplus = $(i - g) d$
- Where g is the nominal growth rate and d is the debt to GDP ratio
- This is true both for fiscal dynamics as well as balance of payments dynamics

For example, let us look at Japan

Japan accumulated US\$ 3 T in CAS and increased its Fin. Income in US\$ B 140



Japan accumulated ~50% of GDP in CAS and 2.5% in net financial income



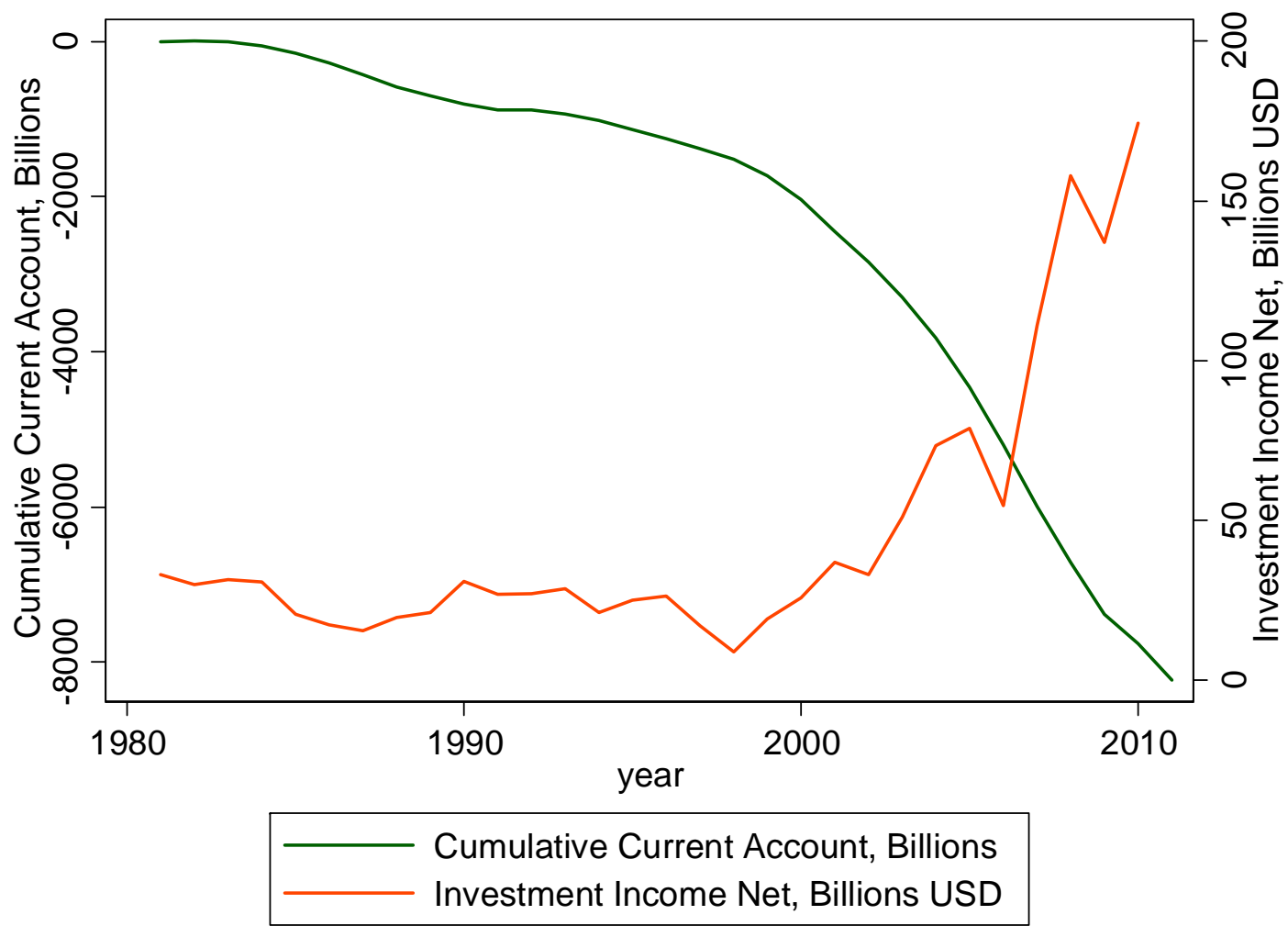
Japan: implied interest rate is reasonable



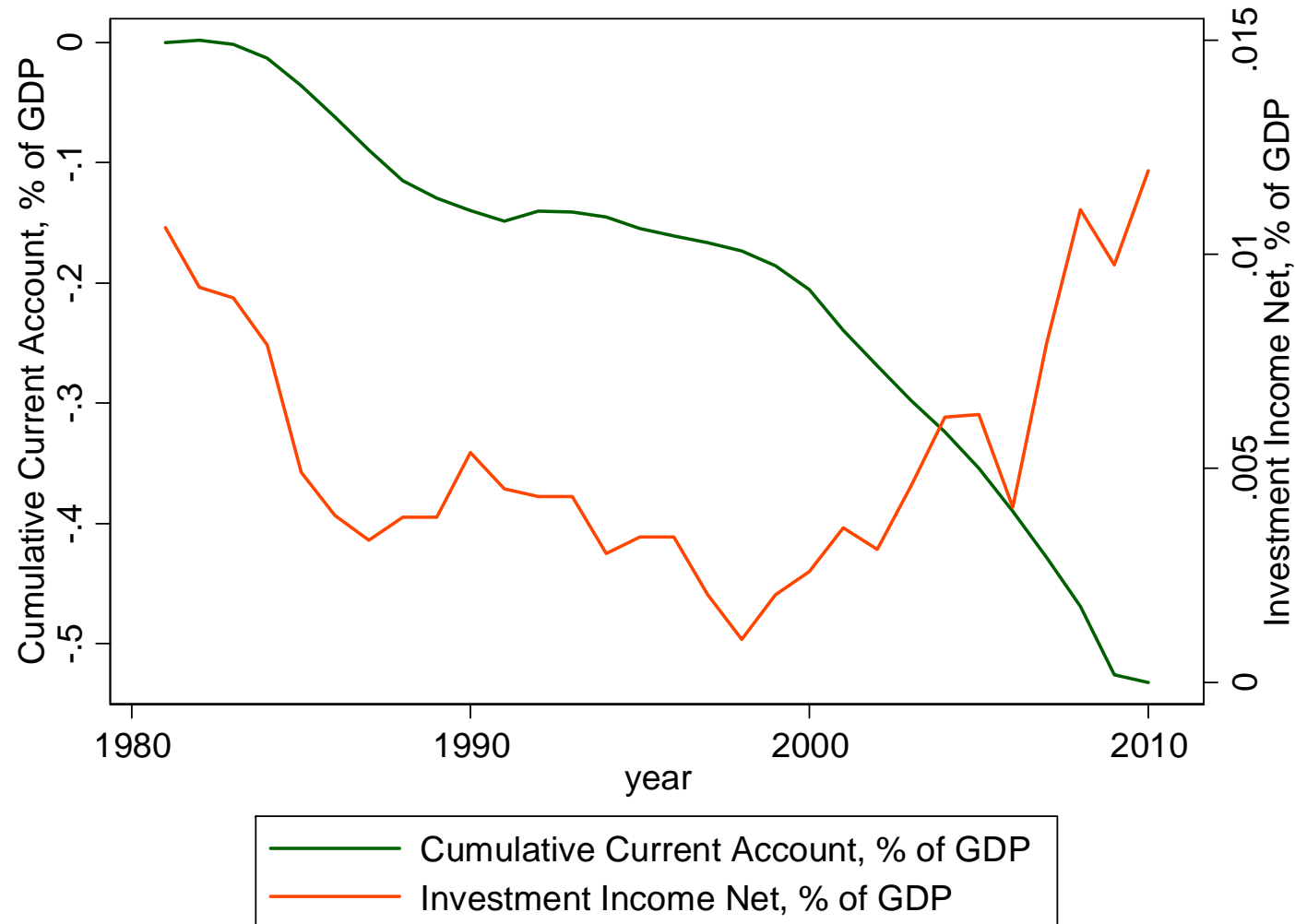
But many countries do not look
like Japan

Let us look at the US

The US accumulated US\$ 8 T in CAD,
but its fin. income went up by US\$ 130B



The cumulative CAD is 50% of GDP
Financial income increased 1% of GDP



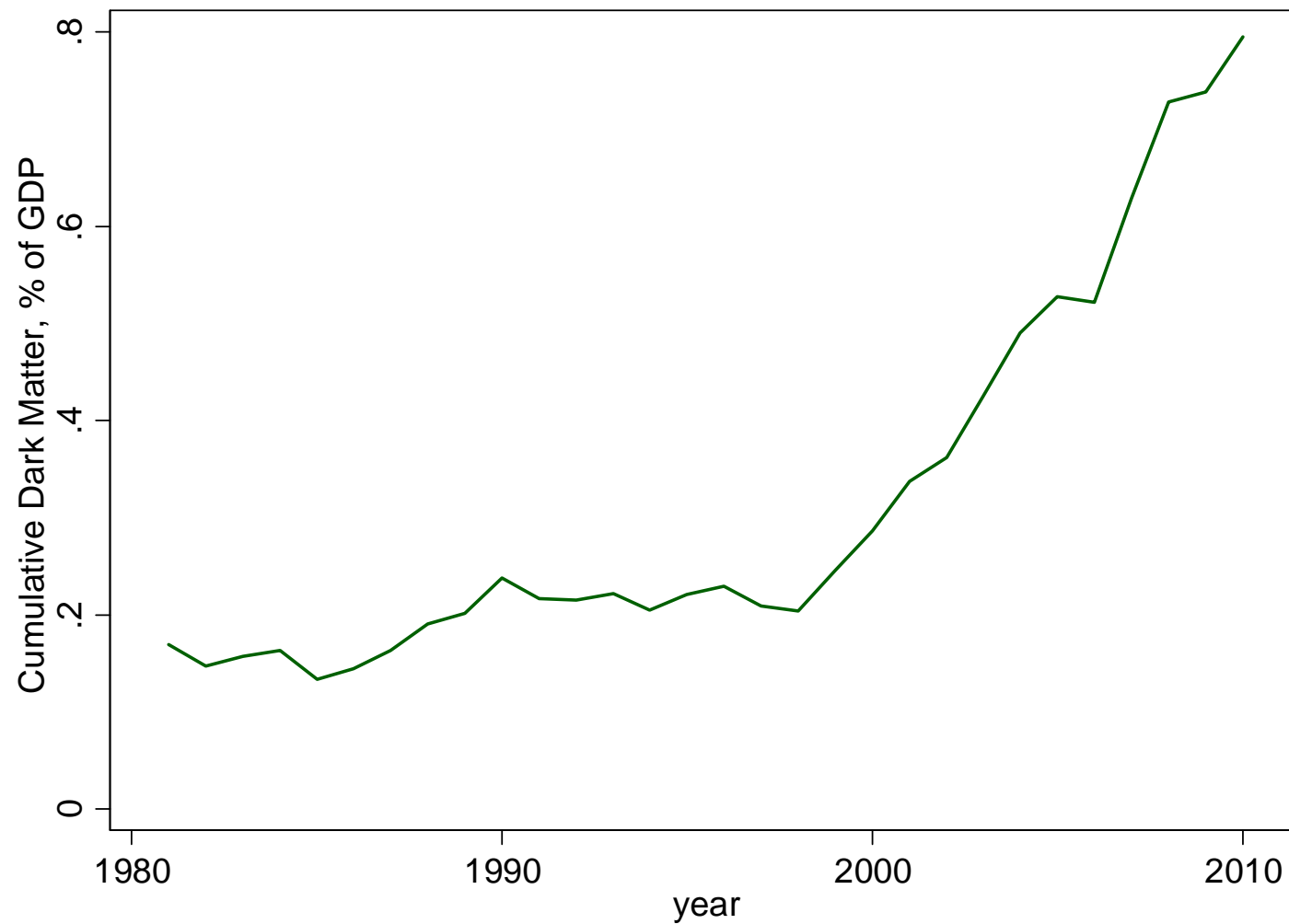
The US pays a negative interest rate on its net financial position



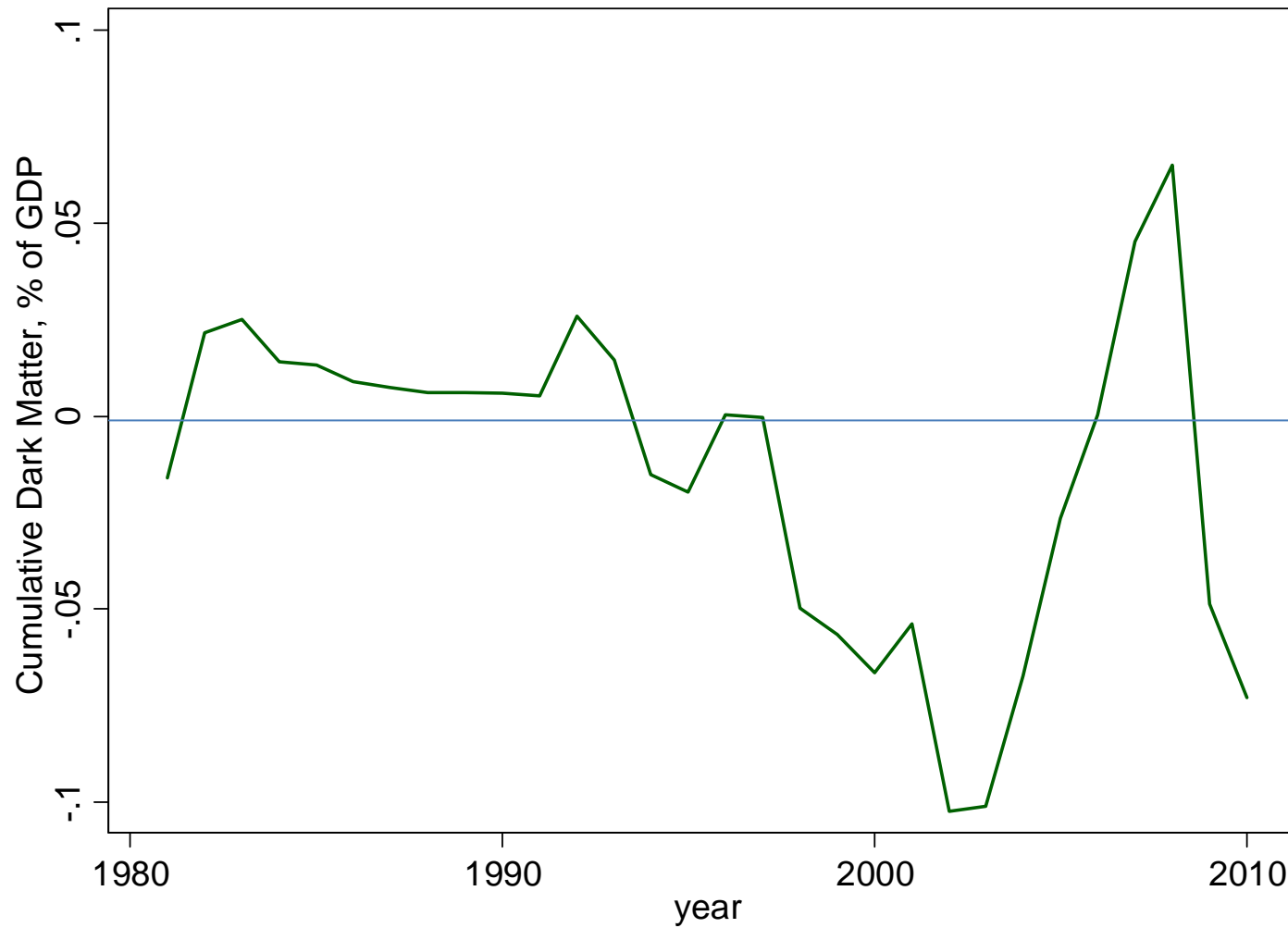
One accounting approach

- Consider that all assets pay a benchmark rate
 - Say 5%
- If you can invest and obtain a higher return, it is as if you own an asset that pays also pays 5% and that represents the difference
- If you pay more than 5%, it is as if you borrowed a larger debt that also pays 5% but that represents the same interest payment
- We call this asset “dark matter”
 - Hausmann and Sturzenegger (2006) (2007)

US dark matter is 80 percent of GDP



Japan's dark matter is insignificant



How can the US do this?

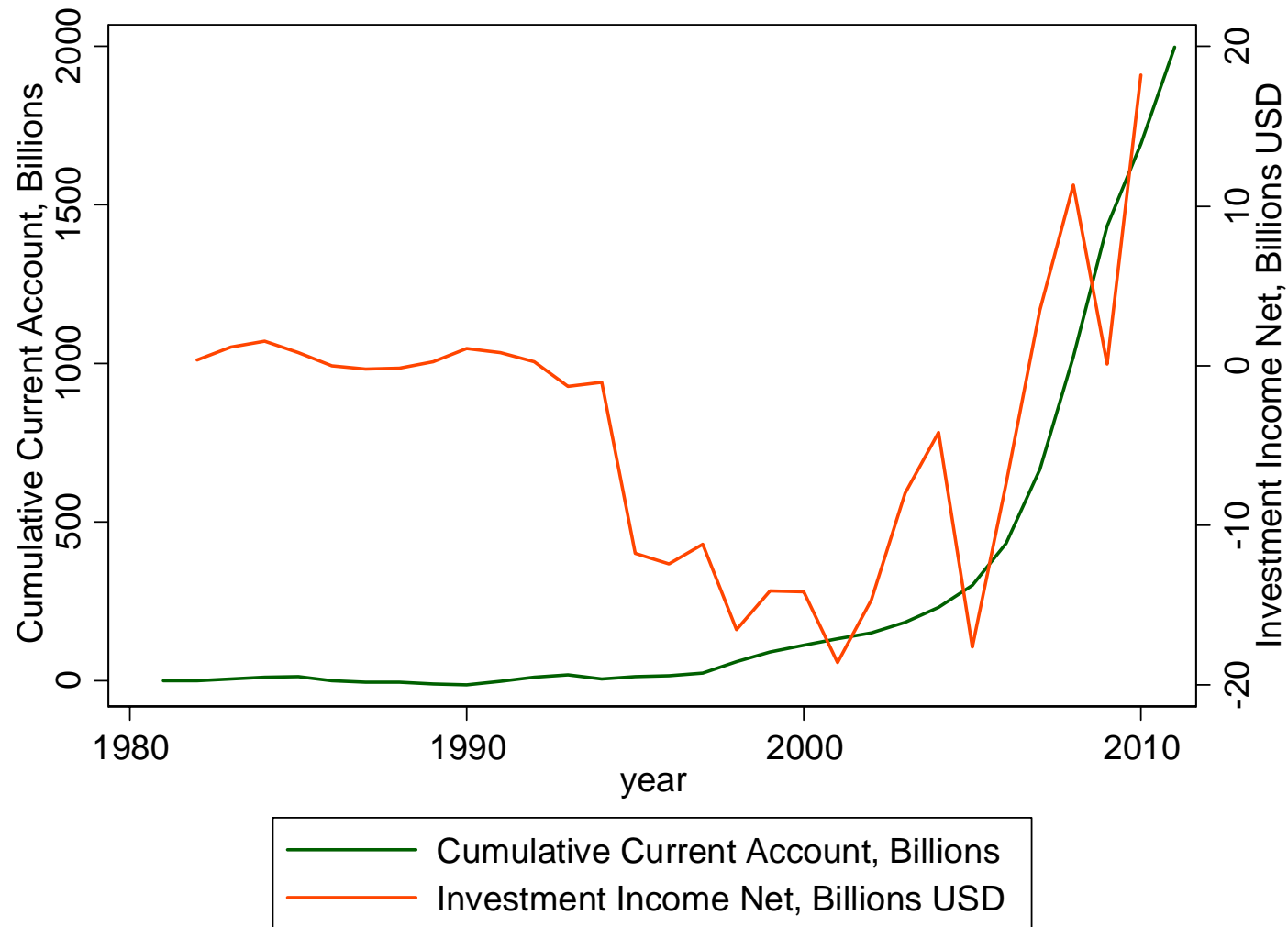
- Say the US borrowed US\$ 8 trillion net
- ...but in fact it borrowed US\$ 20 trillion gross
- Say it pays 3% on its gross debt
 - US\$ 600 billion
- It uses the extra US\$ 12 trillion to invest abroad
- Say the return is 7%
 - US\$ 840 billion
- Net financial income would go up by US\$ 240 billion

Why don't we all do this?

- We can all ask Goldman Sachs or JP Morgan to manage our money
- But US investments abroad are mostly FDI
- They include productive knowledge
- The apparent financial return incorporates payment for the use of productive knowledge
- When China buys US treasuries, it does not add any knowledge to the investment
- Differential returns are an equilibrium phenomenon
- If some countries get excess returns, others pay excess returns (they must add to zero worldwide)

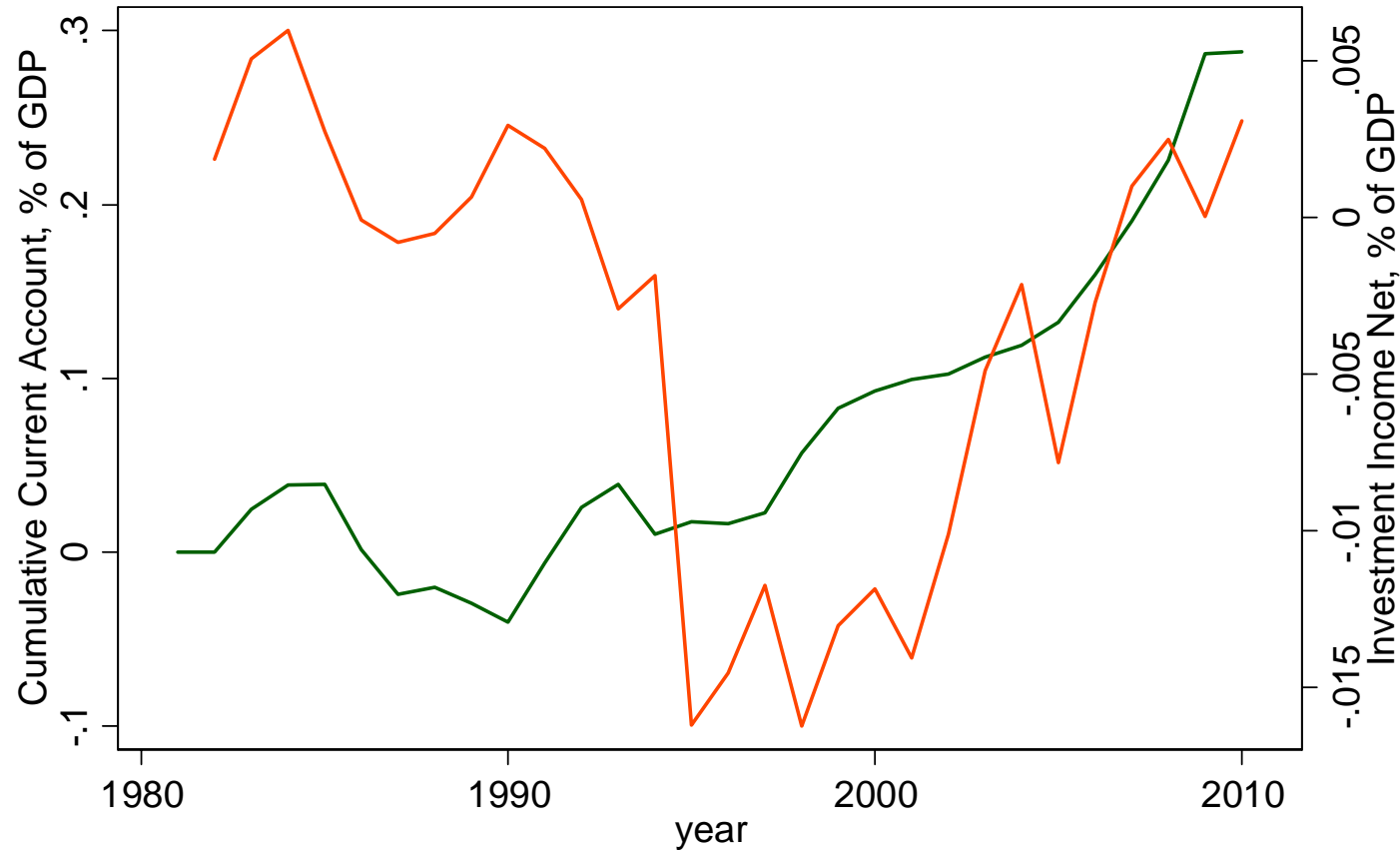
China's CAD at US\$ 2T

Interest income at US\$20B



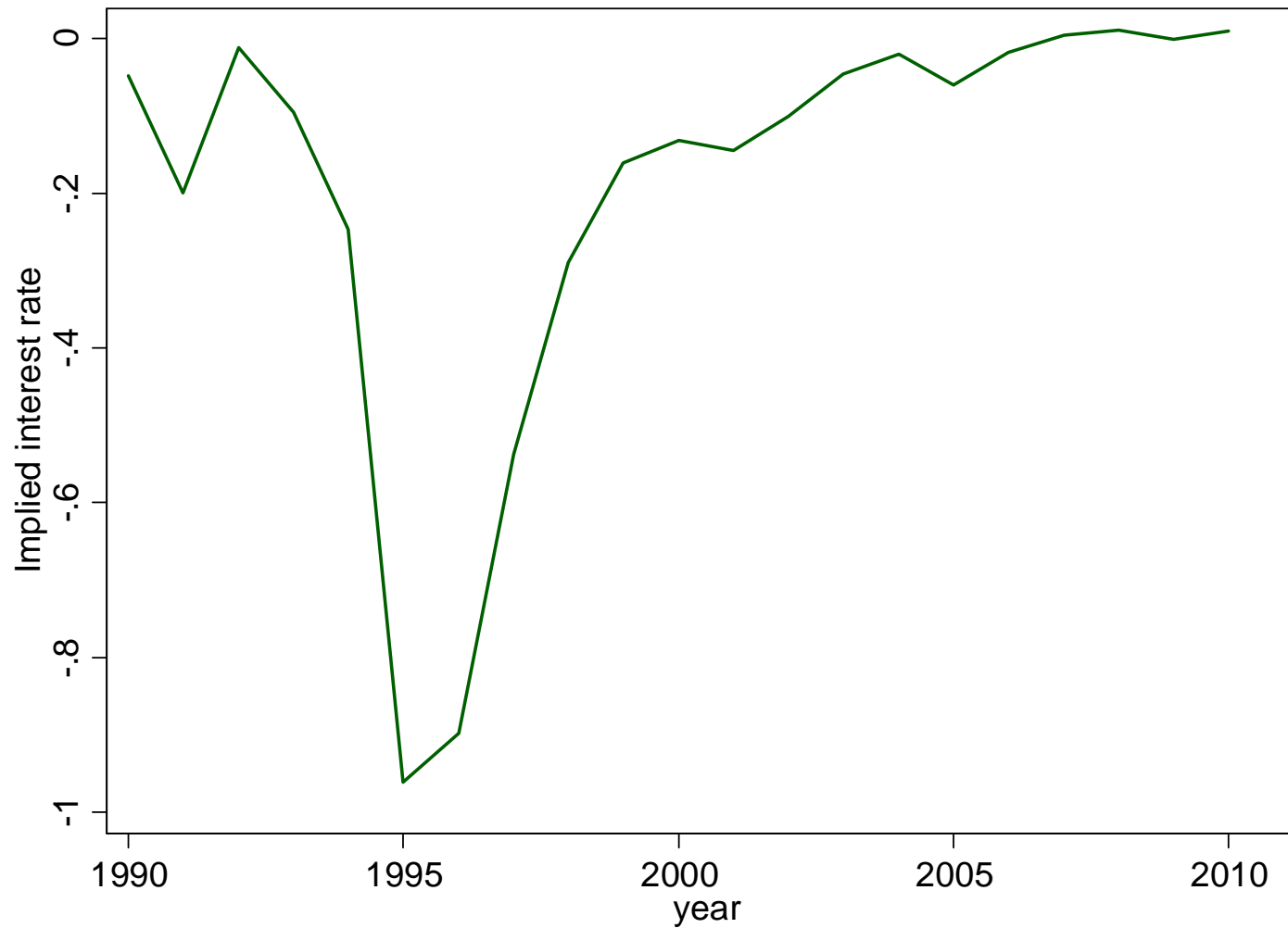
China's CAD at 30% of GDP

Interest income at 0% of GDP

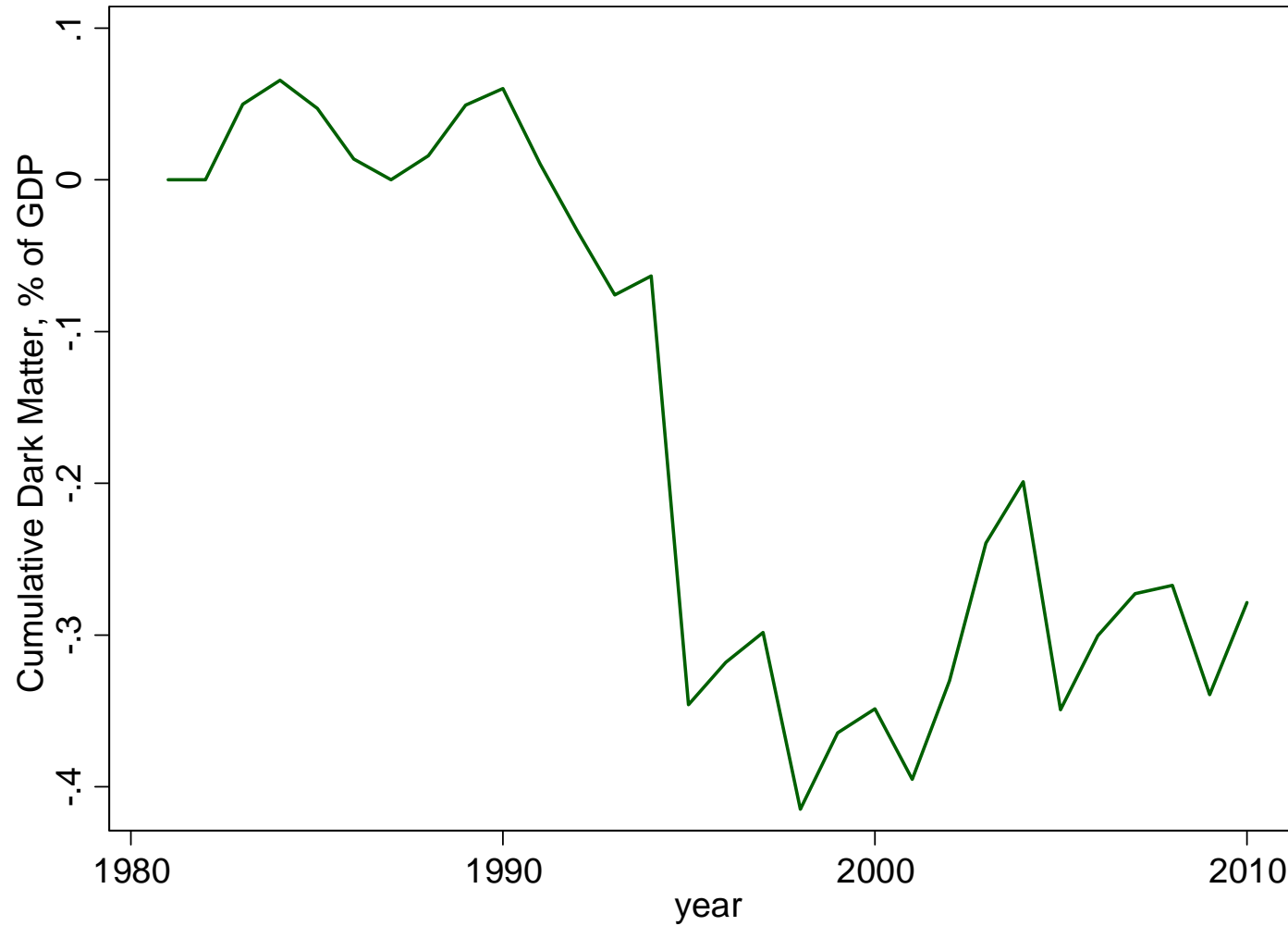


— Cumulative Current Account, % of GDP
— Investment Income Net, % of GDP

China's implied interest rate is negligible



China imports dark matter to the tune of 30% of GDP

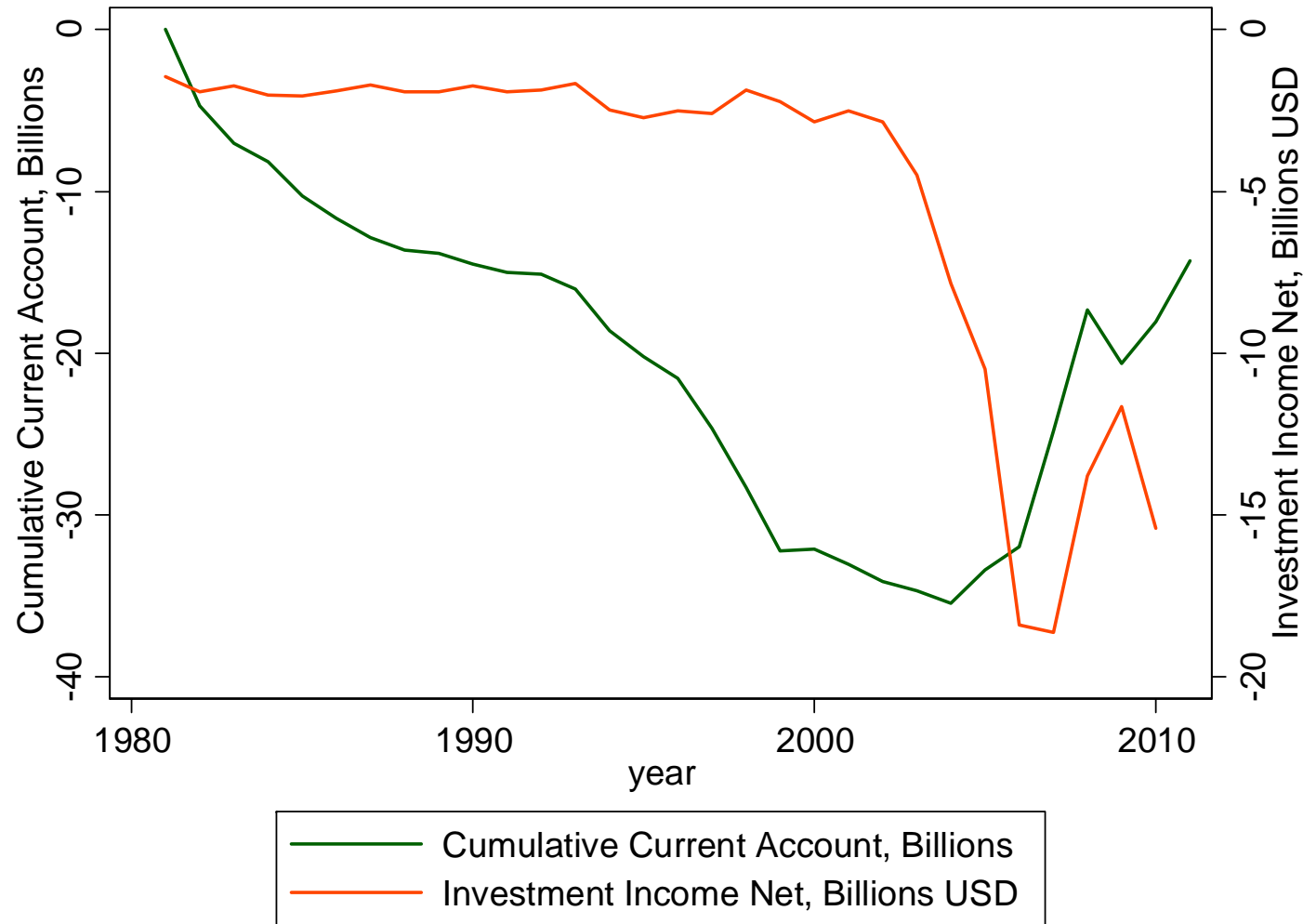


Interpretation

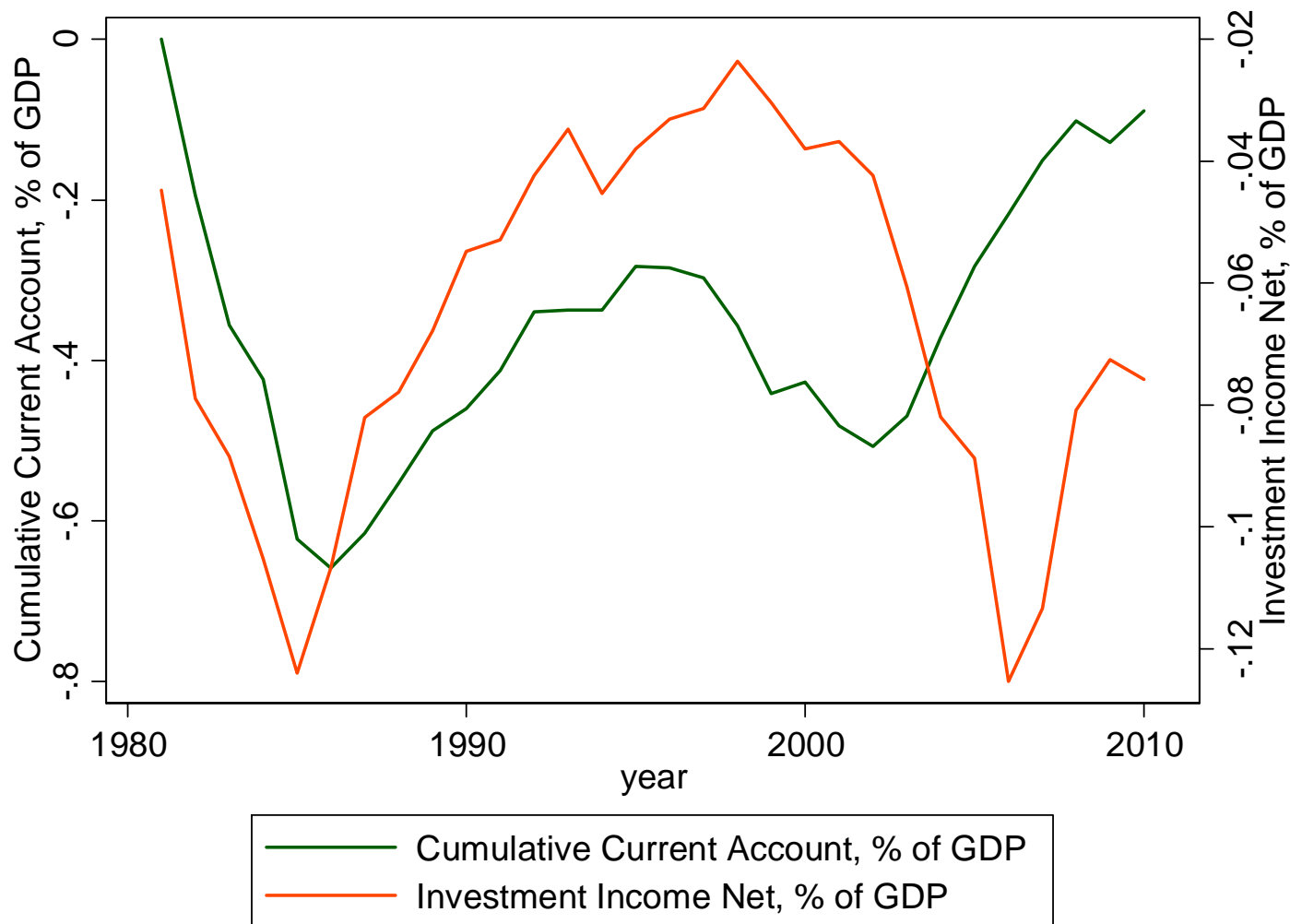
- China is running current account surpluses
- But it has large FDI inflows
 - With their embedded knowledge
- ...and it is buying a lot of international securities
 - With their normal returns

Chile

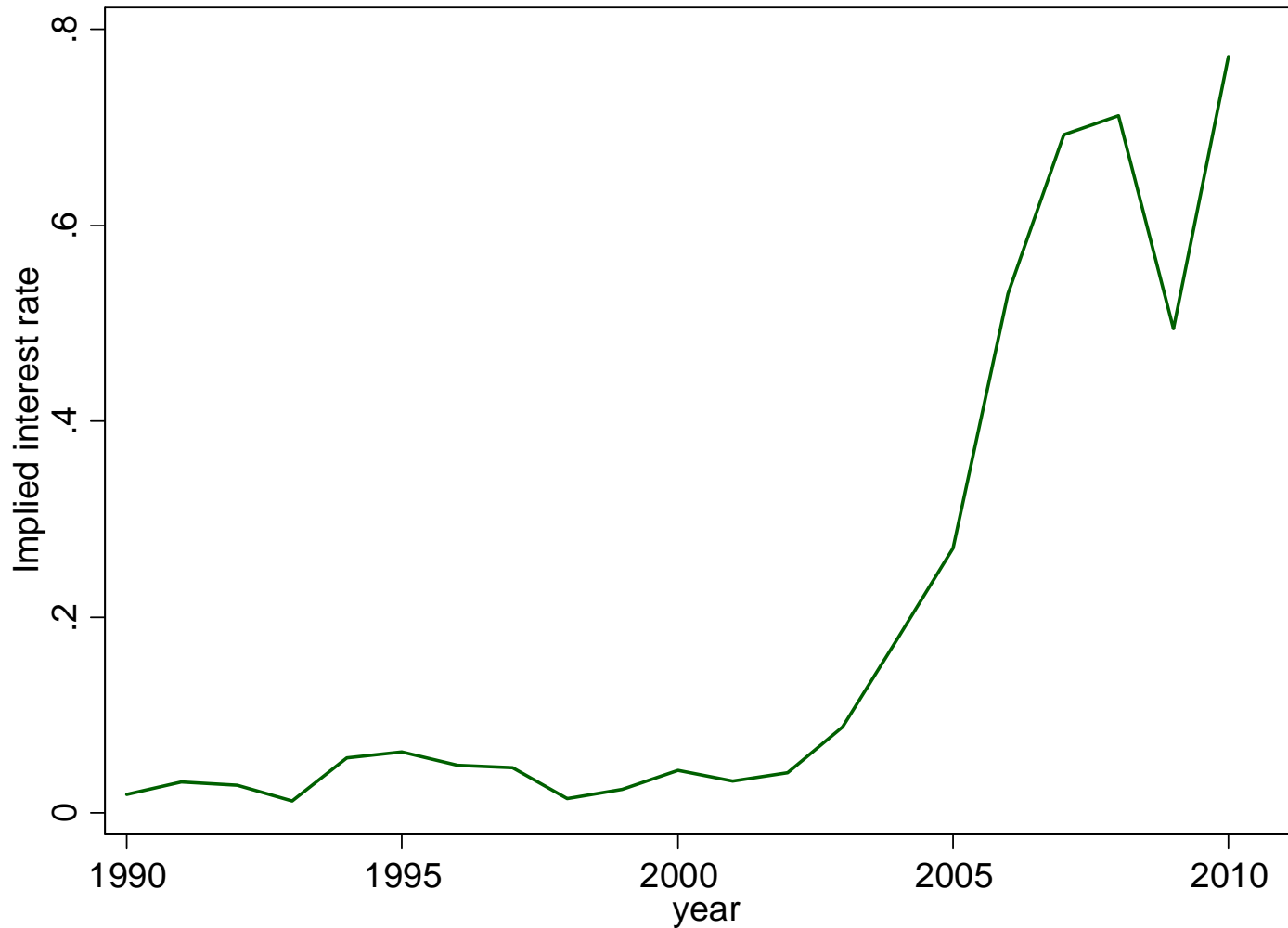
Chile accumulated a CAD of US\$15B,
but pays a similar amount dividends



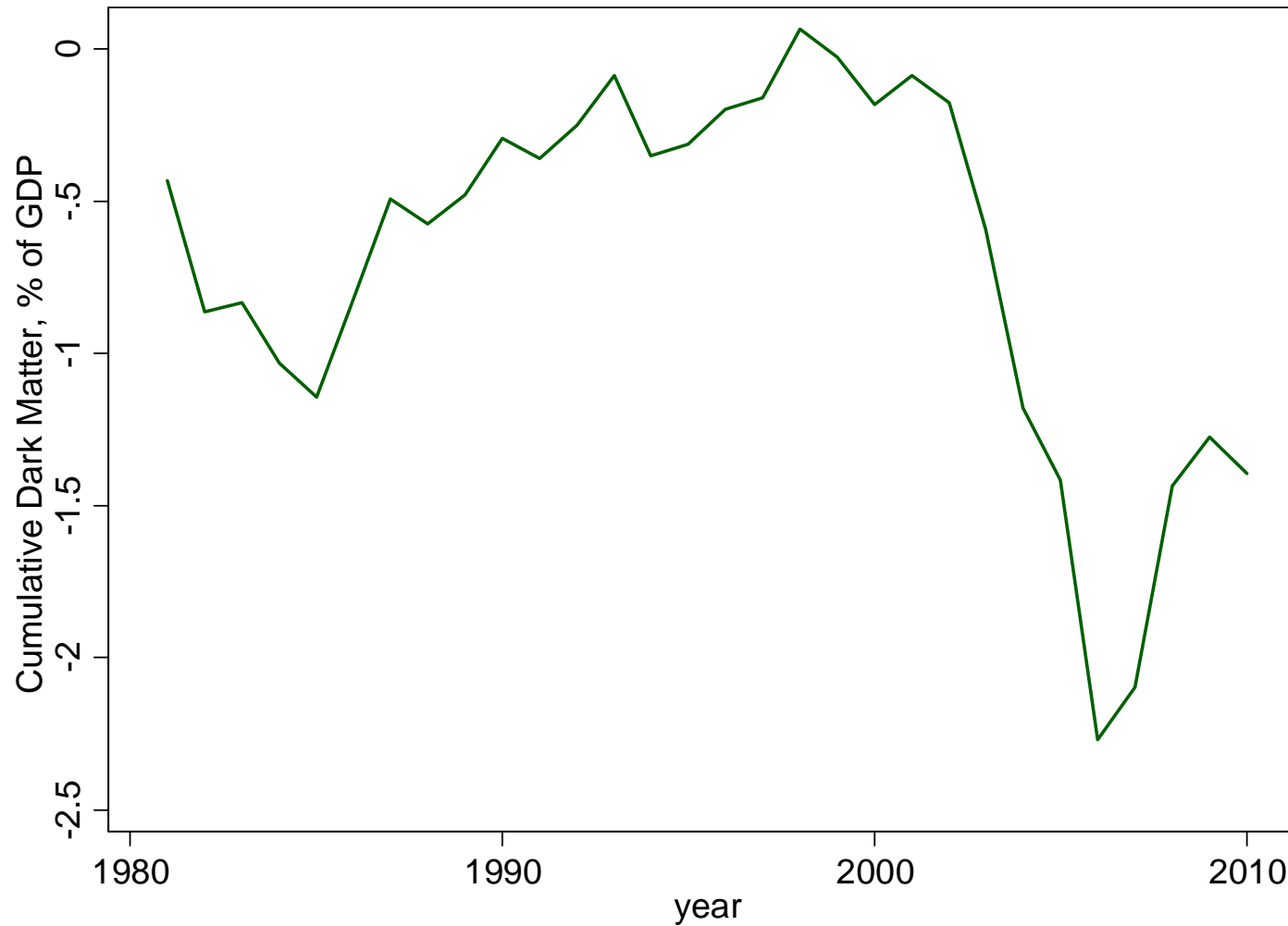
Chile's CAD is small but it pays 8% in "debt service" (160% of GDP at 5%)



Chile's implied interest rate is almost 80% of the cumulative CAD



Chile's dark matter amounts to 150% of GDP



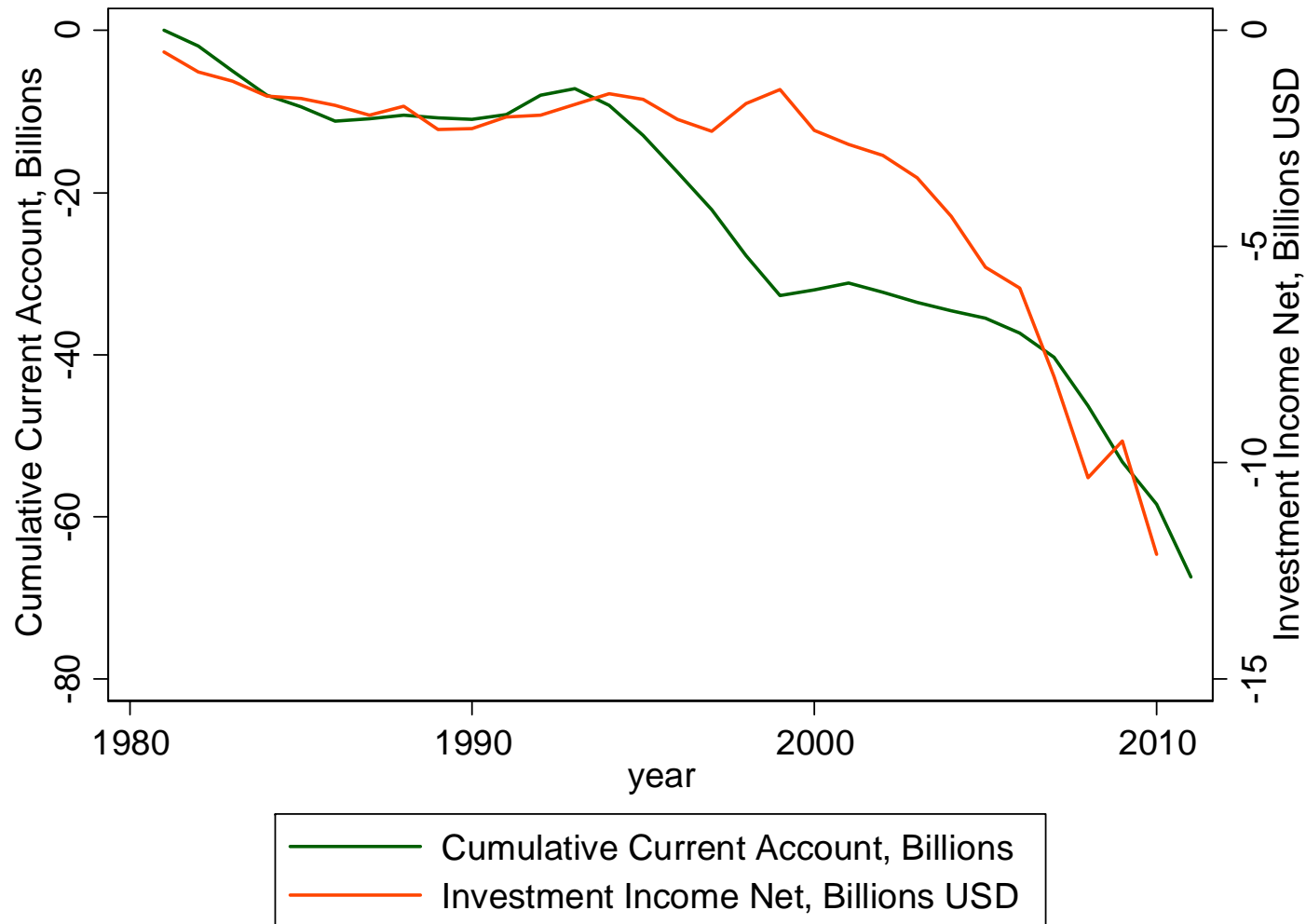
Interpretation

- Chile has received significant FDI in mining and elsewhere
- Good times have dramatically increased the returns on those investments
- But the assets that Chile has invested abroad pay much less
- The difference is equivalent to a very large external debt

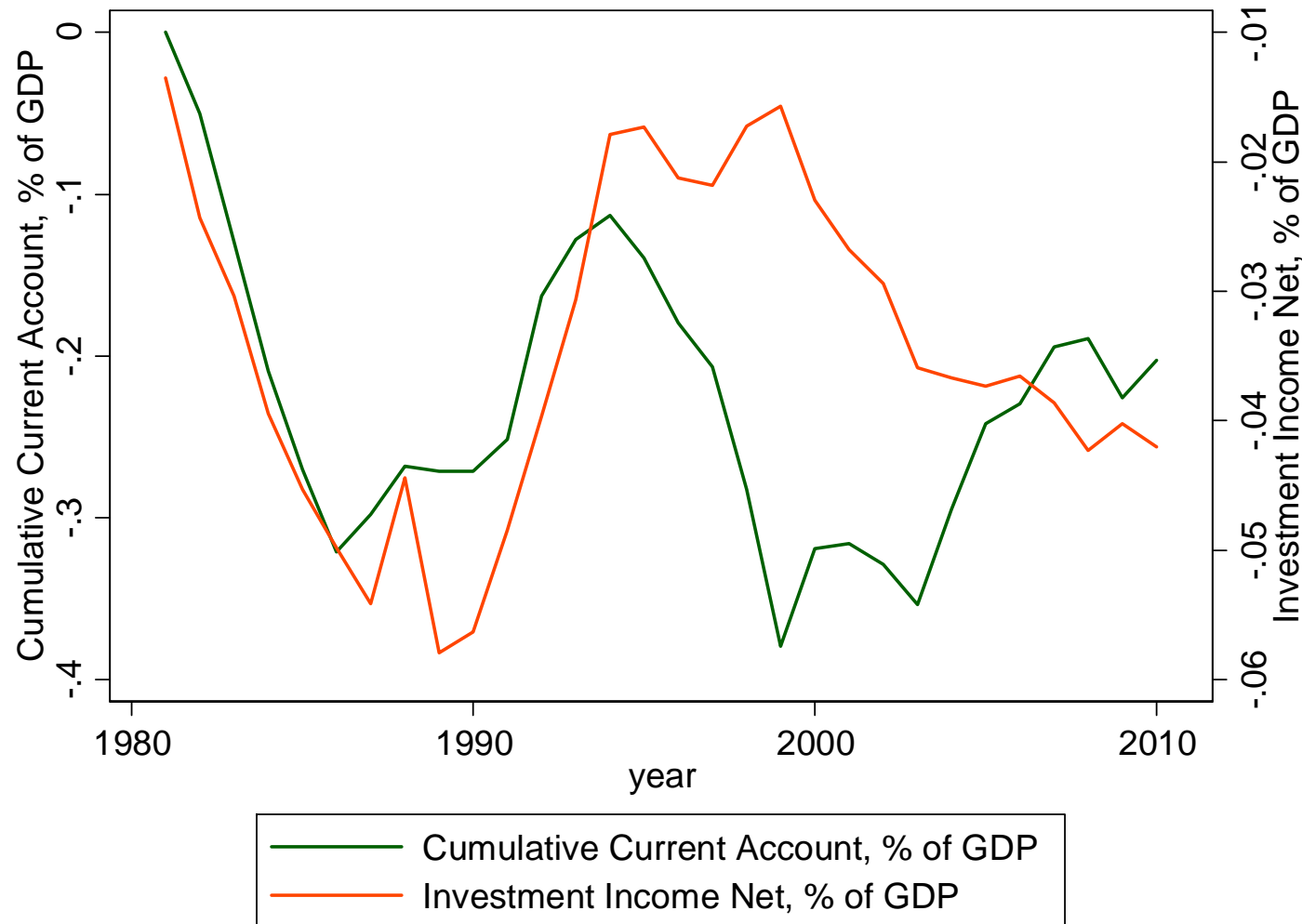
Colombia

Colombia's cum. CAD at US\$60B

Interest payments at US\$12B



Colombia's CAD is at 20% of GDP Interest payments at 3.5% of GDP (not 1 percent at 5%)



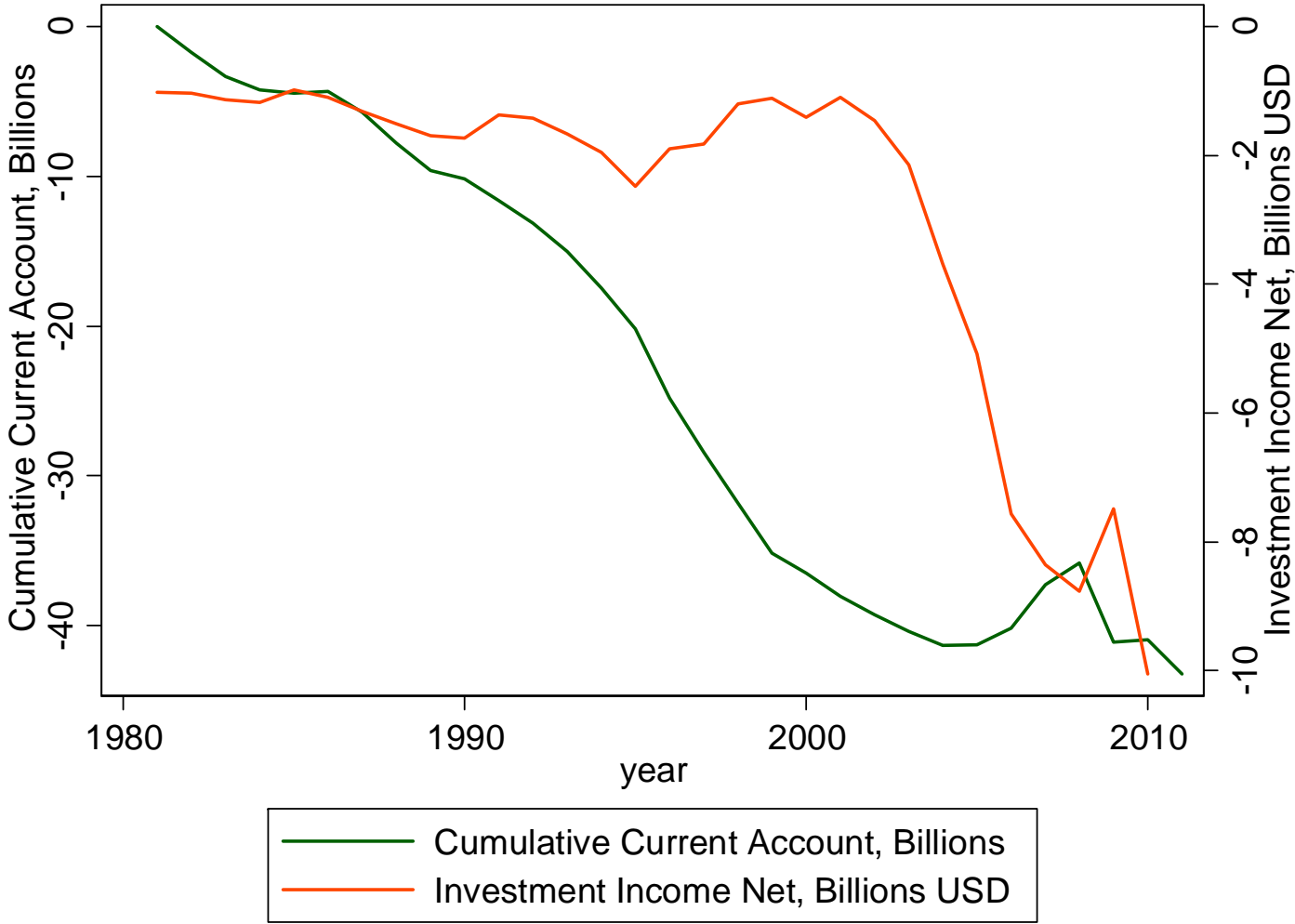
Colombia's implied interest rates at ~20 percent



Peru

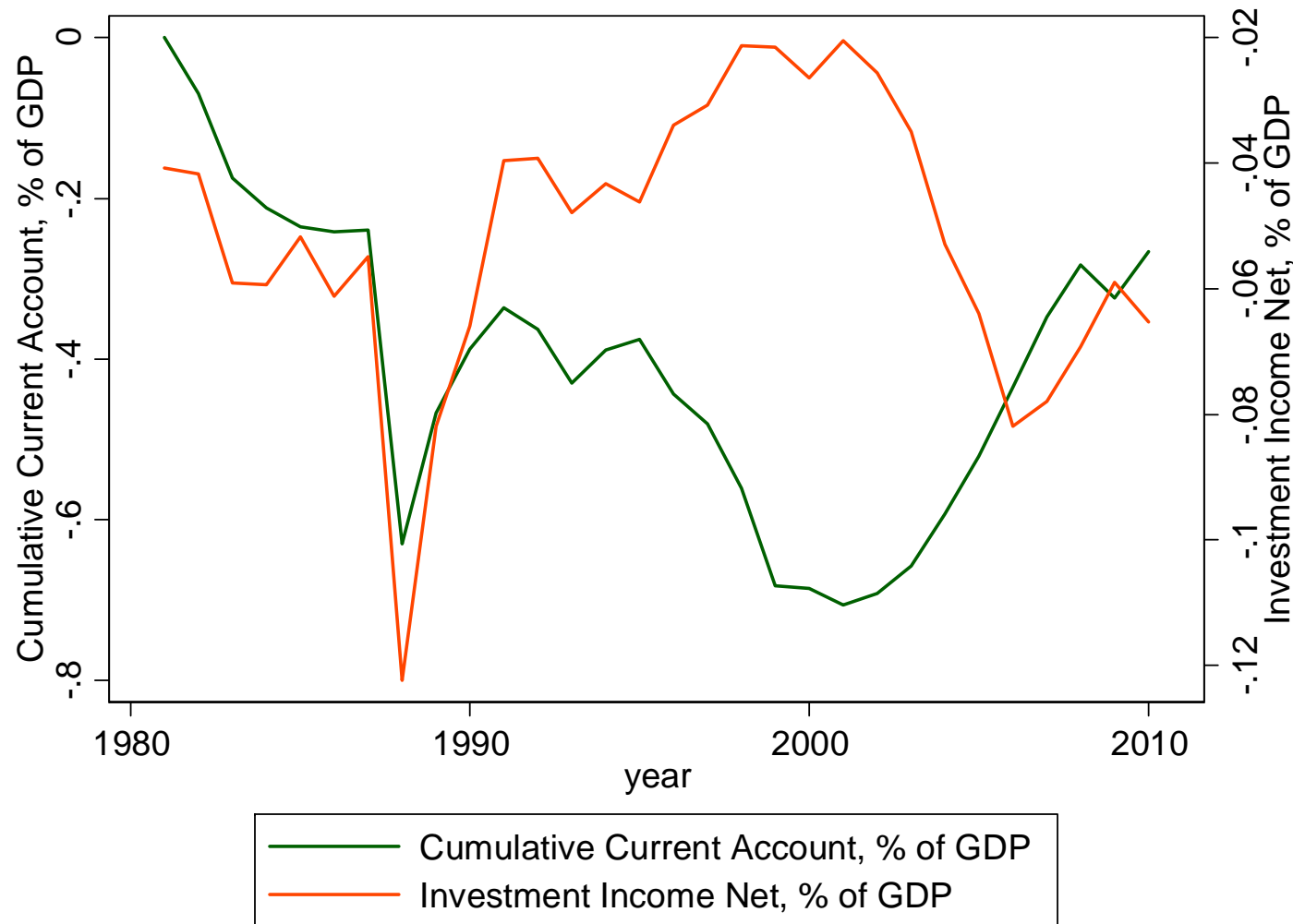
Peru accumulated CAD of US\$40B

Interest payments at US\$10B

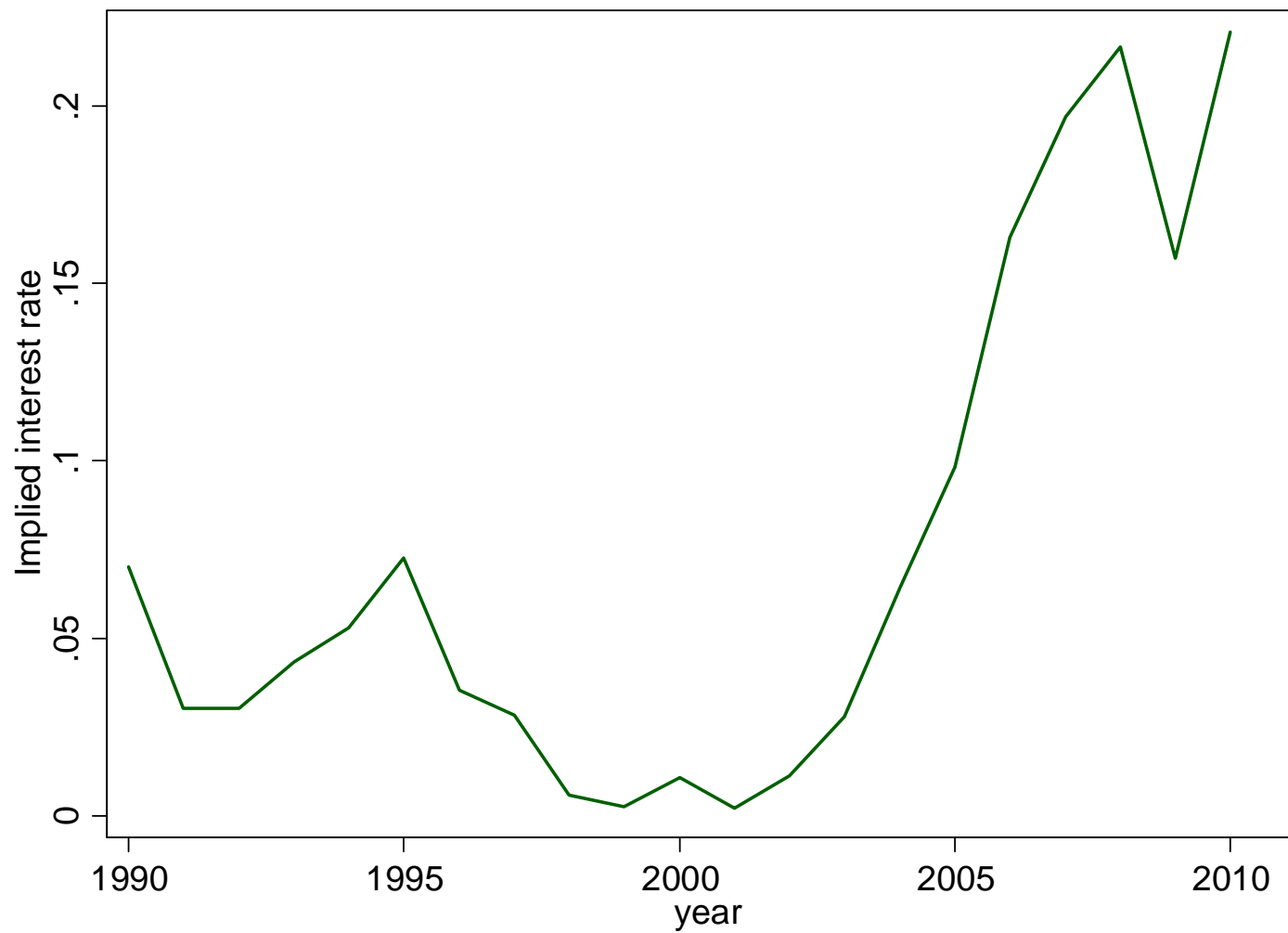


Peru's CAD at ~30 percent of GDP

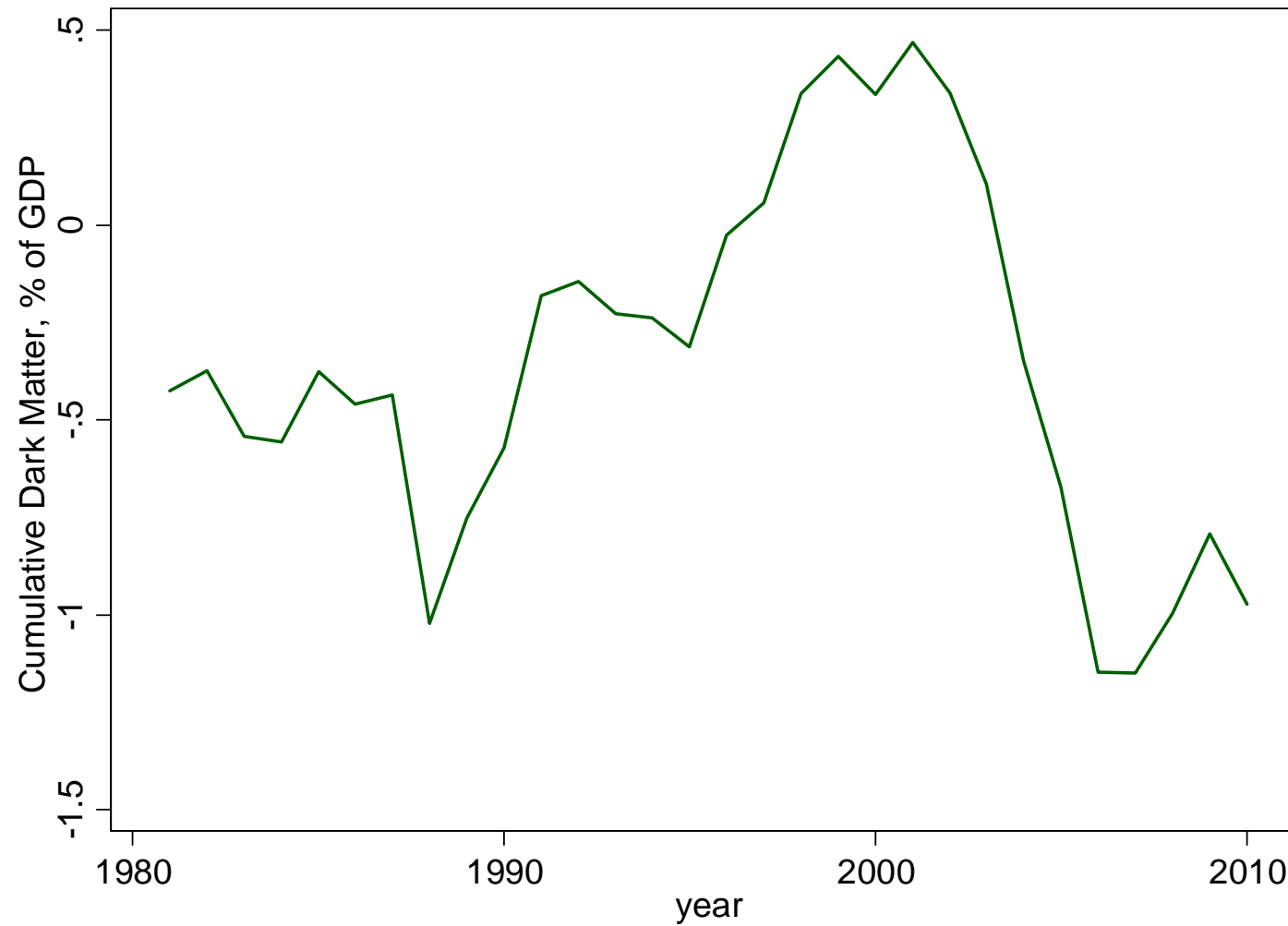
Interest payments at 6%



Peru's implied interest rate at 20%



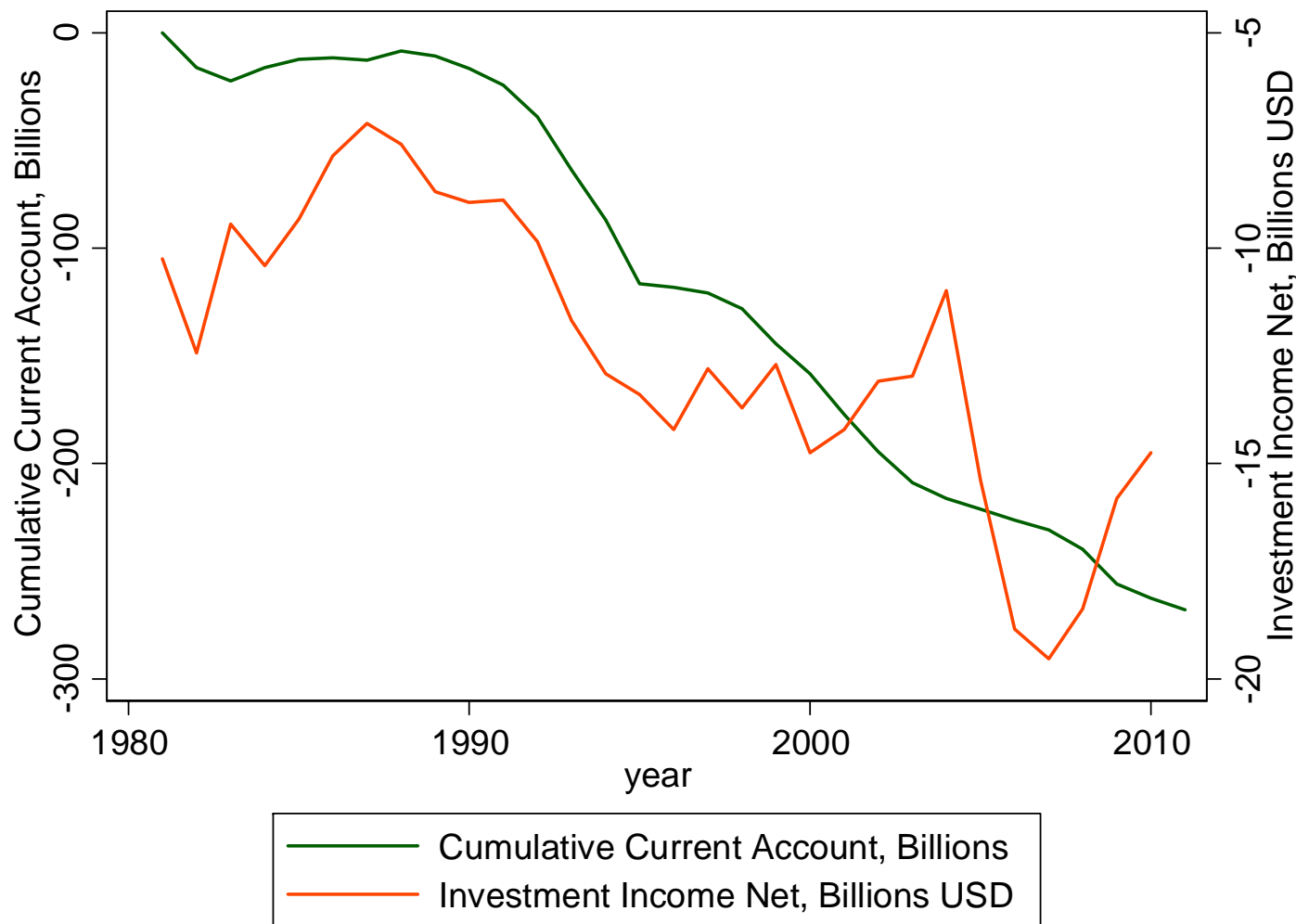
Peru's dark matter is at ~100% of GDP



Mexico

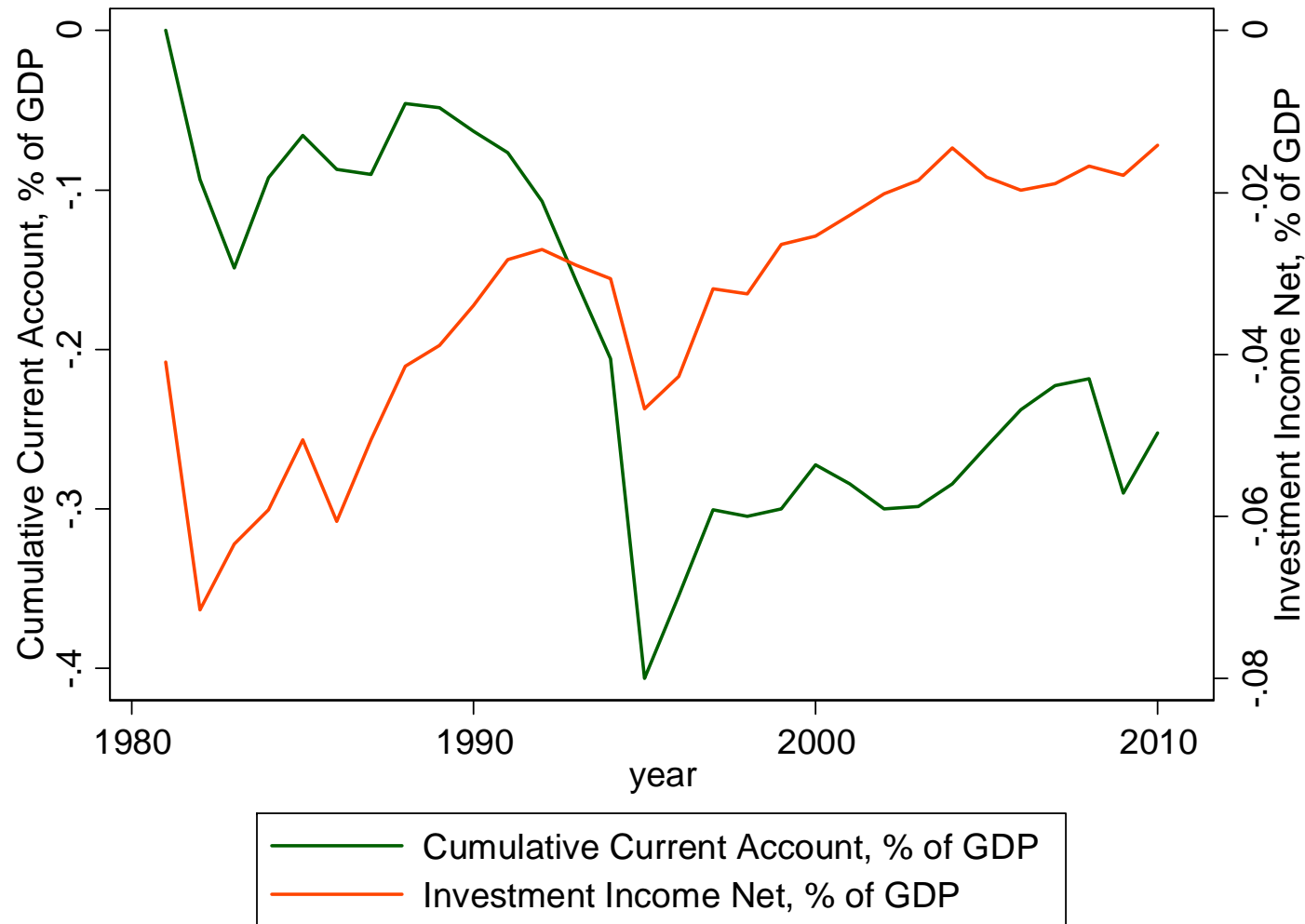
Mexico's CAD at US\$ 270B

Interest payments at US\$ 18B



Mexico's CAD at 25% of GDP

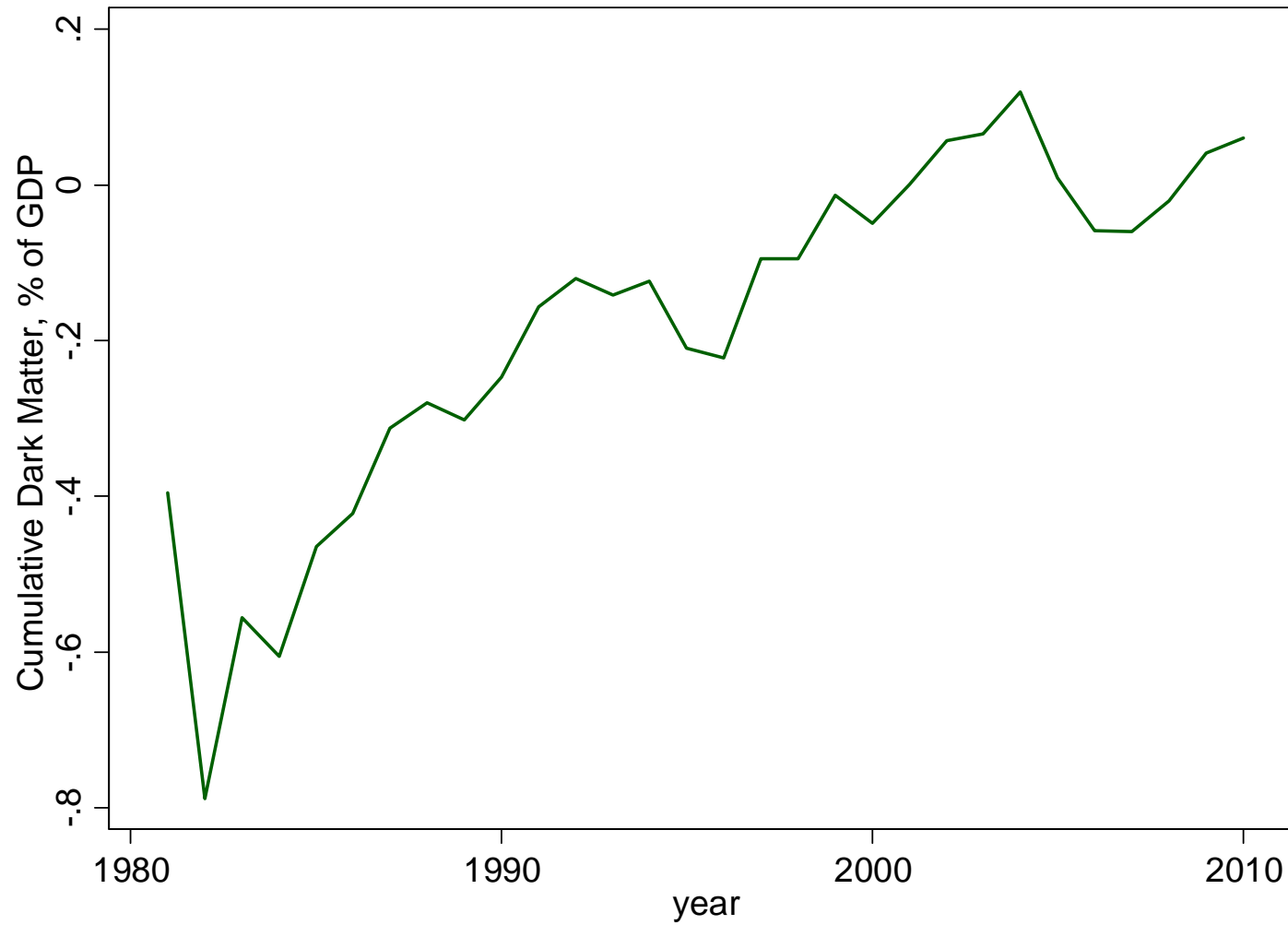
Interest payments at less than 2%



Mexico's implied interest rate is reasonable



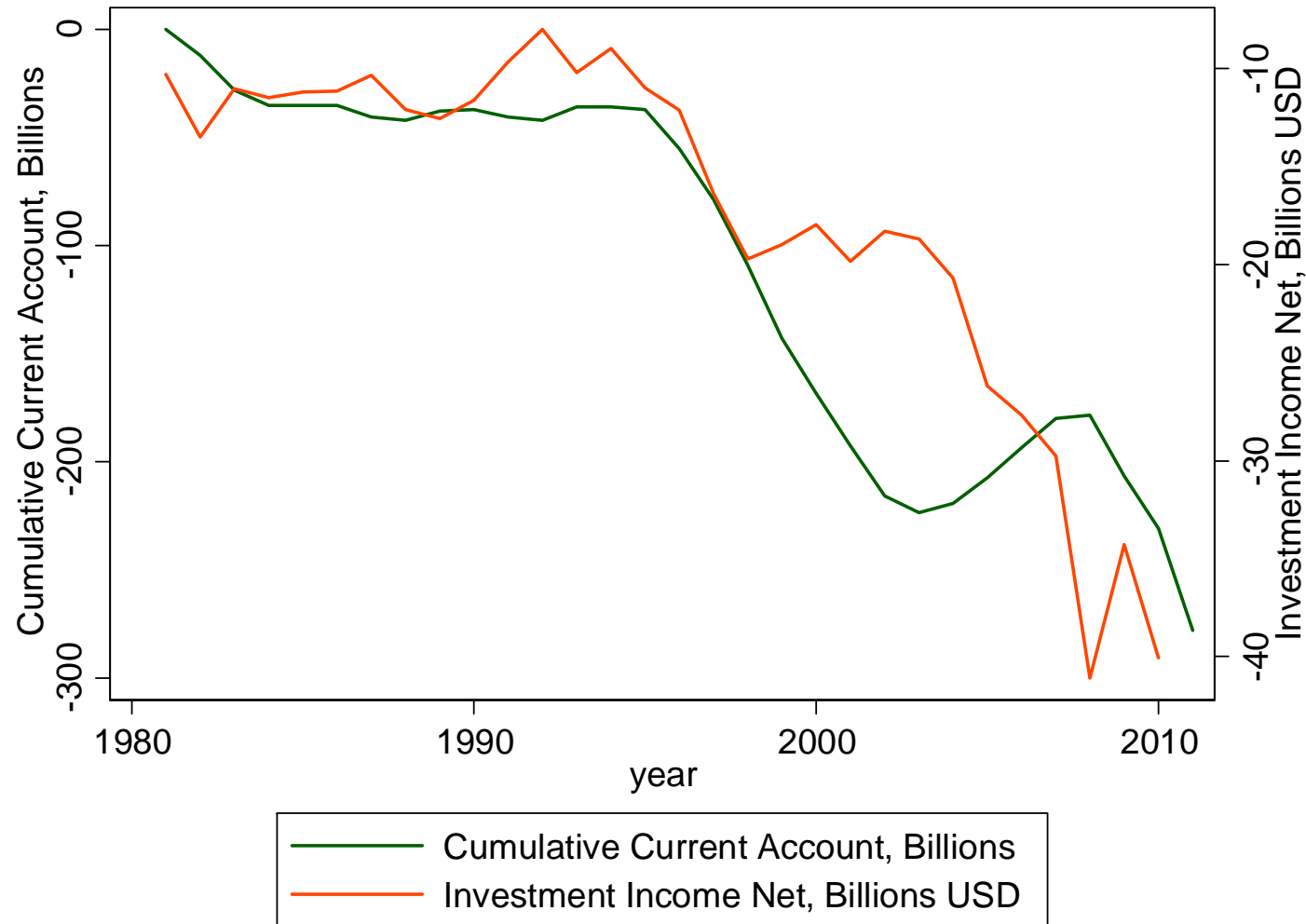
Mexico does not have much dark matter debt



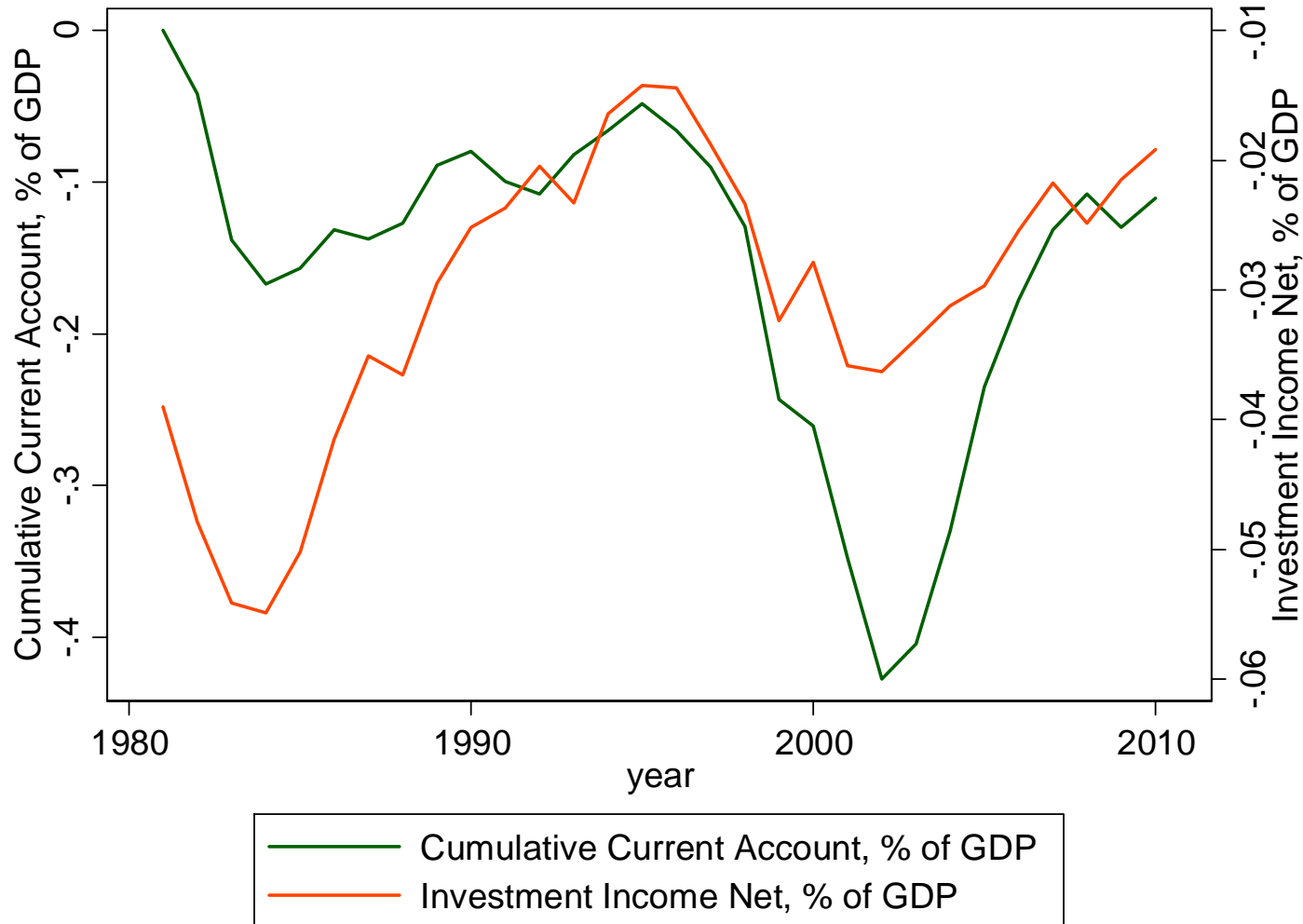
Brazil

Brazil's CAD at ~US\$ 280B

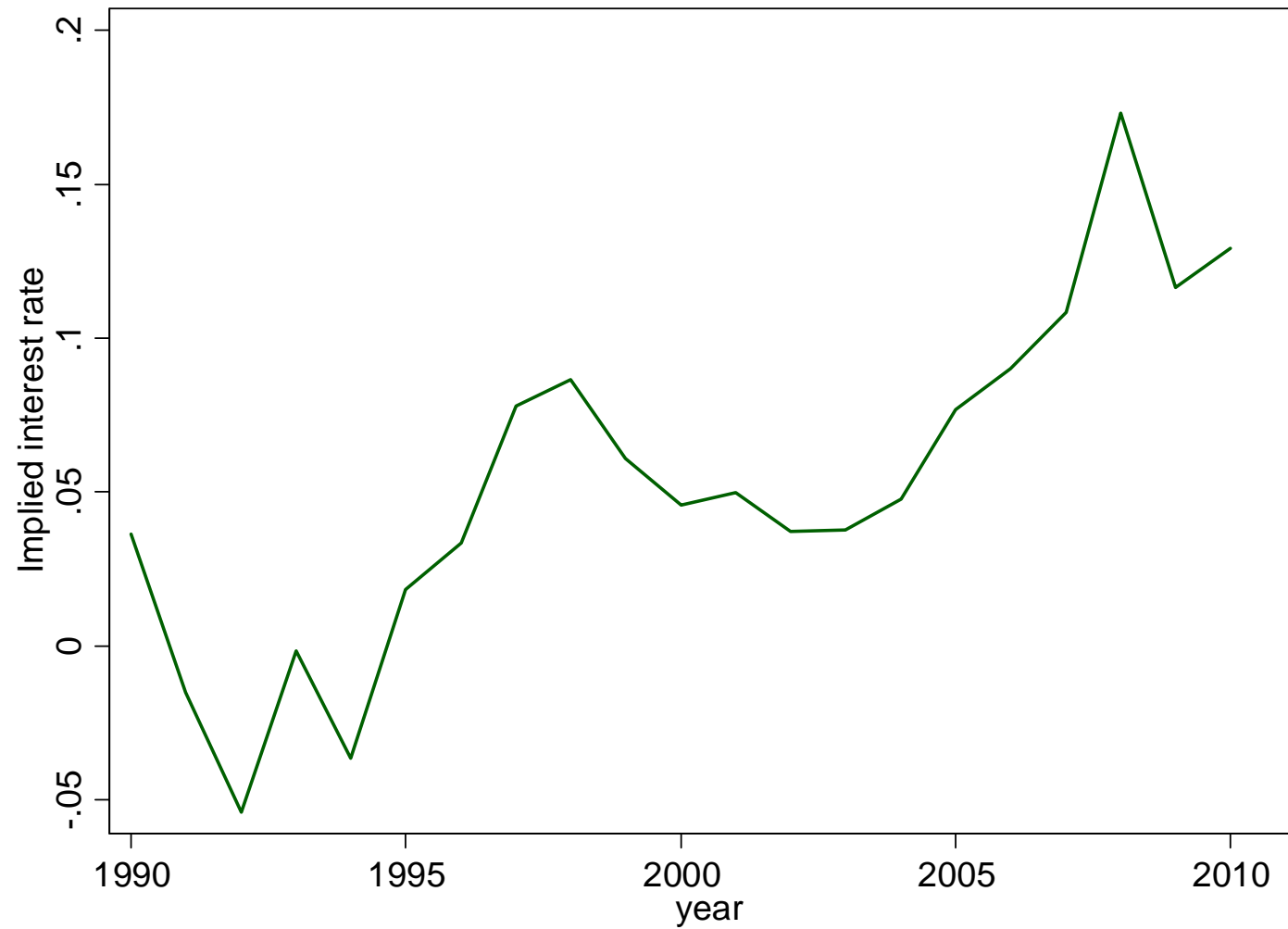
Interest payments at ~US\$40B



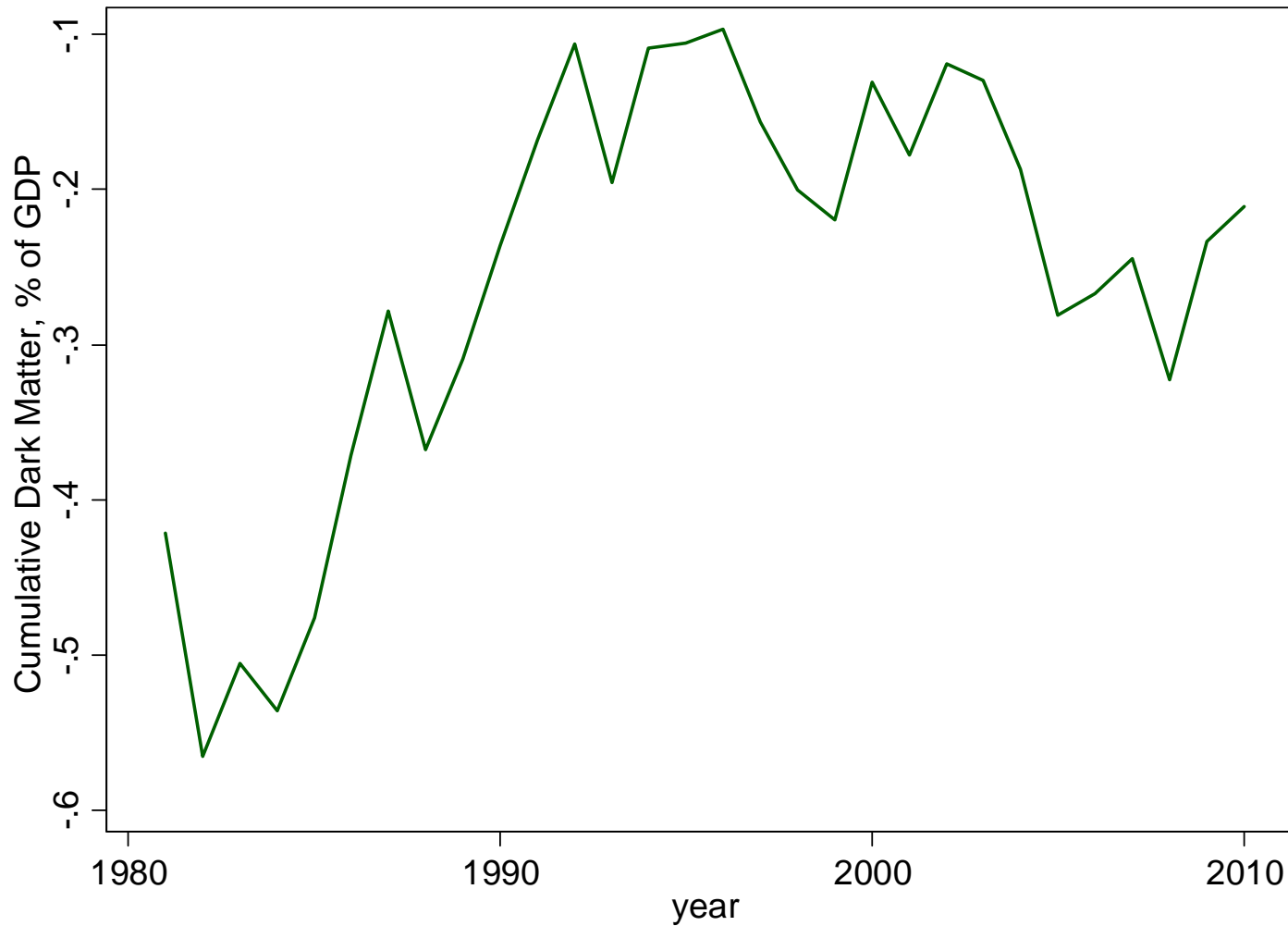
Brazil's CAD is at ~10% of GDP Interest payments at 2% of GDP



Brazil's implied interest at ~15%



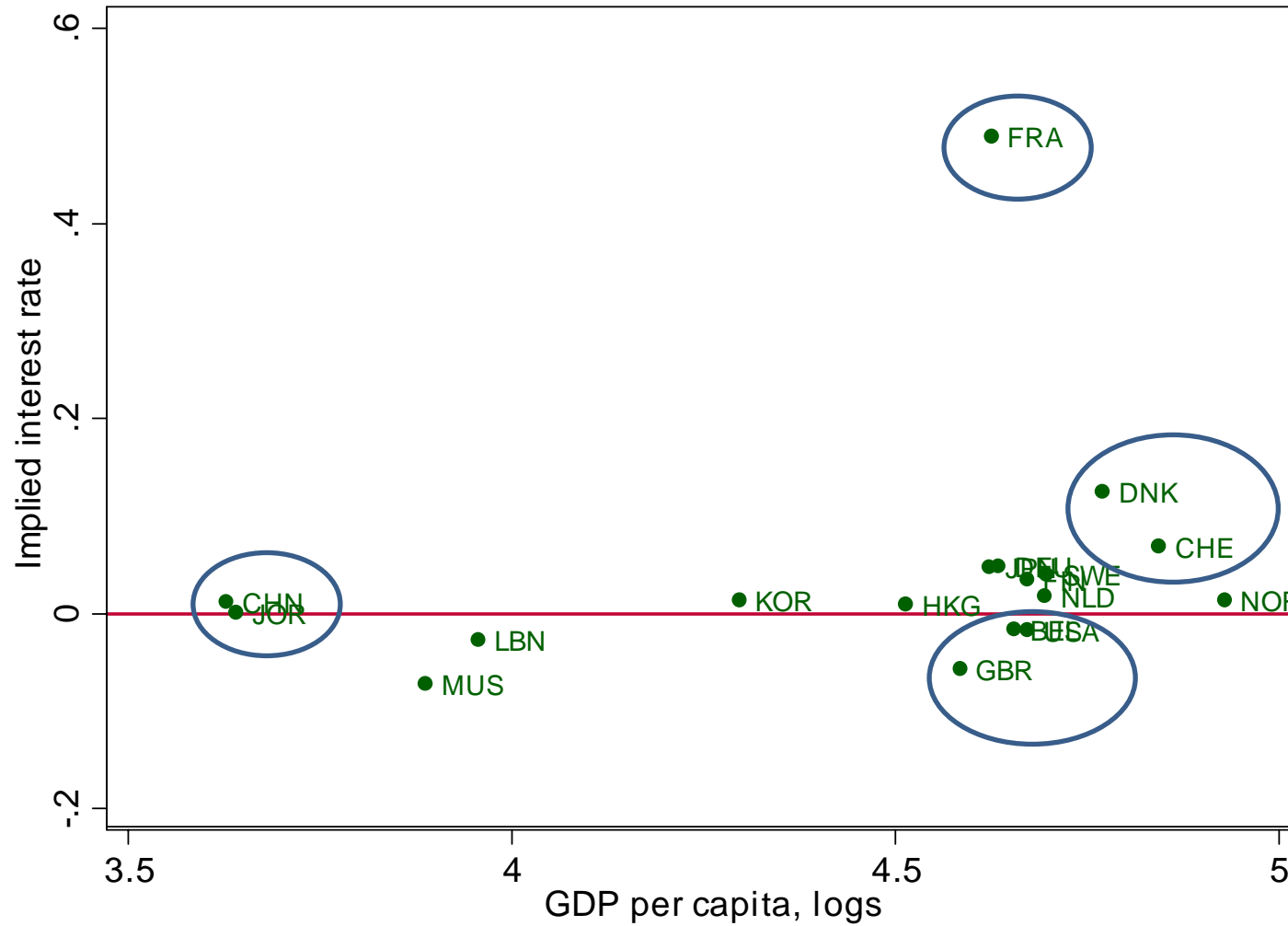
Brazil's dark matter at ~20% of GDP



IMPLIED INTEREST RATES - 2010

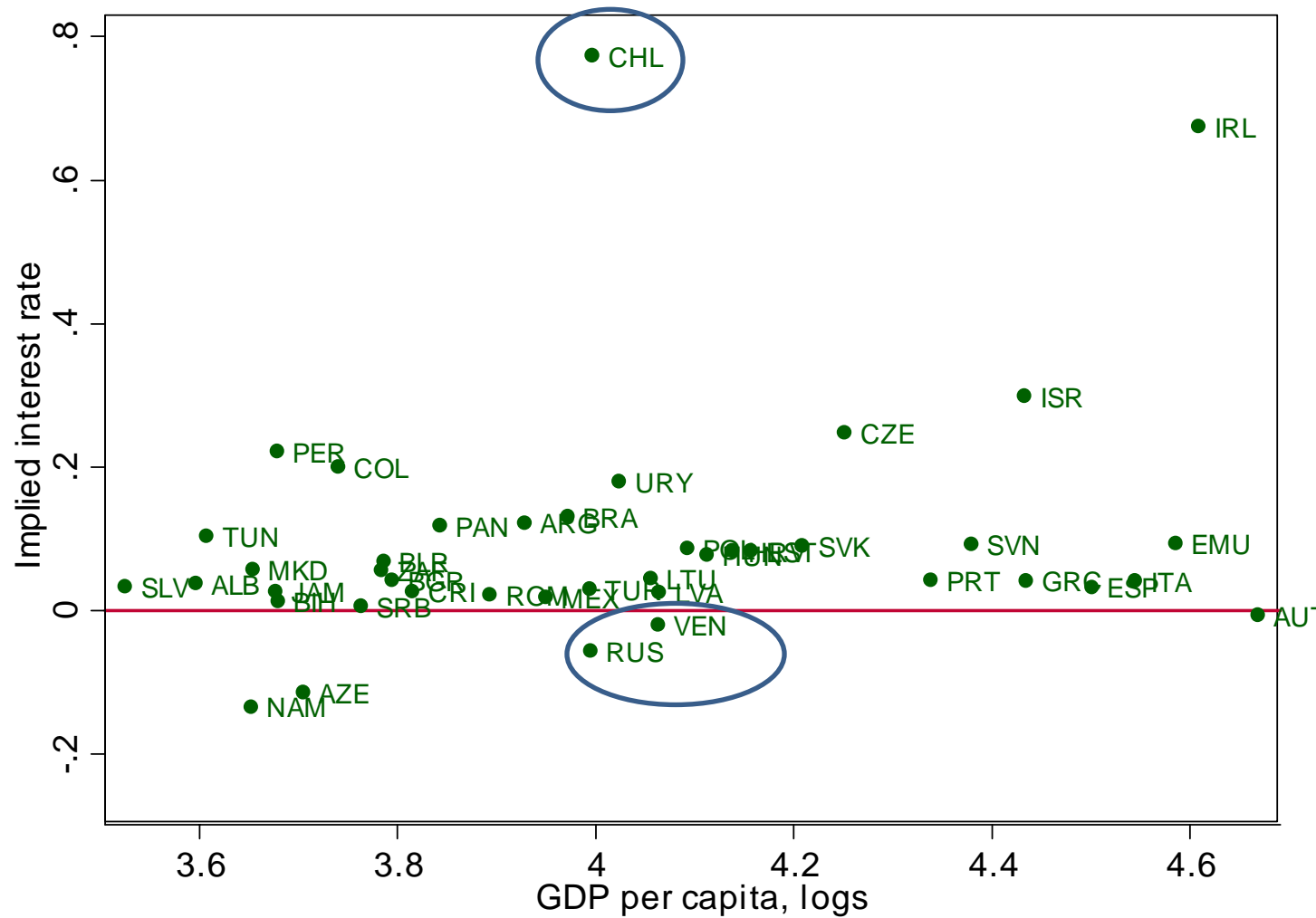
Implied interest rate 2010

(Investment income > 0)



Implied interest rate

(Investment income < 0)



RATINGS AND INVESTMENT INCOME

Ratings: Investment Income matters, cumulative CA does not

VARIABLES	Debt Rating			
	(1)	(2)	(3)	(4)
real GDP per capita, log	11.93*** (2.236)	13.62*** (2.618)	12.11*** (2.255)	13.63*** (2.614)
Total debt to GDP	-3.23*** (0.756)	-3.08*** (0.733)	-3.15*** (0.709)	-3.07*** (0.717)
Net Investment Income to GDP		10.75*** (2.936)		10.64*** (3.059)
Cumulative CA to GDP			0.43 (0.439)	0.07 (0.451)
Constant	-26.46*** (7.755)	-32.50*** (9.210)	-27.09*** (7.826)	-32.52*** (9.199)
Observations	1,451	1,404	1,451	1,404
Adjusted R-squared	0.343	0.367	0.345	0.367
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes

Conclusions

- Assets and liabilities have radically different returns
- This means that the evolution of the current account is a poor guide to solvency
- The net financial income is a more relevant indicator of solvency
- And markets seem to notice
- A similar analysis could be done for public debt

ORIGINAL SIN

Definition

- Eichengreen and Hausmann (1999) defined original sin as "a situation in which the domestic currency is not used to borrow abroad"
 - Countries that suffer from original sin need to borrow funds dominated in terms of a major foreign currency
 - If the borrowing country's domestic currency depreciates, the loan will become more difficult to repay

Measurement

- Eichengreen, Hausmann, and Panizza (2001) used BIS data on the currency composition of international securities to build two indexes of original sin

$$OSIN1 = 1 - \frac{\text{Securities issued by country } i \text{ in currency } i}{\text{Securities issued by country } i}$$

$$OSIN3 = \max\left(1 - \frac{\text{Securities issued in currency } i}{\text{Securities issued by country } i}, 0\right)$$

- Most research has focused on *OSIN3*

Causes

- The case of the missing apple
 - Original sin (at least its international component) does not appear to be correlated with any of the obvious suspects
 - No correlation with inflation, fiscal deficit, quality of policies, and institutional quality
 - Policies and predictability do matter for the domestic component of original sin
 - Only country size seems to matter
 - Eichengreen, Hausmann, and Panizza (2005b) “The Mystery of Original Sin”

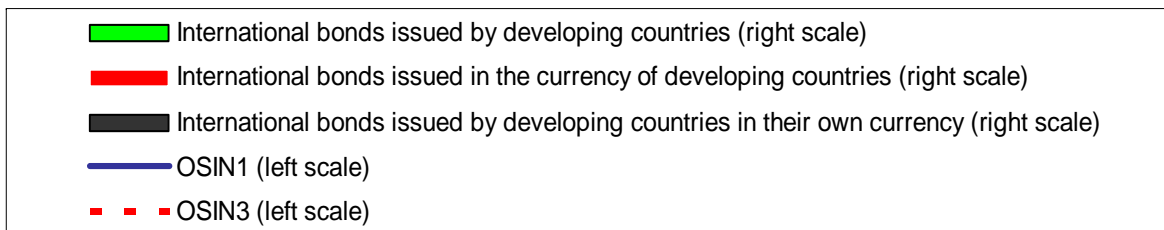
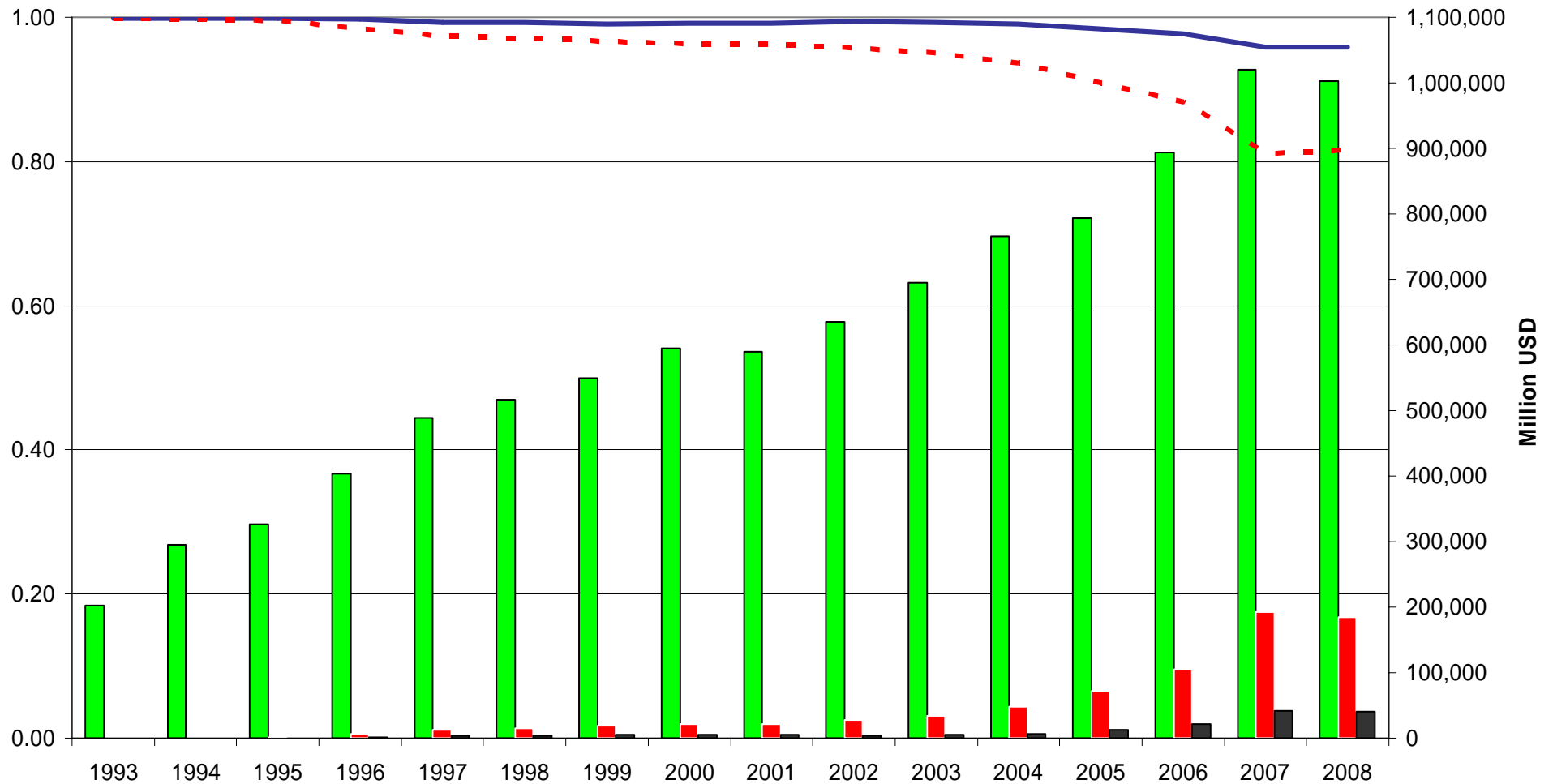
Consequences

- The pain of original sin
 - Original sin leads to “fear of floating,” high GDP volatility, low credit ratings, sudden stops, and limited ability to conduct an independent monetary policy
 - Eichengreen, Hausmann, and Panizza (2005a) “The Pain of Original Sin”
 - Hausmann, Panizza, and Stein (2001) “Why Do Countries Float the Way They Float?”

Not Everybody Agrees

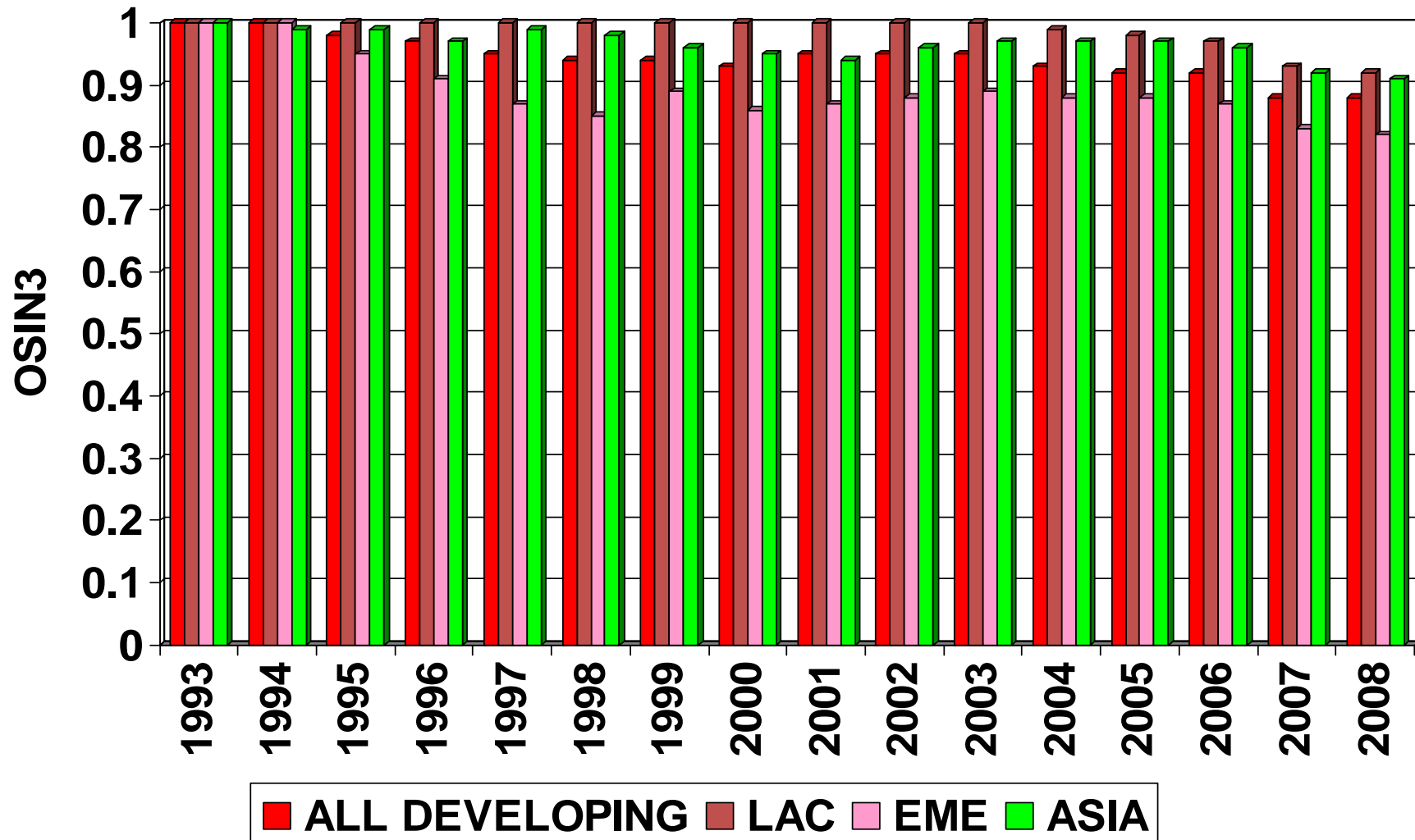
- Original sin is the outcome of bad policies
 - Goldstein and Turner (2004)
 - Burger and Warnock (2006)
 - Reinhart, Rogoff, and Savastano (2003)
- Maybe original sin was a problem in the past but it's no longer a problem now
 - *The principal emerging markets sales desk pitch of recent years has been the expiation of the "original sin" of governments' borrowing in foreign currencies. (John Dizard, Financial Times, October 21 2008).*

But original sin has not gone down much



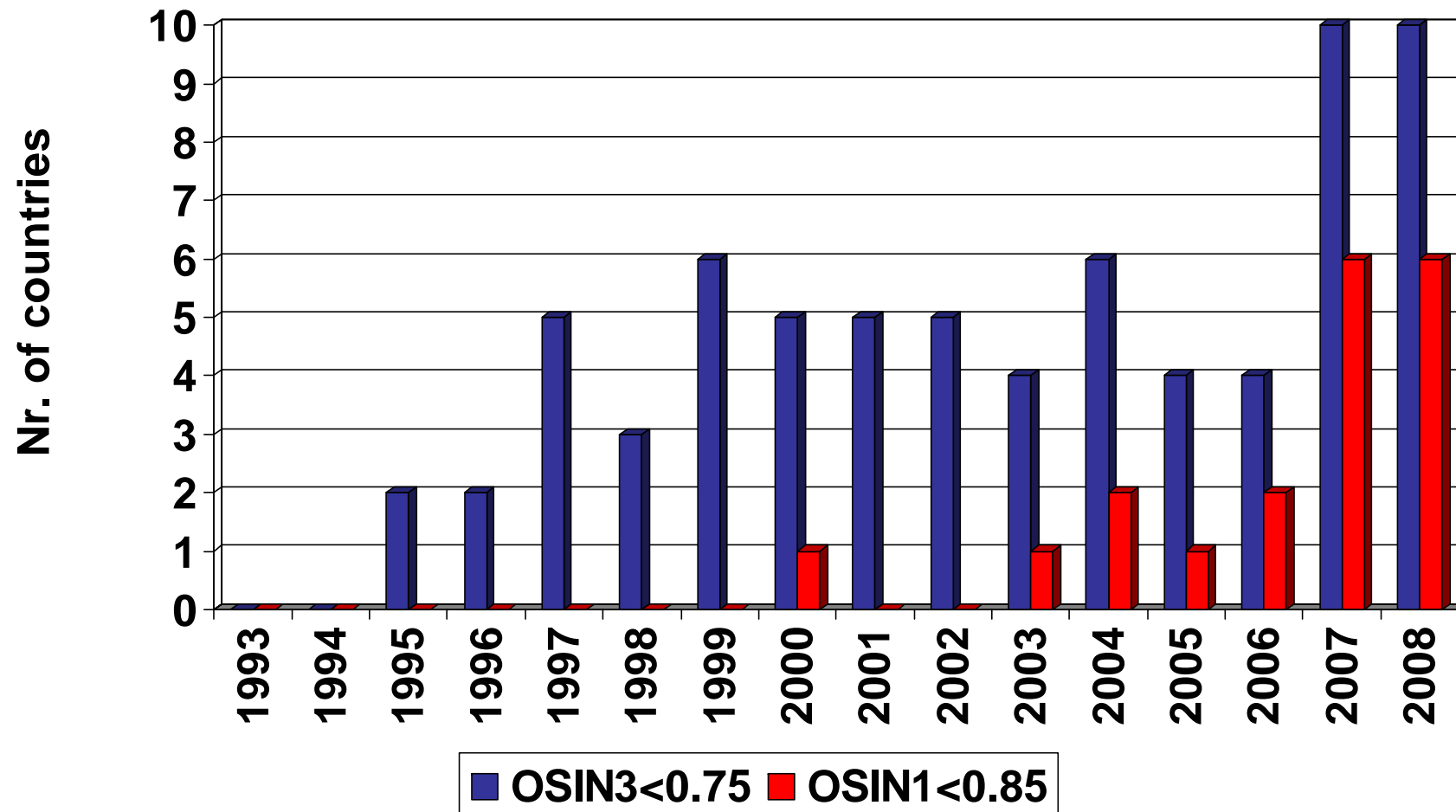
Source: Hausmann and Panizza (2009)

But original sin has not gone down much



Source: Hausmann and Panizza (2009)

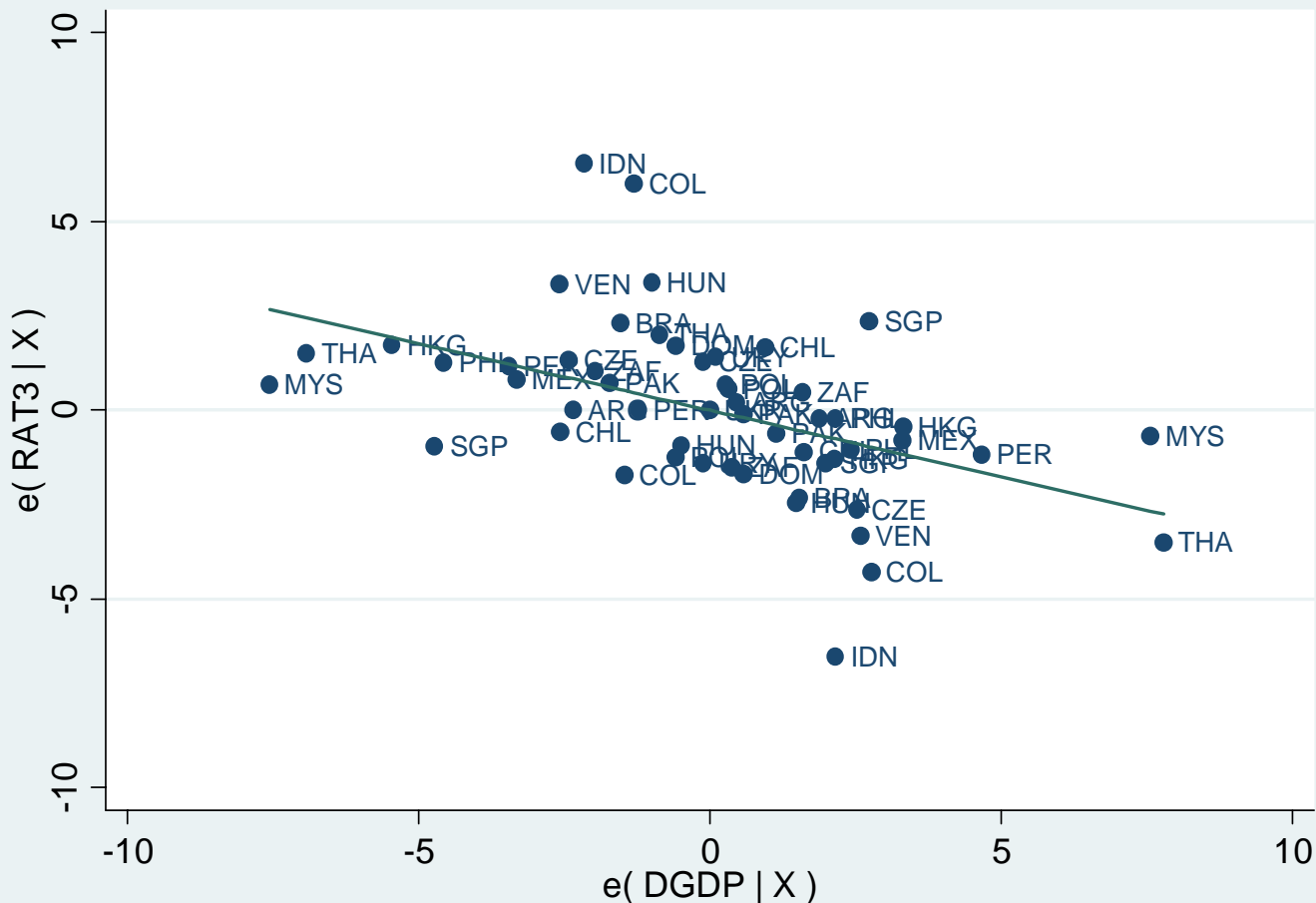
But original sin has not gone down



Source: Hausmann and Panizza (2009)

And yet, things seem to have improved

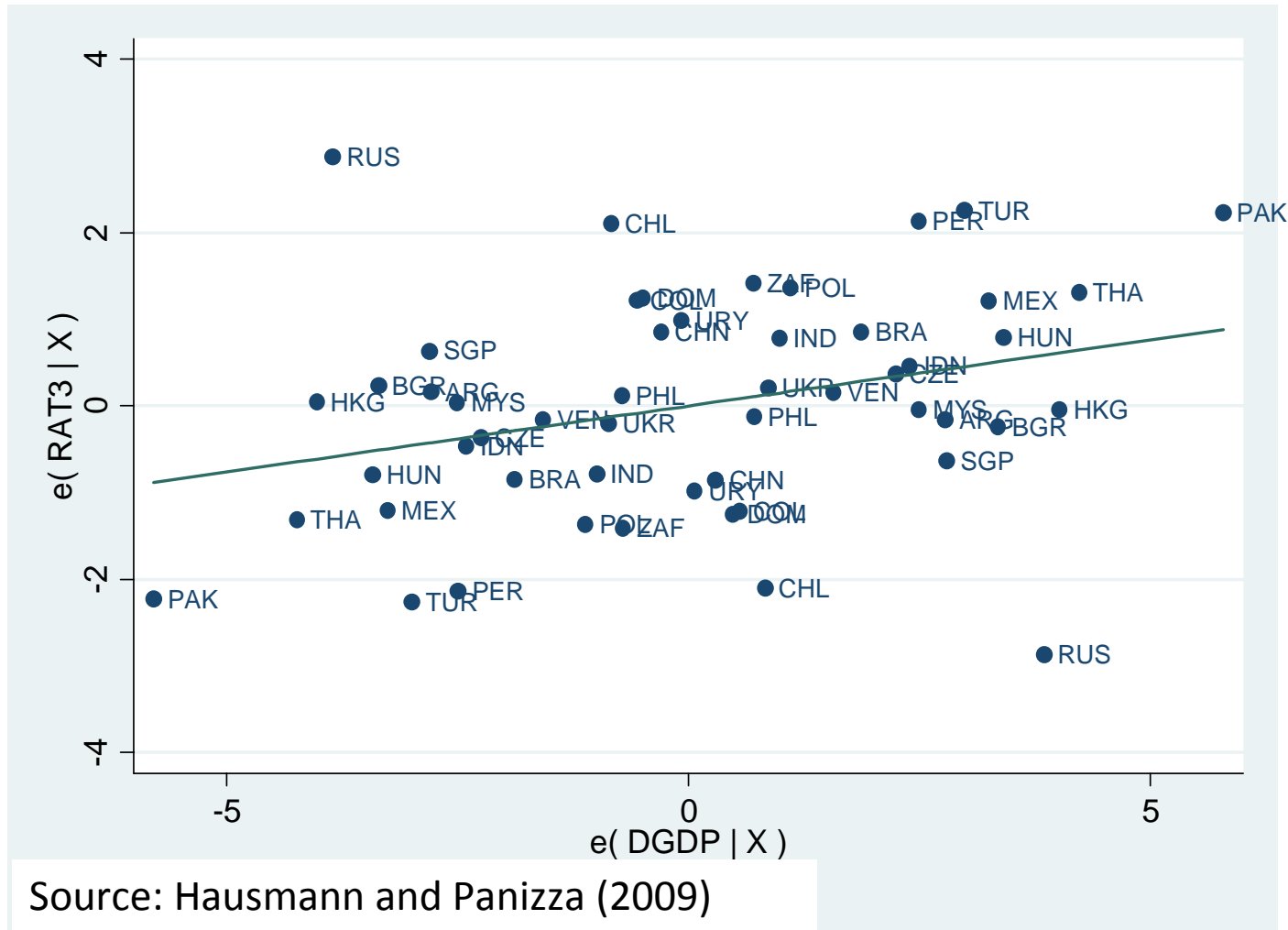
Monetary policy in EM during the Asian/Russian crises (1996-98)



Source: Hausmann and Panizza (2009)

And yet, things seem to have improved

Monetary policy in EM around the subprime crisis (2008-09)



Source: Hausmann and Panizza (2009)

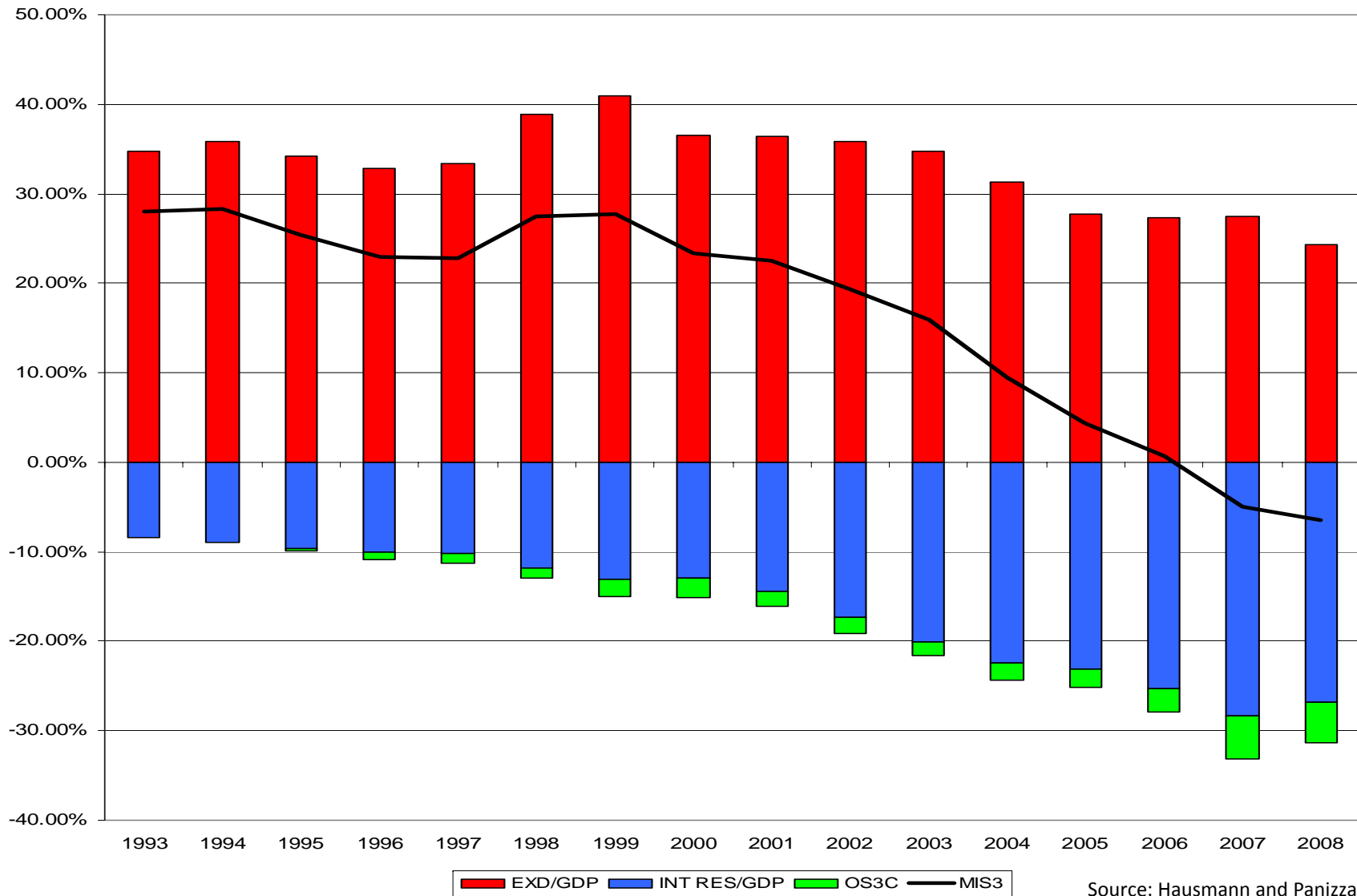
What has gone down is net external borrowing by developing countries

- Consider the following measure of aggregate mismatches:

$$MISM = \frac{\text{foreign currency debt}}{GDP} - \frac{\text{international reserves}}{GDP} + (1 - OSIN) \frac{\text{foreign currency debt}}{GDP}$$

- So, a country can reduce its aggregate mismatch by
 - Borrowing less (in gross terms)
 - Accumulating reserves
 - Reducing original sin

Developing countries no longer have a net external debt



Source: Hausmann and Panizza (2009)

Lower mismatches and not lower original sin are the explanation for better polices

Dependent variable: Policy interest rate

	(1)	(2)	(3)
L.IR	0.528*** (0.0521)	0.659*** (0.0866)	0.533*** (0.0541)
INF	0.398*** (0.0688)	0.280** (0.109)	0.406*** (0.0657)
GROWTH	-0.281*** (0.0769)	0.157** (0.0706)	-0.0457 (0.11)
MISM3			2.679 (1.956)
MIS3*GR			-0.722 (0.466)
Constant	2.832*** (0.834)	0.303 (0.588)	1.639** (0.78)
Observations	270	52	270
R-squared	0.642	0.307	0.649
N. of countries	23	26	23
Period	1993-08	2008-09	1993-08
GROWTH+ 0.28*MIS3*GR			-0.248***
p-value			0.00
GROWTH+ 0.09*MIS3*GR			-0.111
p-value			0.147

Conclusions

- There is limited traction for the redemption story, but countries seem to be doing what we suggested they could do:

If a country ...suffers from ... original sin.., when it accumulates a net debt, as developing countries are expected to do, it will have an aggregate currency mismatch on its balance sheet. ... such a country can take steps to eliminate that mismatch or prevent it from arising in the first place... it can decide not to borrow. A financially autarchic country will have no currency mismatch because it has no external debt, even though it still suffers from original sin... Alternatively, the government can accumulate foreign reserves to match its foreign obligations. In this case the country eliminates its currency mismatch by eliminating its net debt.

Eichengreen, Hausmann, Panizza (2005a)

RATINGS, INVESTMENT INCOME AND ORIGINAL SIN

Ratings, Investment Income and OSIN

VARIABLES	Debt Rating			
	(1)	(2)	(3)	(4)
real GDP per capita, log	11.99*** (1.621)	12.12*** (1.616)	14.25*** (2.086)	14.25*** (2.097)
Total debt to GDP	-5.14*** (0.924)	-5.11*** (0.957)	-4.70*** (0.939)	-4.70*** (0.979)
Original Sin (3)	-2.18*** (0.572)	-2.19*** (0.575)	-2.29*** (0.580)	-2.29*** (0.576)
Central Bank Reserves to GDP		-0.36 (1.645)	-0.53 (1.773)	-0.53 (1.772)
Net Investment Income to GDP			10.53*** (3.401)	10.57*** (3.207)
Cumulative CA to GDP				-0.02 (0.512)
Constant	-25.52*** (5.688)	-25.96*** (5.609)	-33.65*** (7.404)	-33.63*** (7.461)
Observations	897	897	874	874
Adjusted R-squared	0.514	0.514	0.526	0.525
Year Fe	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes

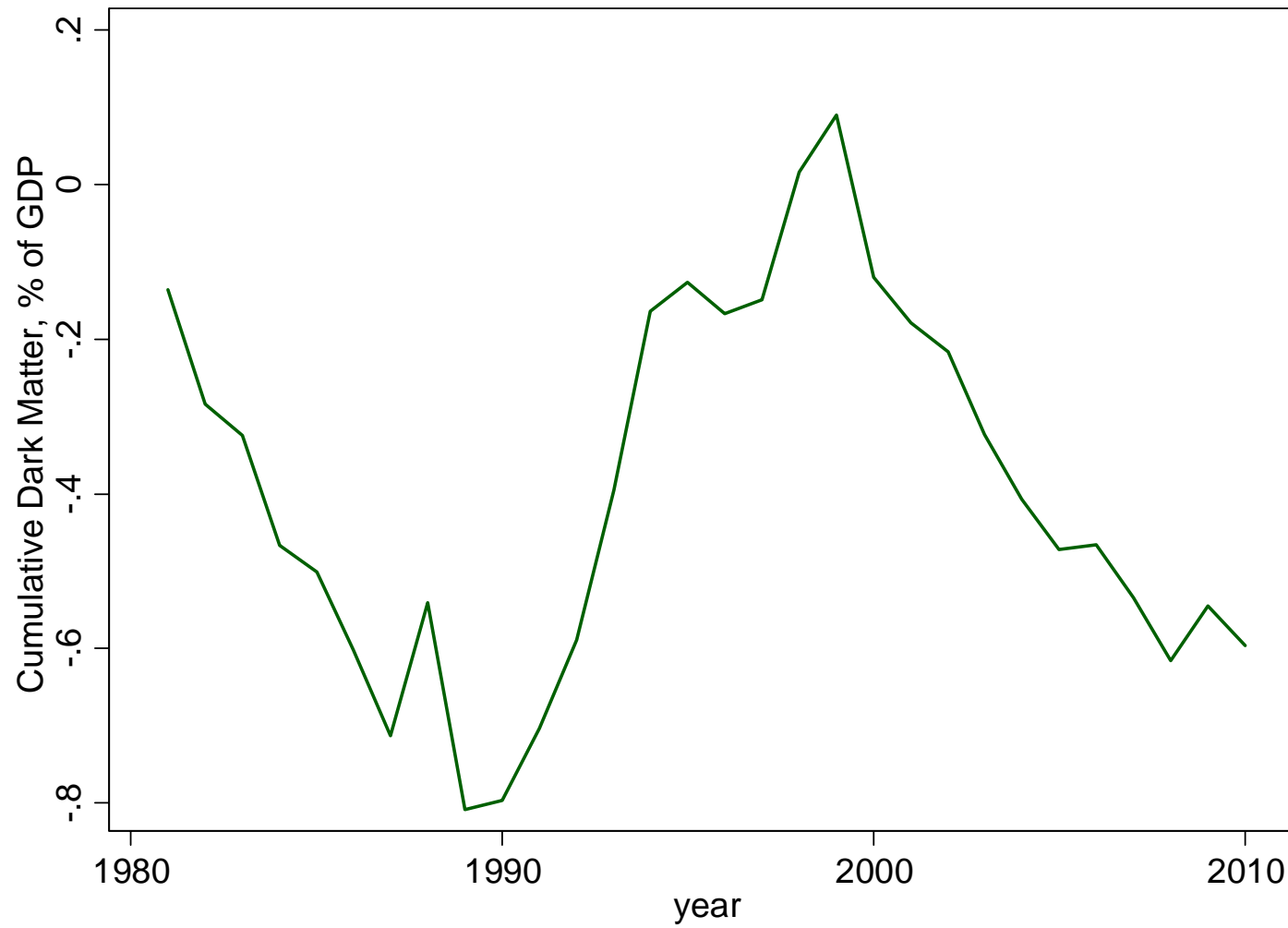
Conclusions

- Countries are borrowing less
- They are holding large FOREX reserves
- ...which lower their net financial income
 - These may be optimal policies in the presence of original sin
 - But they are second best policies
 - The country will not benefit from financial globalization
 - Reserves are expensive
- While reserves give more policy space, they don't improve perceptions of solvency

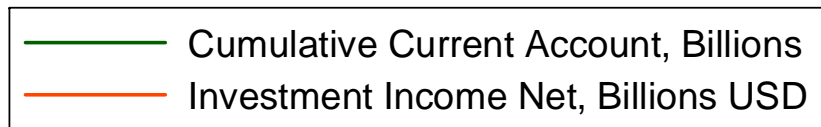
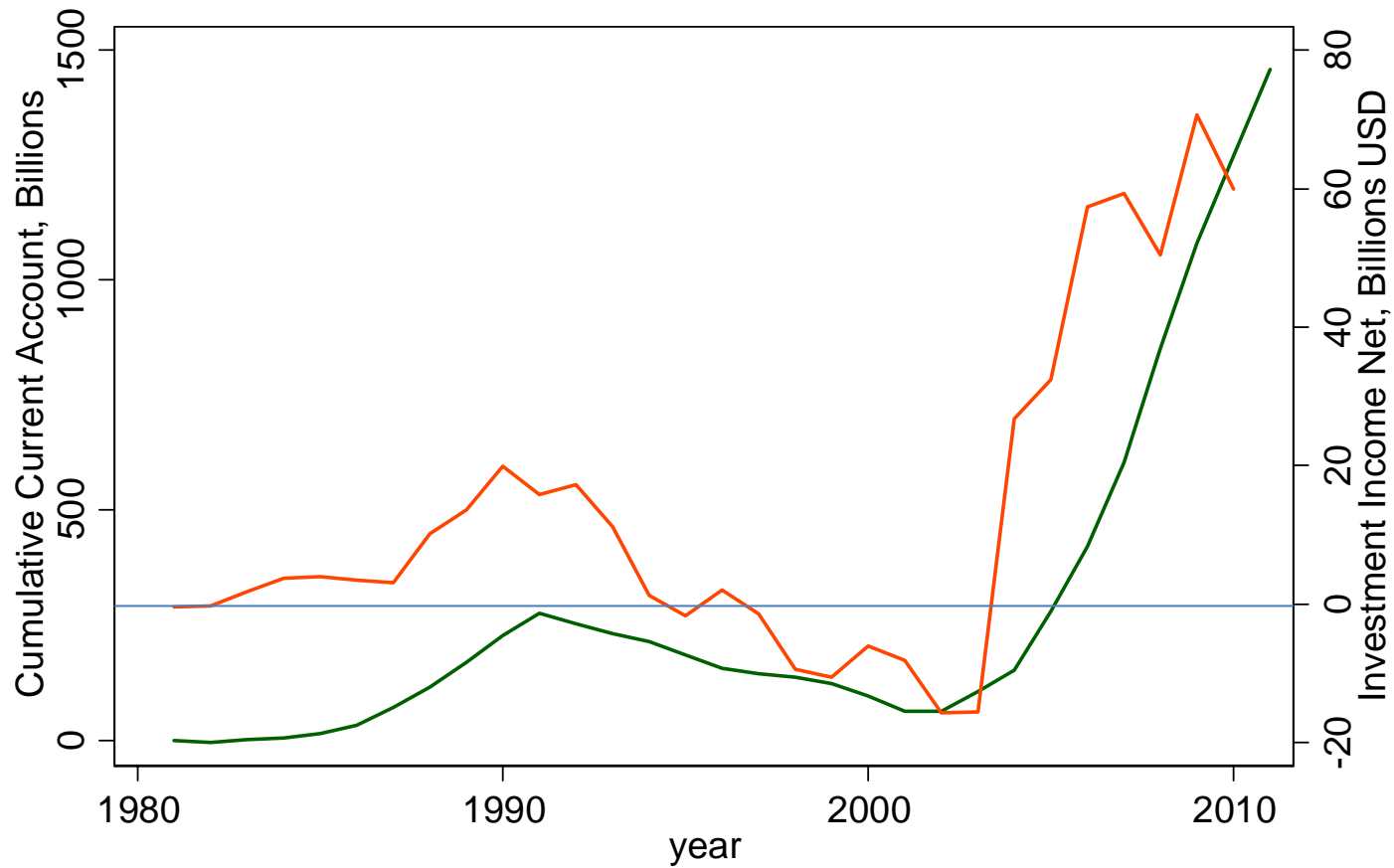
Thank you!

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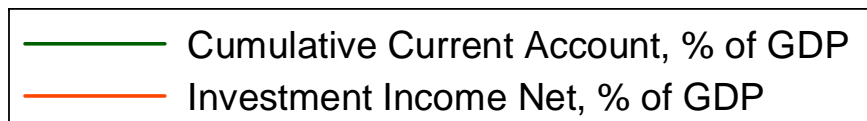
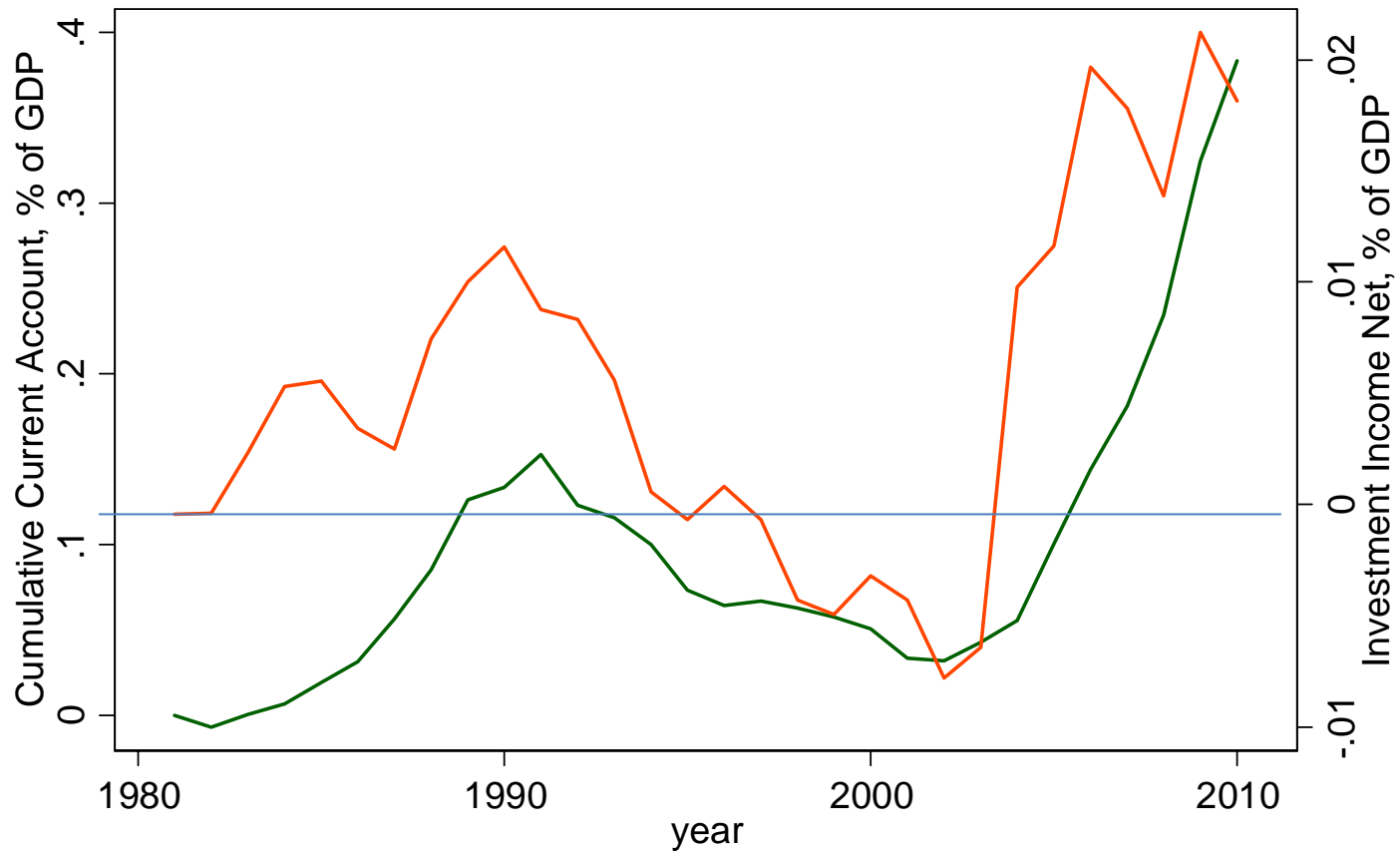
Colombia



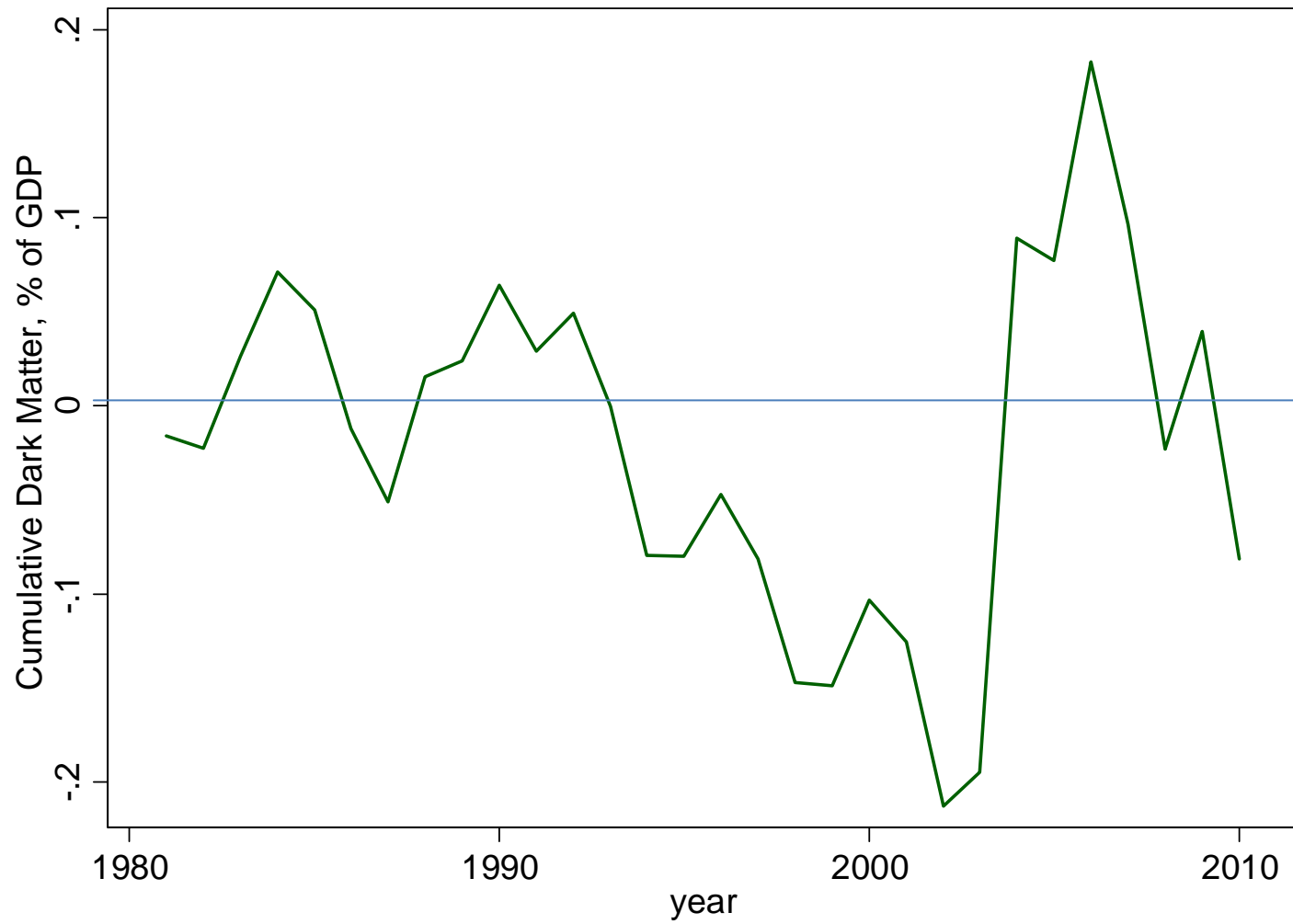
Germany



Germany



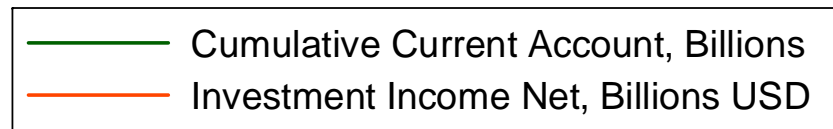
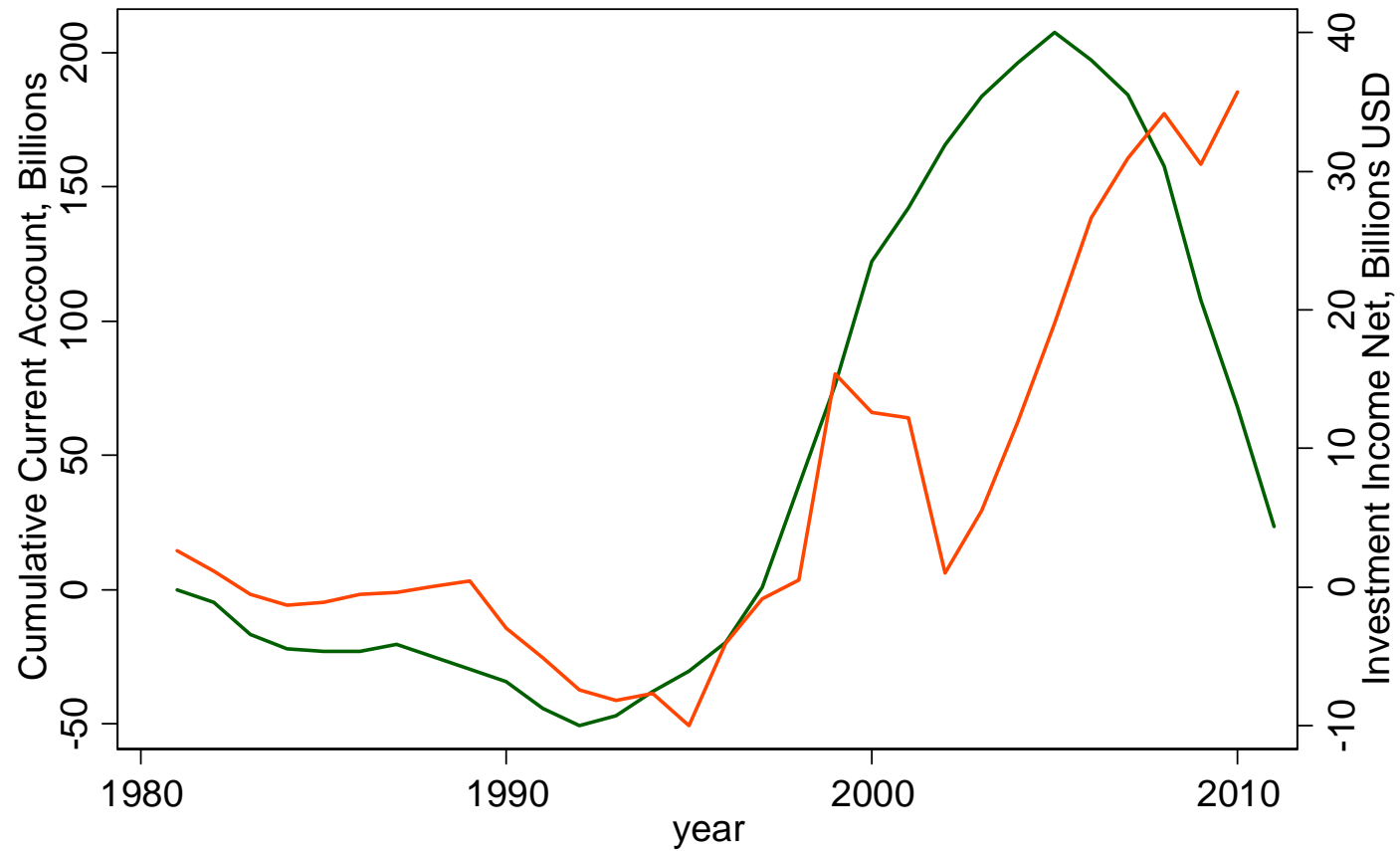
Germany



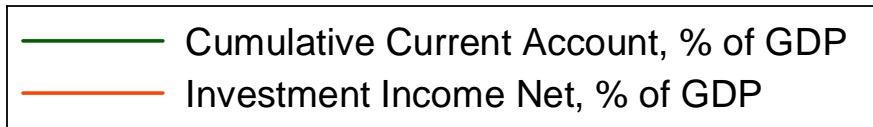
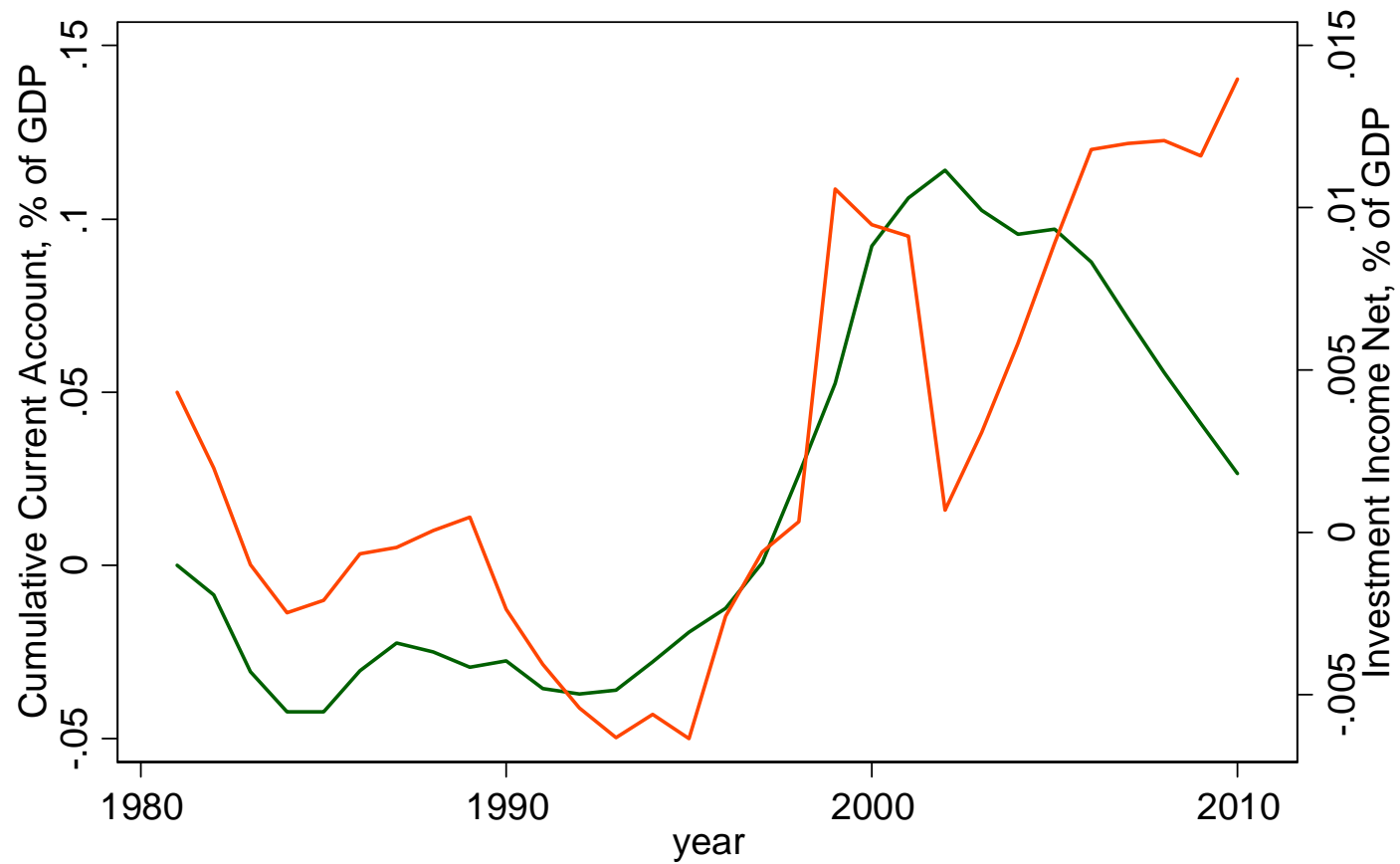
Germany



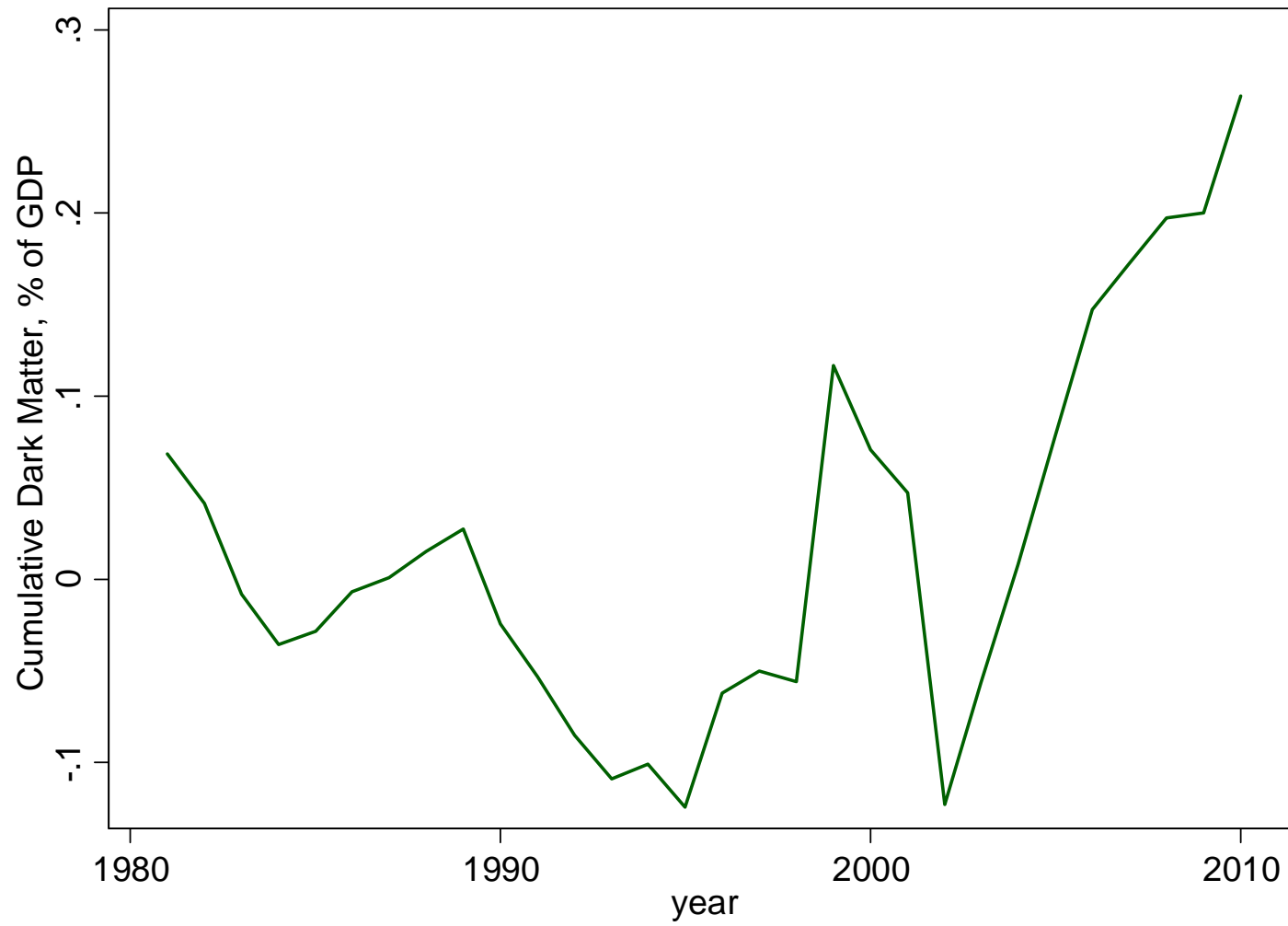
France



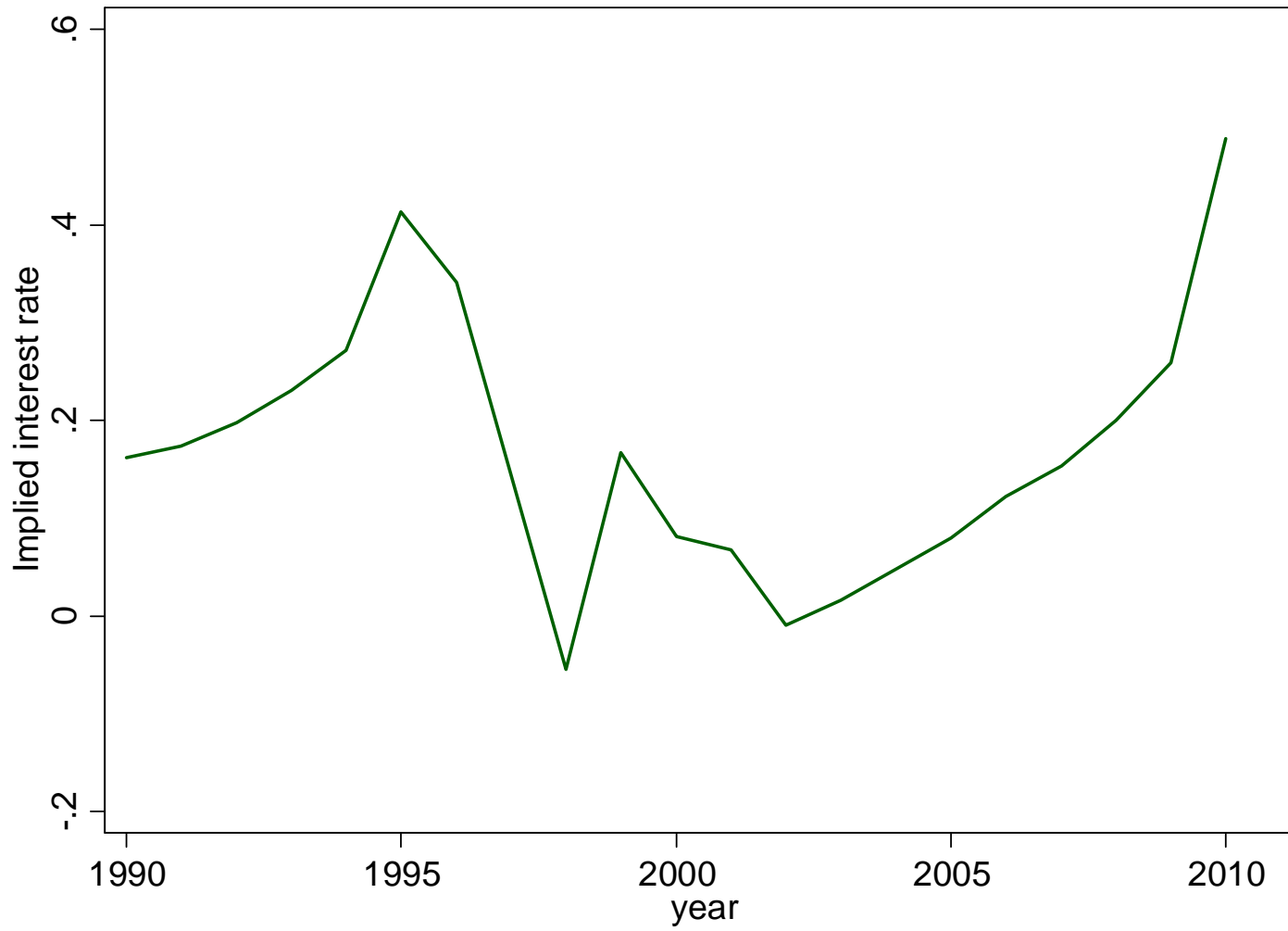
France



France



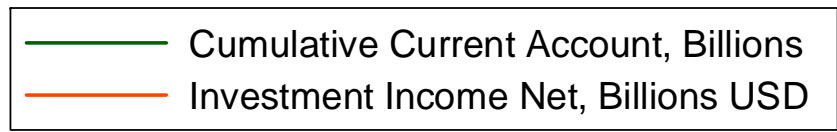
France



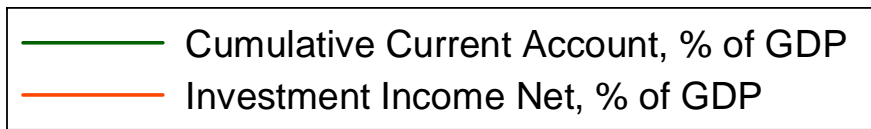
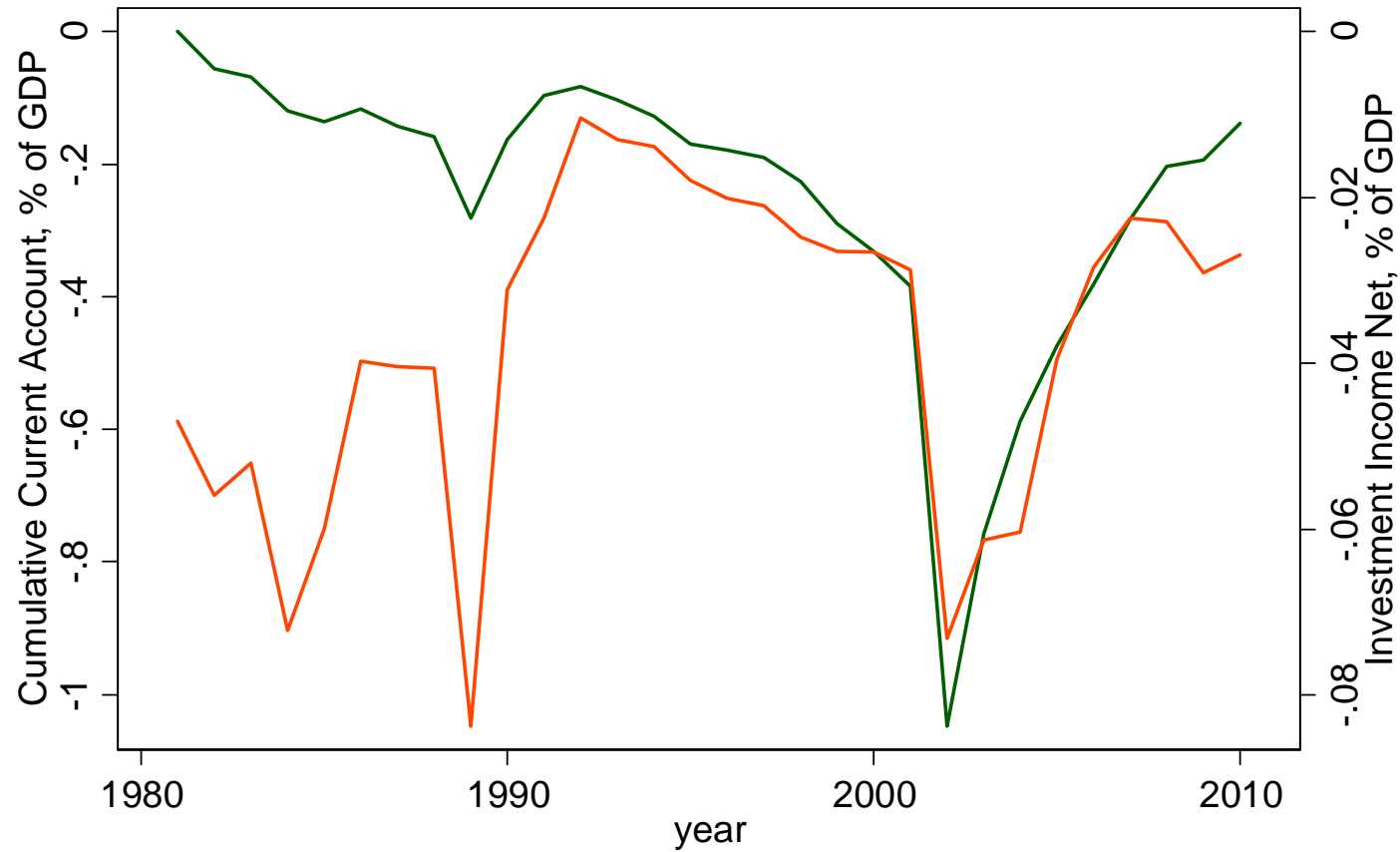
Cumulative current account and investment income

LATIN AMERICA

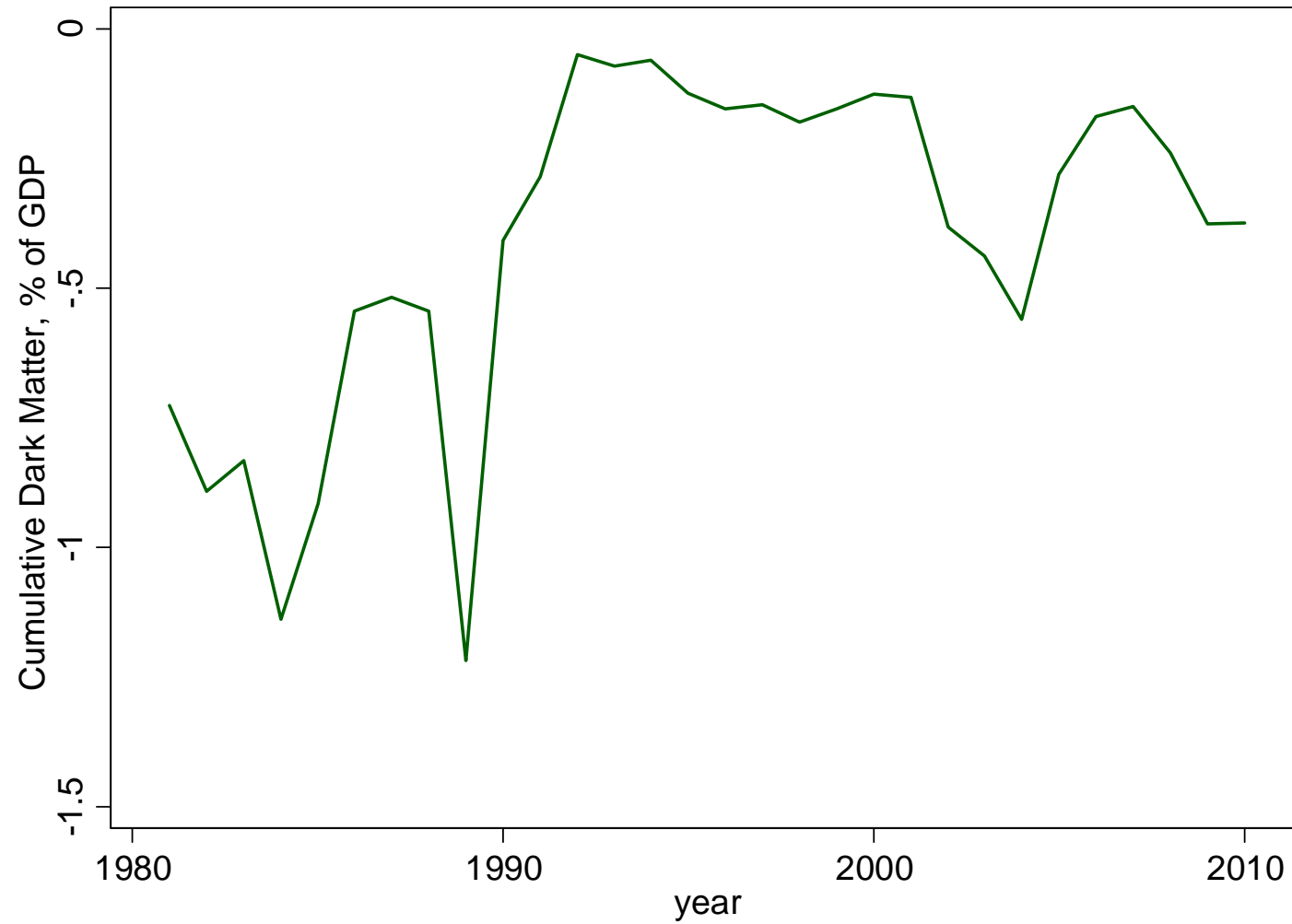
Argentina



Argentina



Argentina

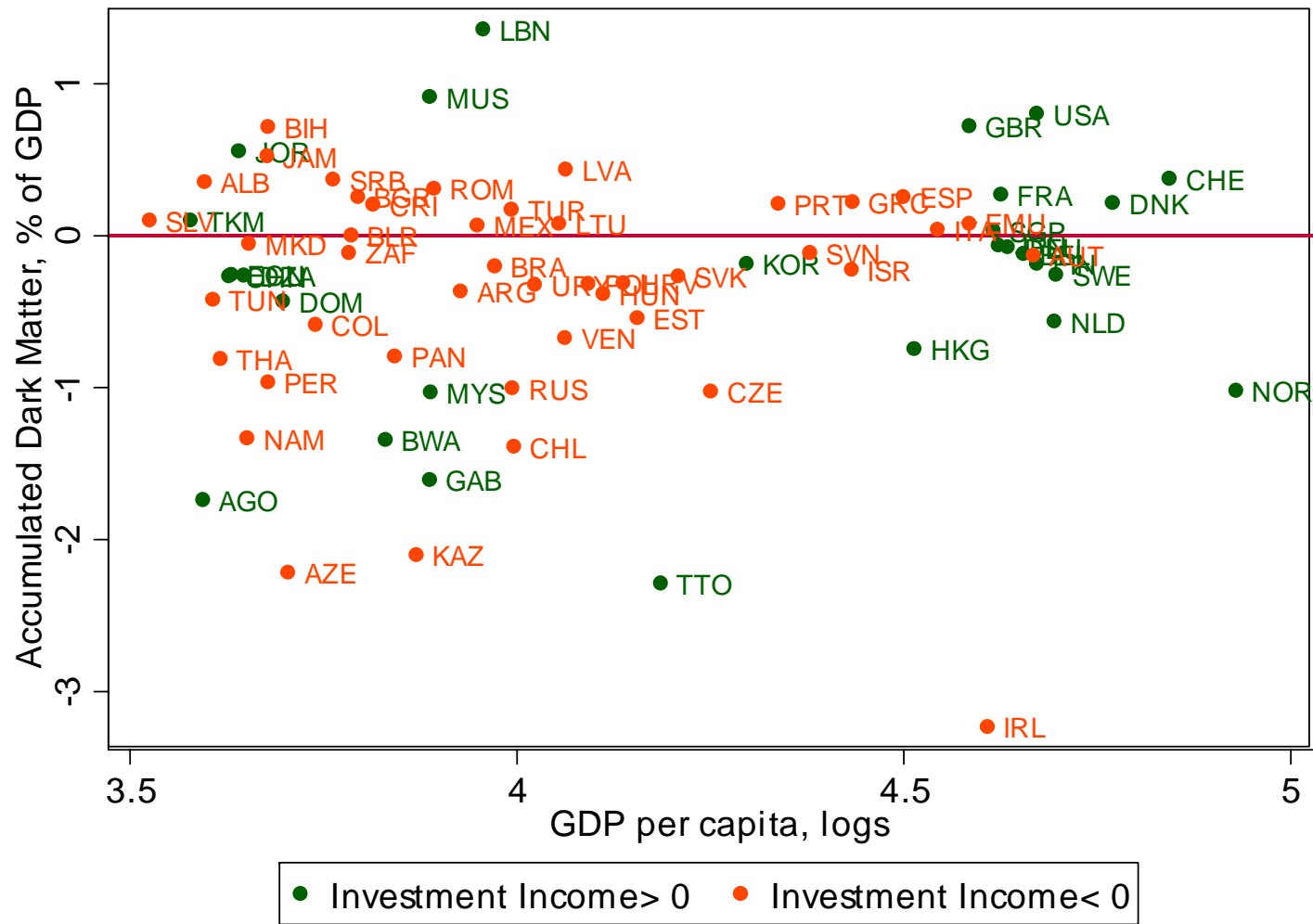


Argentina

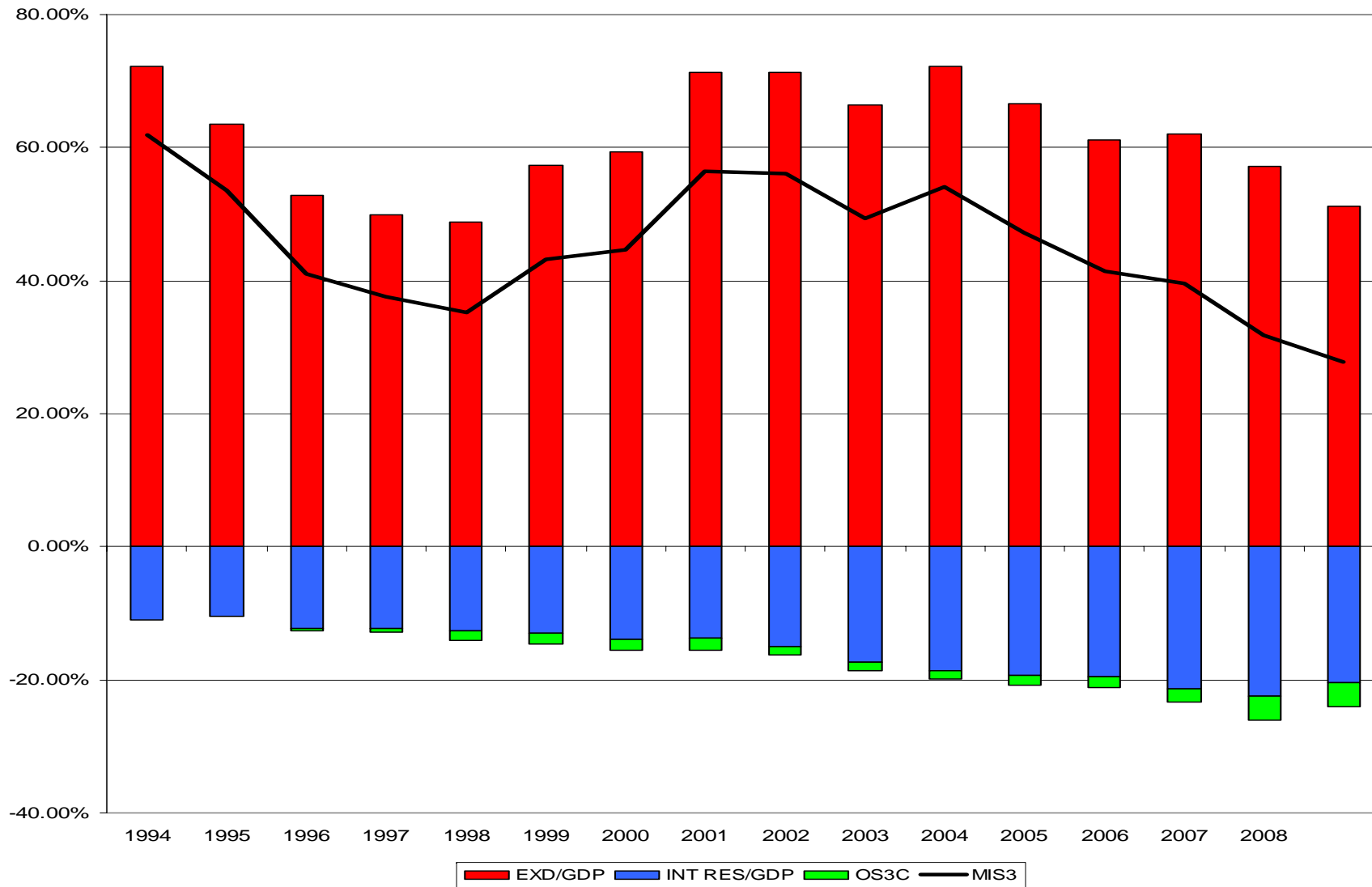


DARK MATTER

Cumulative dark matter 2010

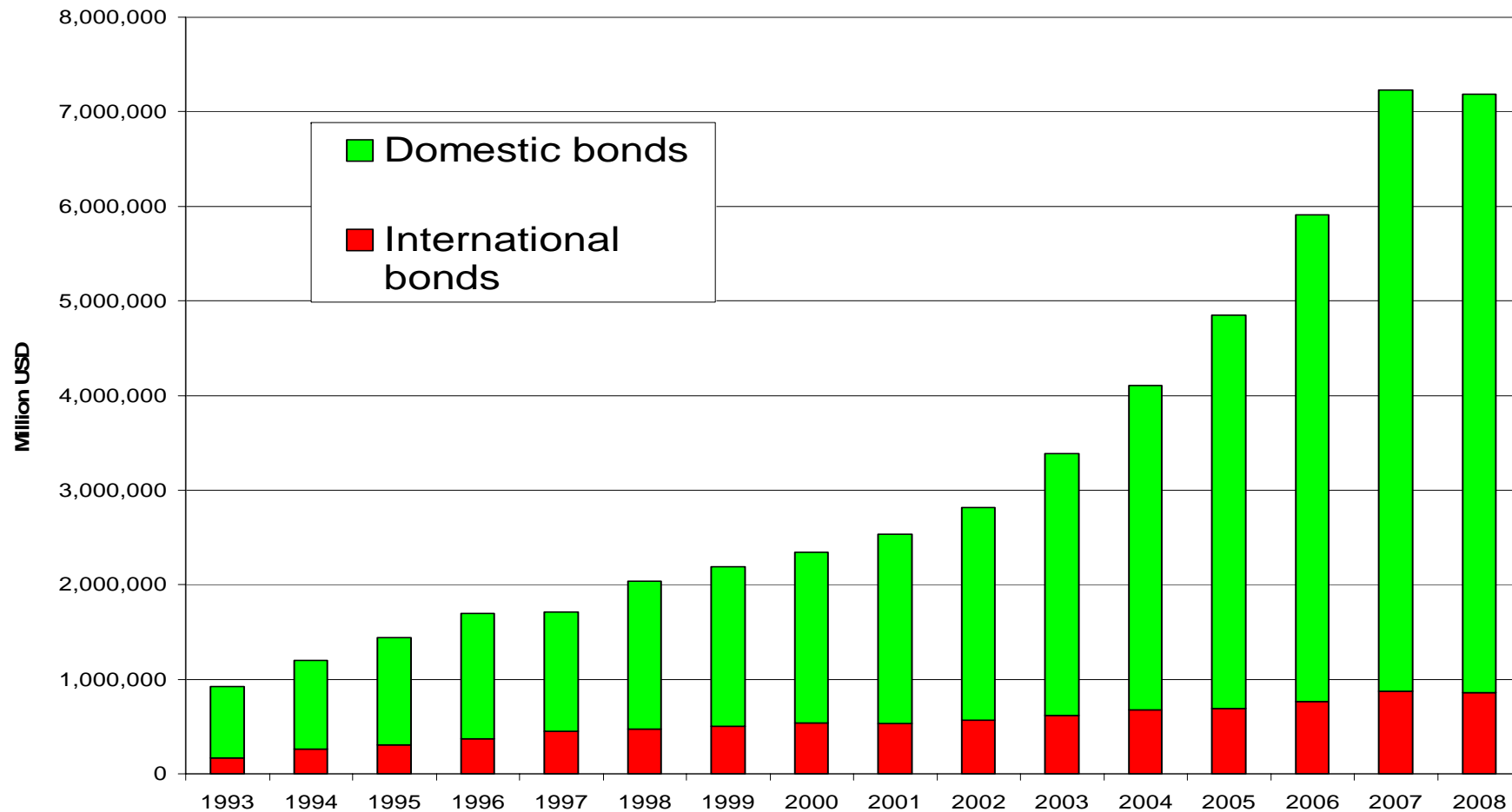


What has gone down is net external borrowing by developing countries



Source: Hausmann and Panizza (2009)

But, maybe redemption was achieved by borrowing domestically

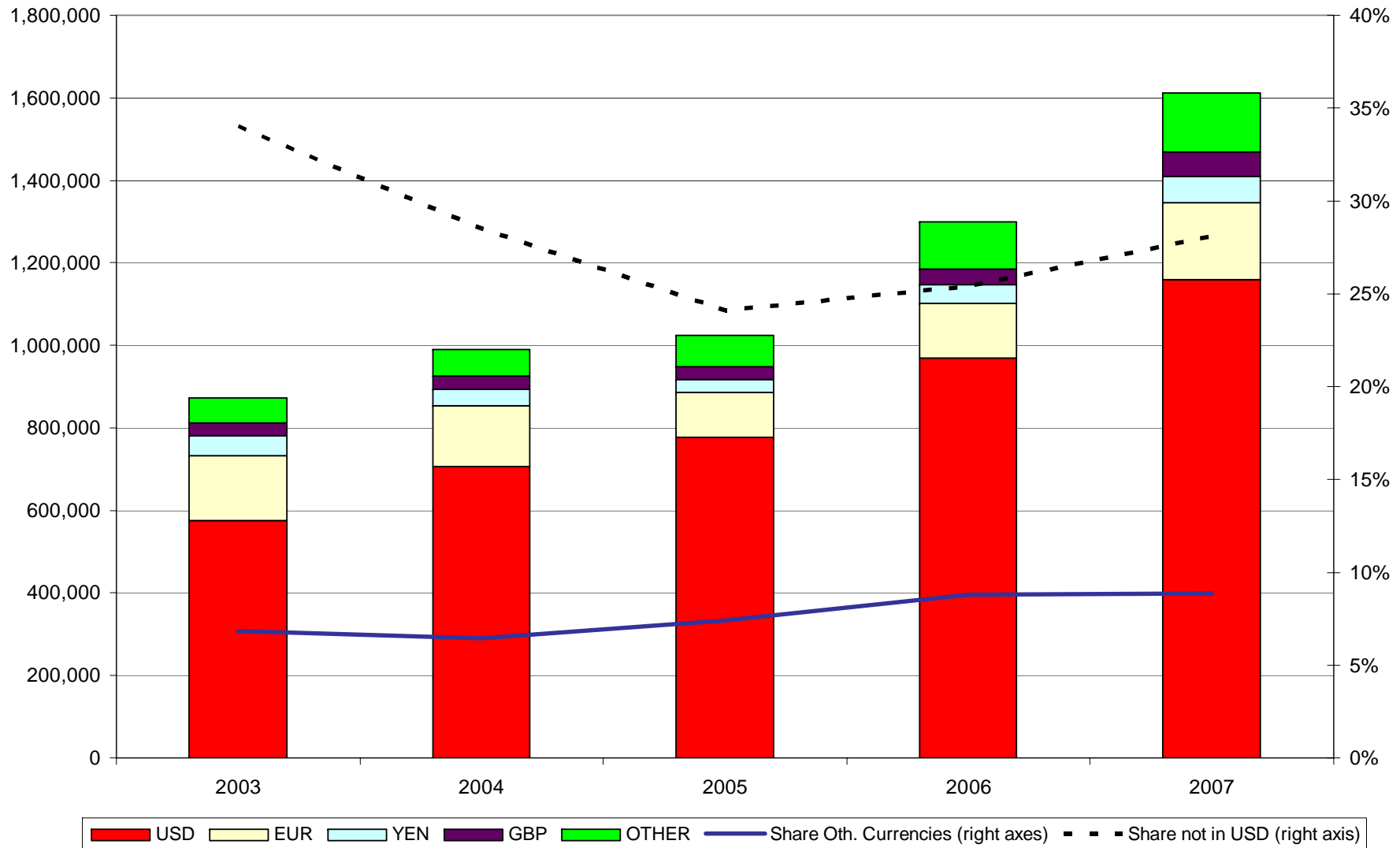


Countries included in the sample: Argentina, Brazil, Chile, China, Colombia, Croatia, Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, South Korea, Lebanon, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Russia, Singapore, Slovakia, South Africa, Taiwan (China), China, Thailand, Turkey, Venezuela.

Source: Hausmann and Panizza (2009)

Possible, but unlikely

Developing countries' bonds held by US investors



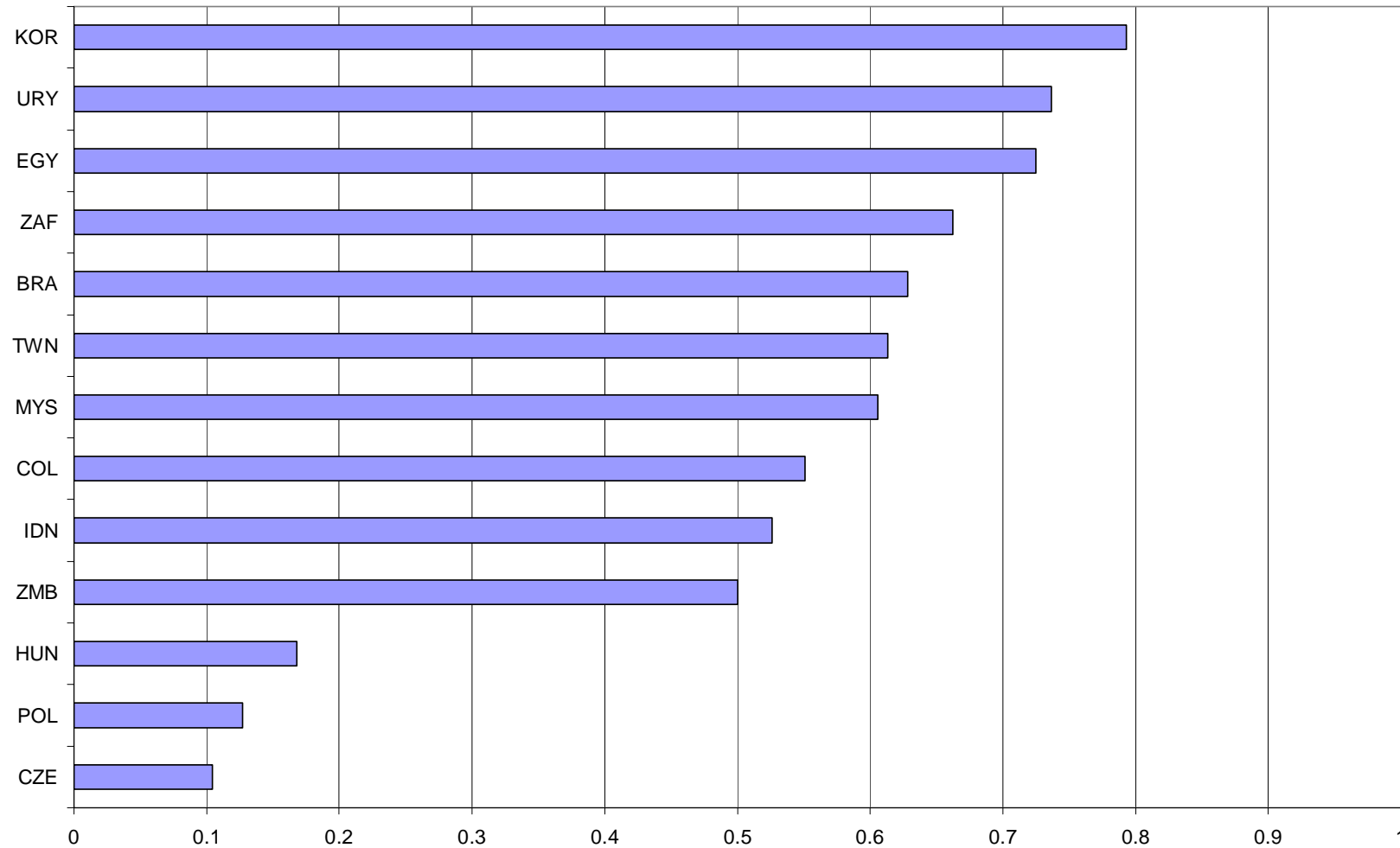
Possible, but unlikely

Original sin indexes based on US Treasury data

	Mean	Median	St Dev	Min	Max	N.Obs
US SIN1 =1-(OTH+OWN)/TOT						
2003	0.94	1	0.16	0	1	69
2004	0.90	1	0.23	0	1	70
2005	0.89	1	0.22	0	1	70
2006	0.83	0.97	0.24	0	1	70
2007	0.81	0.95	0.24	0	1	72
US SIN2 =1-OWN/TOT						
2006	0.90	1	0.22	0	1	70
2007	0.90	1	0.21	0.10	1	72

Possible, but unlikely

US-SIN2: countries with value of the index lower than 0.9 (2007 survey)



Source: Hausmann and Panizza (2009)

Measurement

- Caveats:
 - These indexes only include international securities
 - They don't include syndicated bank loans and official (multilateral and bilateral) loans
 - They don't capture the activity of foreign investors in the domestic bond market
 - They don't measure the domestic component of original sin