FETP/MPP8/Macroeconomics/Riedel

The Policy Trilemma, Sterilized Intervention and Exchange Rate Protection

Introduction

The Policy Trilemma suggests that a country that is open to international trade and investment and wants to fix or manage its exchange rate must be prepared to forego an independent monetary policy. Fixing the exchange rate is a monetary policy and a country can only have one at a time!

Some countries want to have it both ways—fix the exchange rate and conduct an independent monetary policy at the same. A monetary policy that is not consistent with the fixed exchange rate will require the central bank to intervene heavily in the foreign exchange market. Such interventions can have major monetary (and inflationary/deflationary) consequences unless such interventions can be "sterilized."

Often sterilized intervention, especially in countries with overvalued currencies, serves only to hasten the approach of a balance of payments crisis and a run on the currency.

Countries with undervalued currencies (surpluses in the overall balance of payments) have more leeway to conduct sterilized interventions, but there are costs and benefits. China, and to a lesser extent Vietnam, are the best example of such a policy.

Introduction--continued

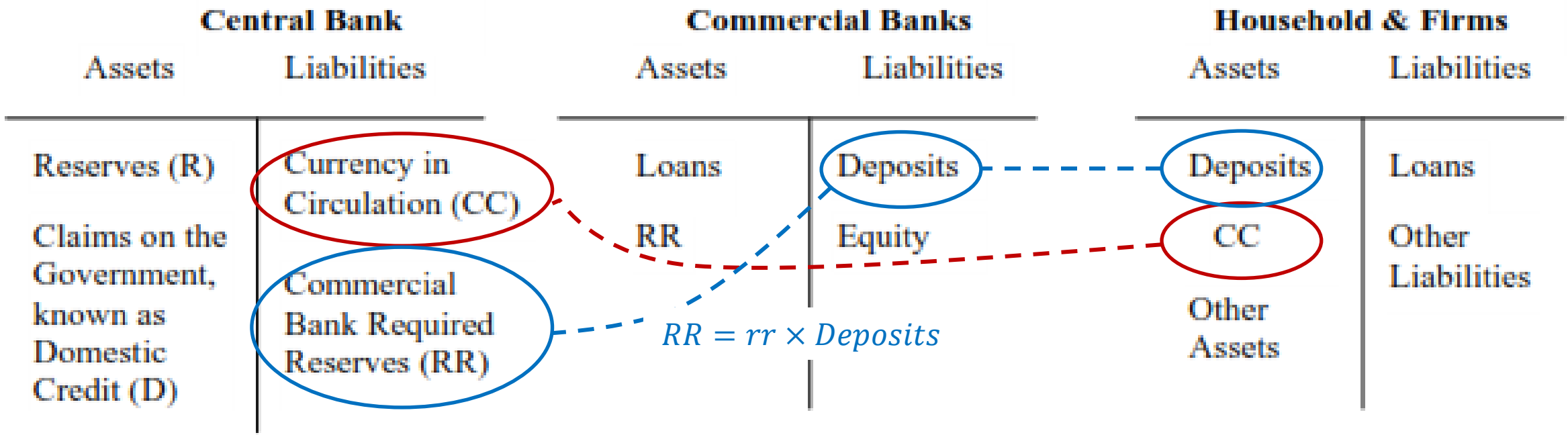
China practiced of sterilized intervention for about one decade, 2002 to 2010 or so, during which time it amassed several trillions of official foreign reserve assets.

China's large and growing trade surpluses, together with its mounting accumulation of foreign reserves, raised many questions and much criticism in its trade-partner countries:

1. Was China "manipulating" its currency?
2. Was China practicing protectionism on a macro scale?
3. Did China's massive accumulation of foreign reserves contribute significantly to a "global saving glut."
4. If so, did China's massive outflow of savings (via foreign reserve accumulation) contribute to the global financial crisis of 2009-10?

The answer to these questions requires an understanding of sterilized intervention its costs and benefits.

Some basics: The money supply process



$$M^S = CC + Deposits = CC + RR/rr = h(CC + RR) = h(R + D) = h(B)$$

(rr) The reserve requirement ratio (rr) is the faction of deposits that commercial banks are required to hold as reserves at the central bank: $rr = RR/Deposits$.

(h) The money multiplier (h) is the ratio of money supply (e.g. M2) to the central bank assets (=liabilities), known as "reserve money" or "base money": $h = M^S/B$.

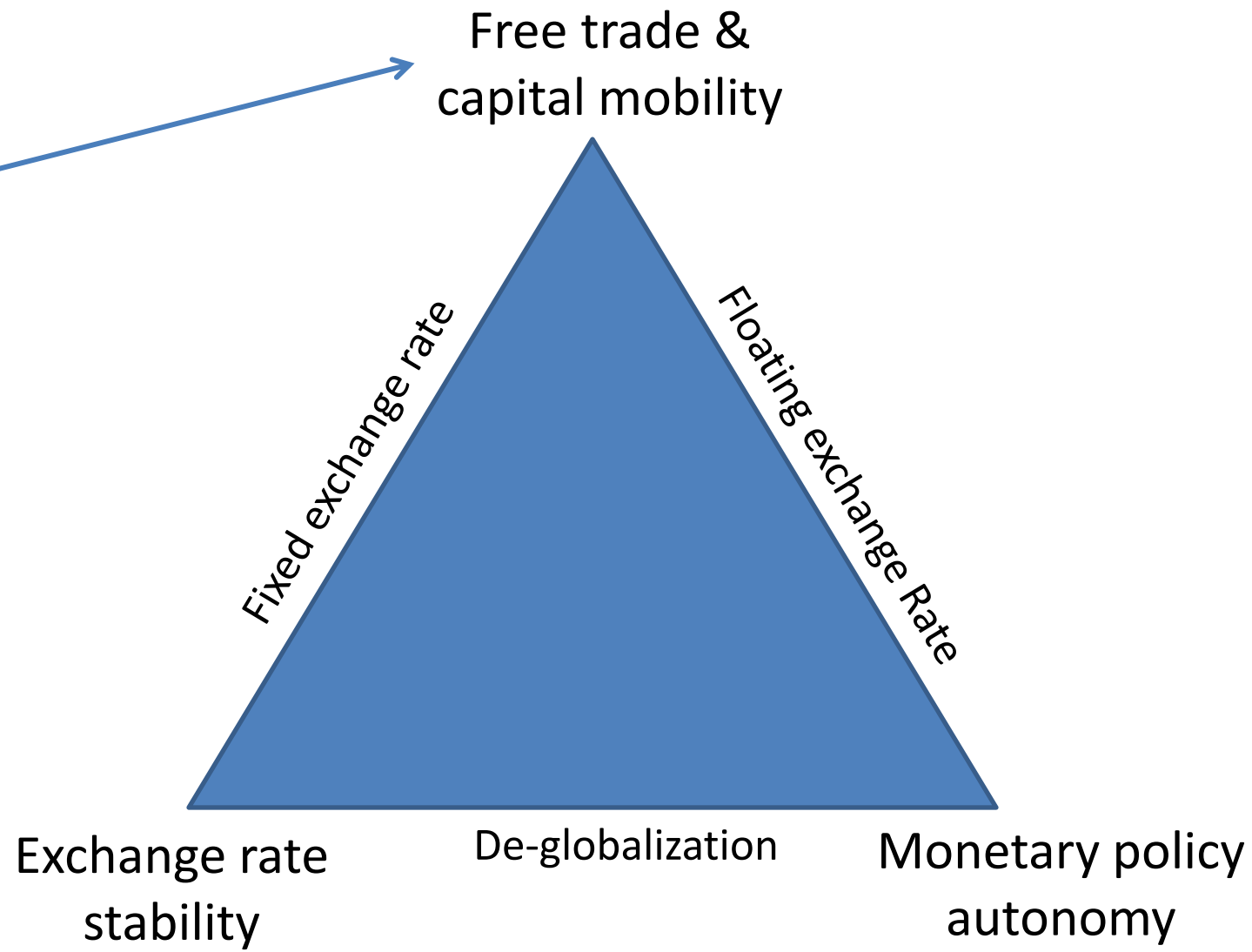
The central bank changes the money supply by changing B (buying and selling domestic and foreign assets) and/or changing h by changing rr: $\Delta M^S = h \cdot \Delta B + B \cdot \Delta h$

Some more basics: The Policy Trilemma

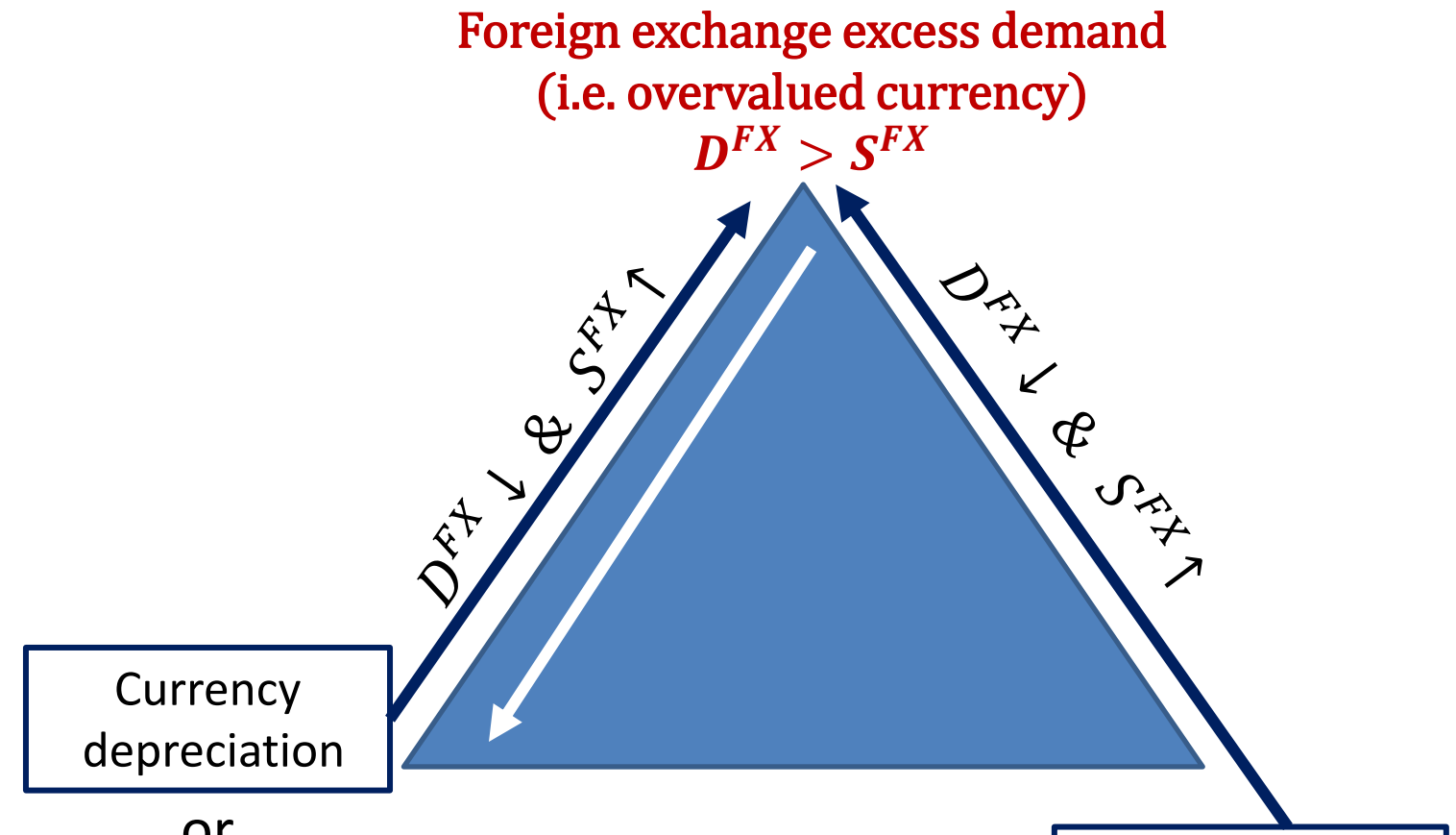
Here is the standard presentation of the POLICY TRILEMMA, but with one simple revision….

If integration into world goods and asset markets is desired, then a country must choose either to:

1. Fix the exchange rate and give up an independent monetary policy
2. Float the exchange rate and retain monetary policy for domestic policy objectives



Foreign Exchange Market Intervention and Sterilization



The two Central Bank operations (selling foreign assets and buying domestic assets) cancel each other and no monetary adjustment occurs…

The foreign exchange market disequilibrium persists, requiring further intervention…

Until, the country depletes its stock of foreign reserves and then…

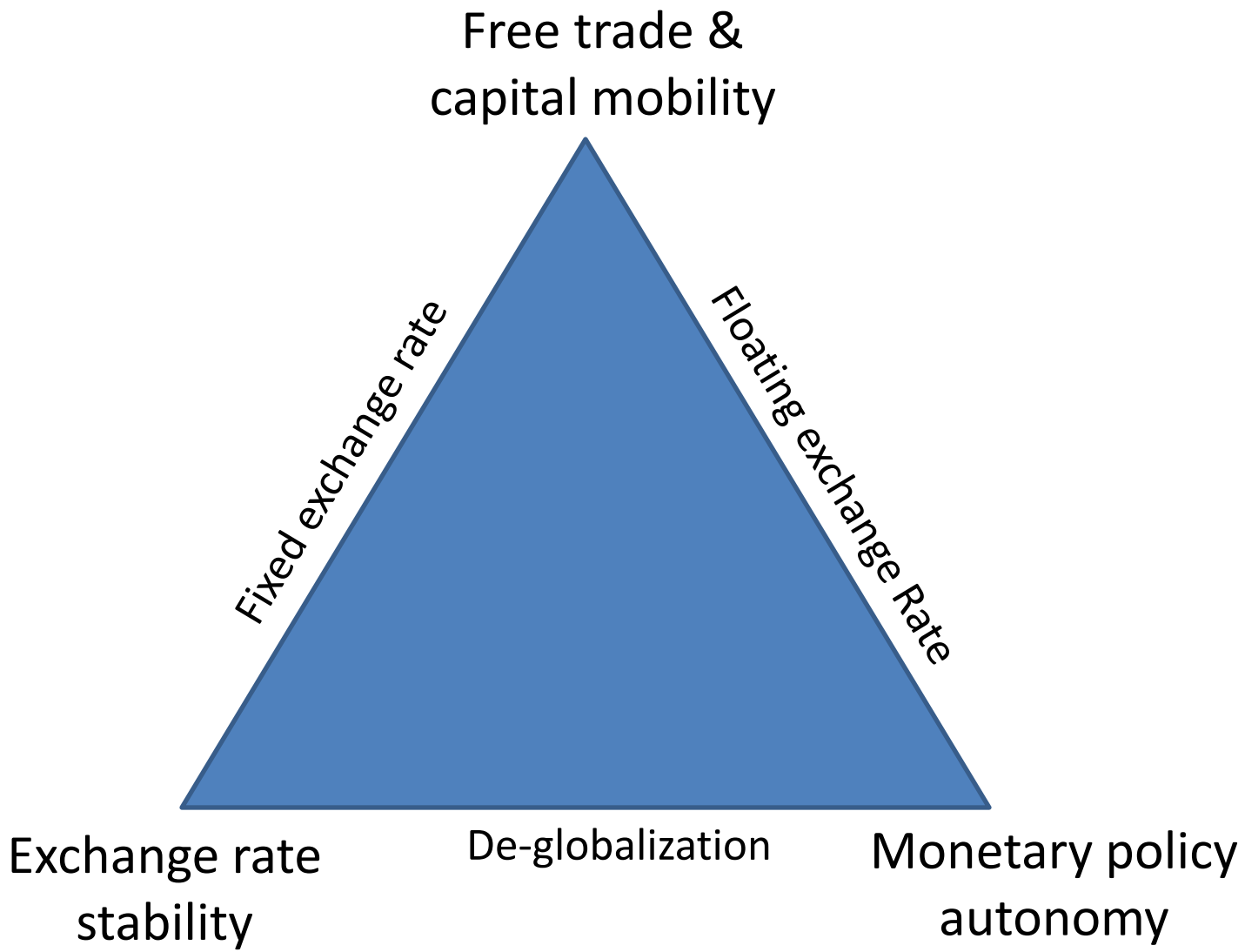
Sterilization as an escape from the Policy Trilemma

Sterilization is a means of escaping the policy trilemma, if only temporarily.

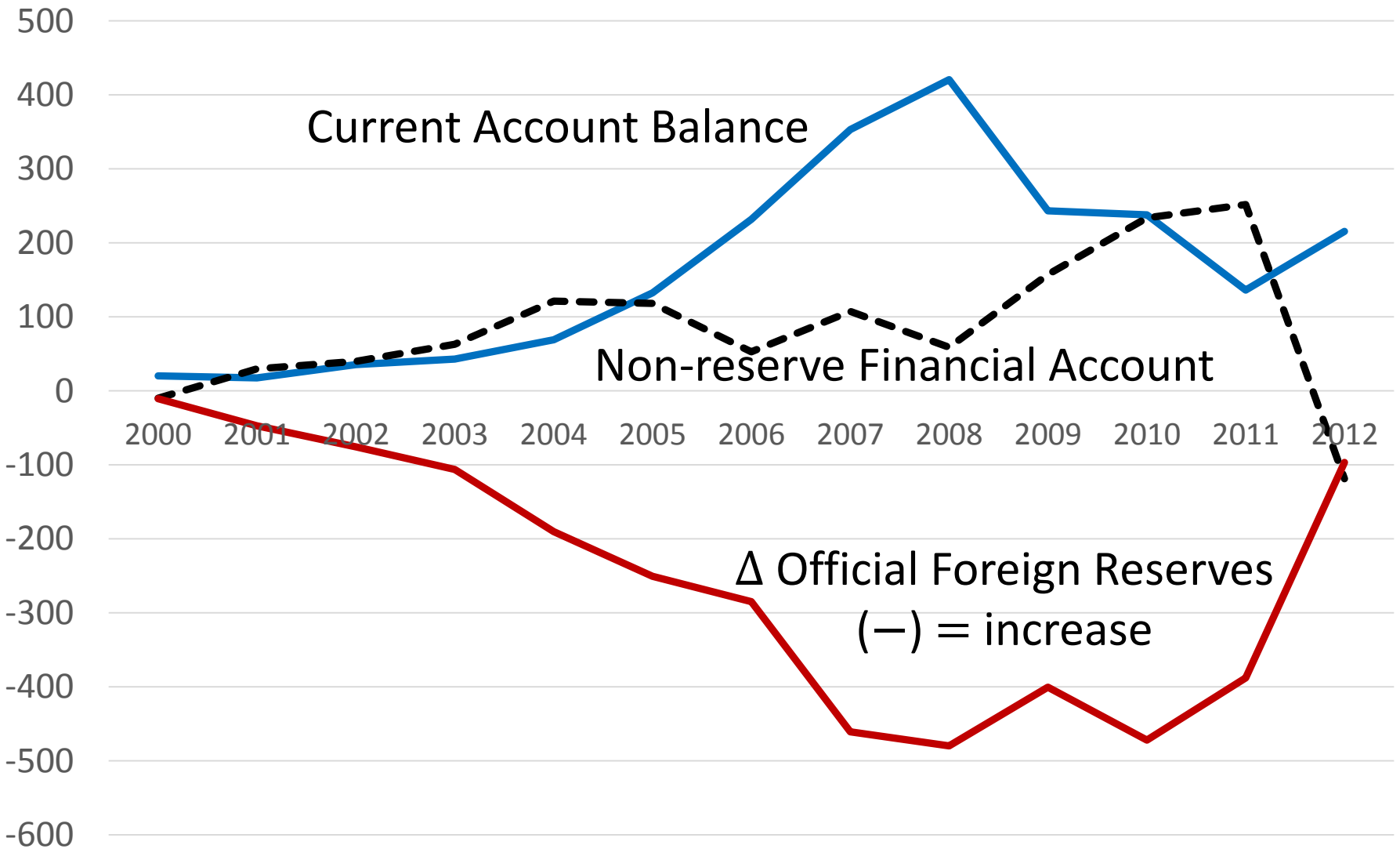
A countries with excess FX demand (i.e. overvalued currencies) can sterilize only so long as the market perceives that it has sufficient reserves to defend the exchange rate. When that fails, there is a speculative attack on the currency and the game is over.

But, what about countries with excess supply of FX (i.e. undervalued currencies)?

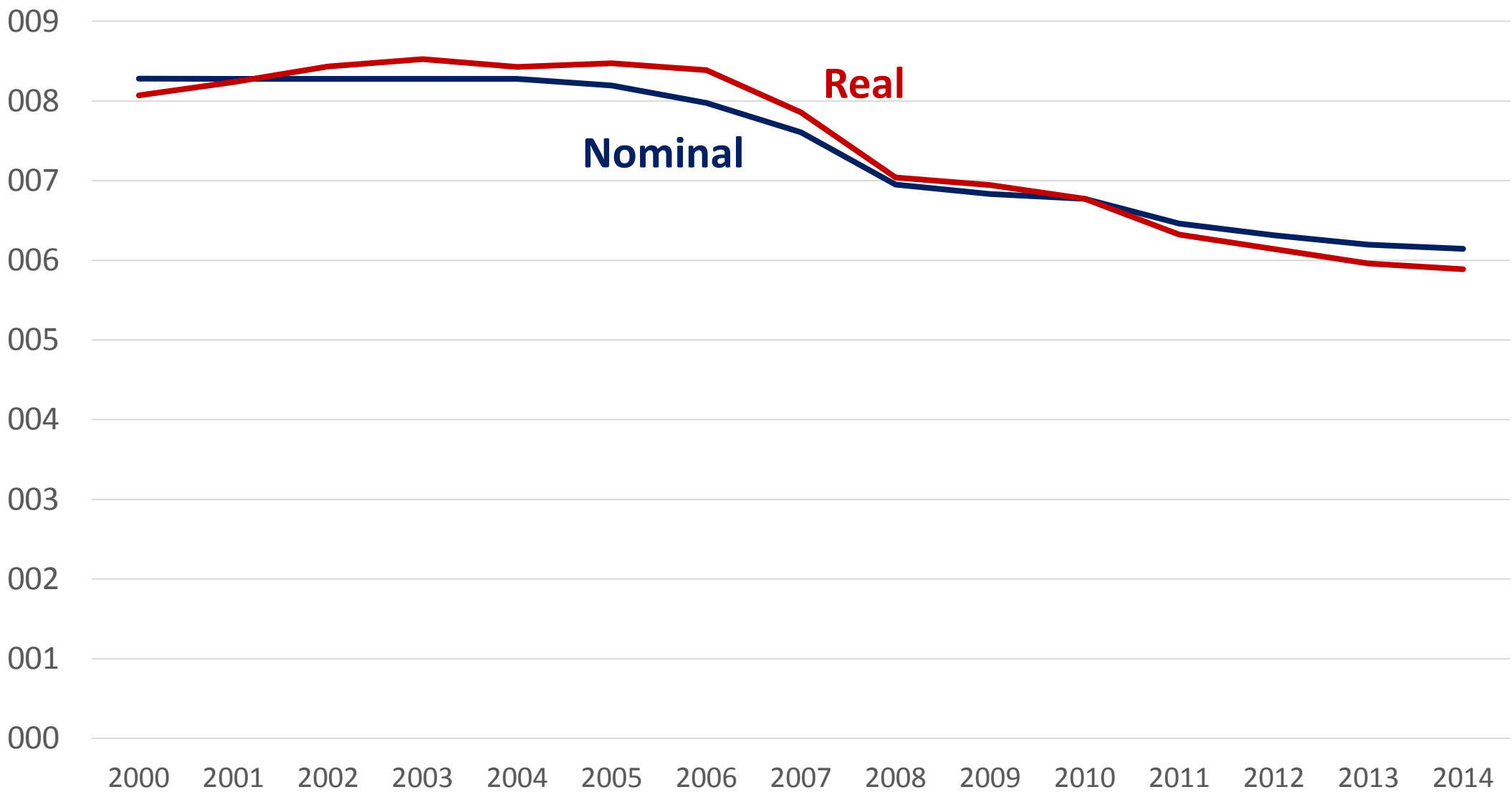
That is the case of China…



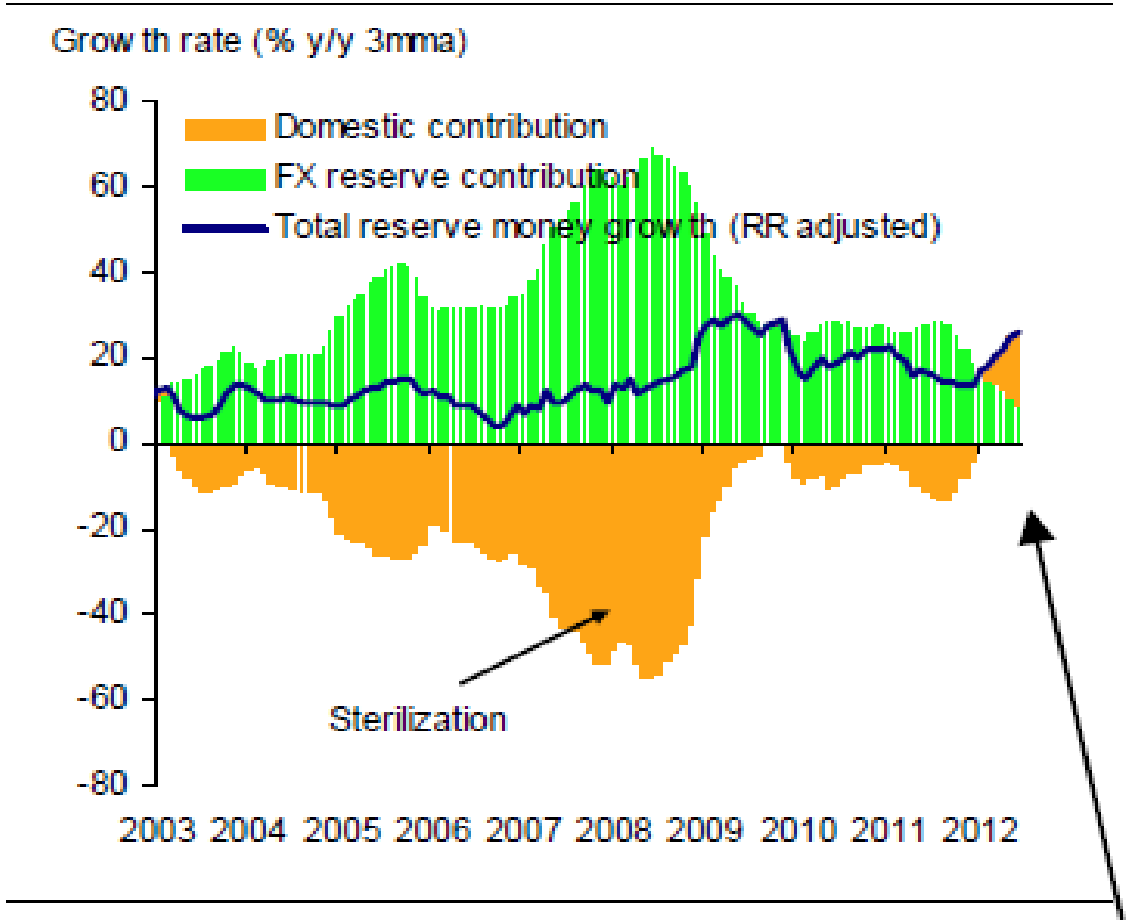
China's Balance of Payments: 2000-2012 (USD billions)



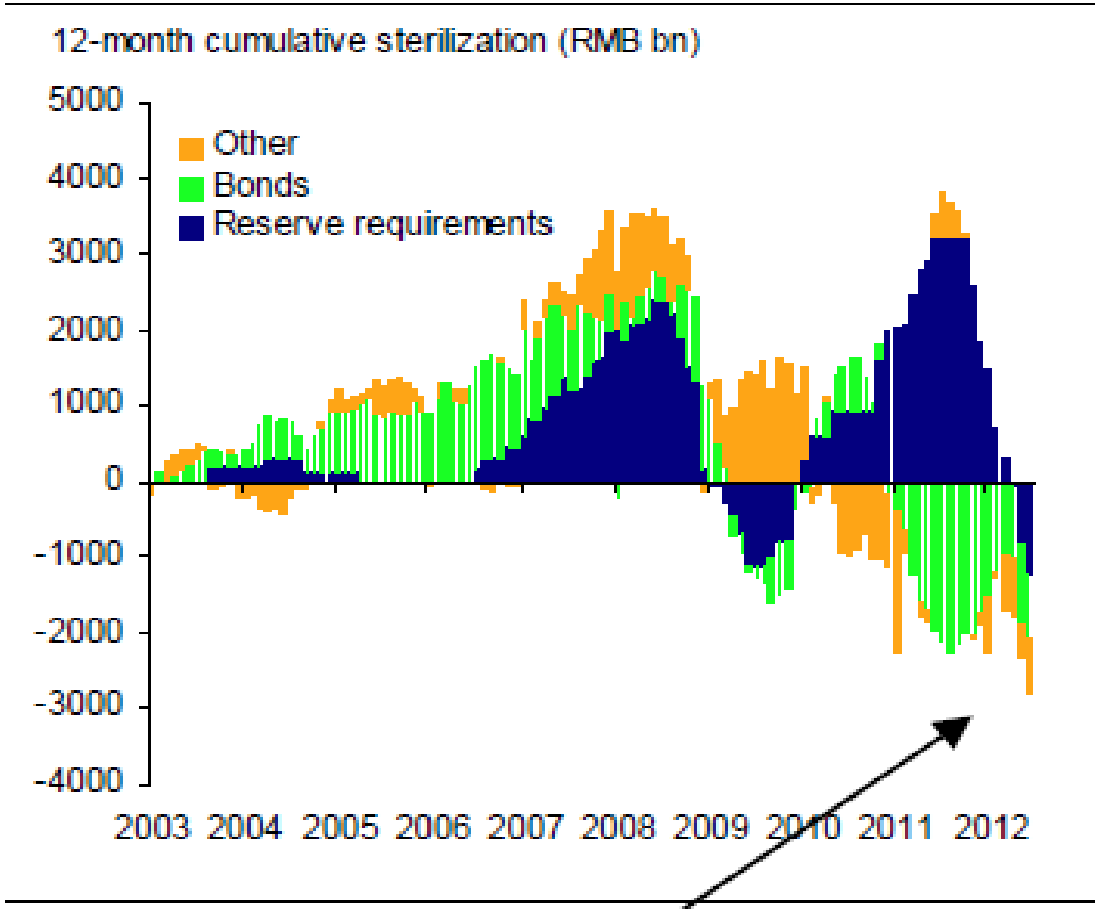
Nominal and Real RMB/USD Exchange Rates



From 2003 to 2009, the PBC intervened heavily in the foreign exchange market, amassing more than $2 trillion in foreign reserves, but avoided the monetary consequences by offsetting reserve purchases by simultaneously selling “sterilization bonds” and raising bank reserve requirements.



Source: CEIC, UBS estimates



Source: CEIC, UBS estimates

The PBC has reduced the size of sterilization in light of weakening FX accumulation

Questions

- What was the rationale for China's policy of sterilized intervention?
- What were the costs and benefits of this policy?

Competing Hypotheses

- Mercantilist exchange rate protection (Riedel, 2009)
- Positive Externalities in the tradable goods sector (Rodrik, 2008)
- Financial frictions that limit the ability of firms in tradable goods sector to borrow (Song, et. al., 2011)

W. Max Corden, "Exchange Rate Protection," *Protection, Growth and Trade: Essays in International Economics*, Basil Blackwell, 1981

James Riedel, "Overvaluation, Exchange Rate Protection, and External Imbalance in China," mimeo, 2009

Yi Huang, "From World factory to World Creditor: The External Wealth of China and Excess Returns," 2011

Dani Rodrik, "The Real Exchange Rate and Economic Growth," *Brookings Papers on Economic Activity*, Fall 2008.

Zhen Song, Kieth Storesletten and Fabrizio Zilibotti, "Growing Like China," *American Economic Review*, 101 (February 2011).

Exchange rate protection: hypothesis

There is exchange rate protection when a country protects its tradable goods sector relative to its non-tradable sector by:

- devaluing its exchange rate,
- allowing the exchange rate to depreciate more than it would otherwise,
- or preventing an appreciation that would otherwise take place" (Corden, 1981,.)

Here a model is presented to explain and illustrate that the KEY to exchange rate protection is STERILIZED INTERVENTION…without sterilized intervention exchange rate protection doesn't work!!

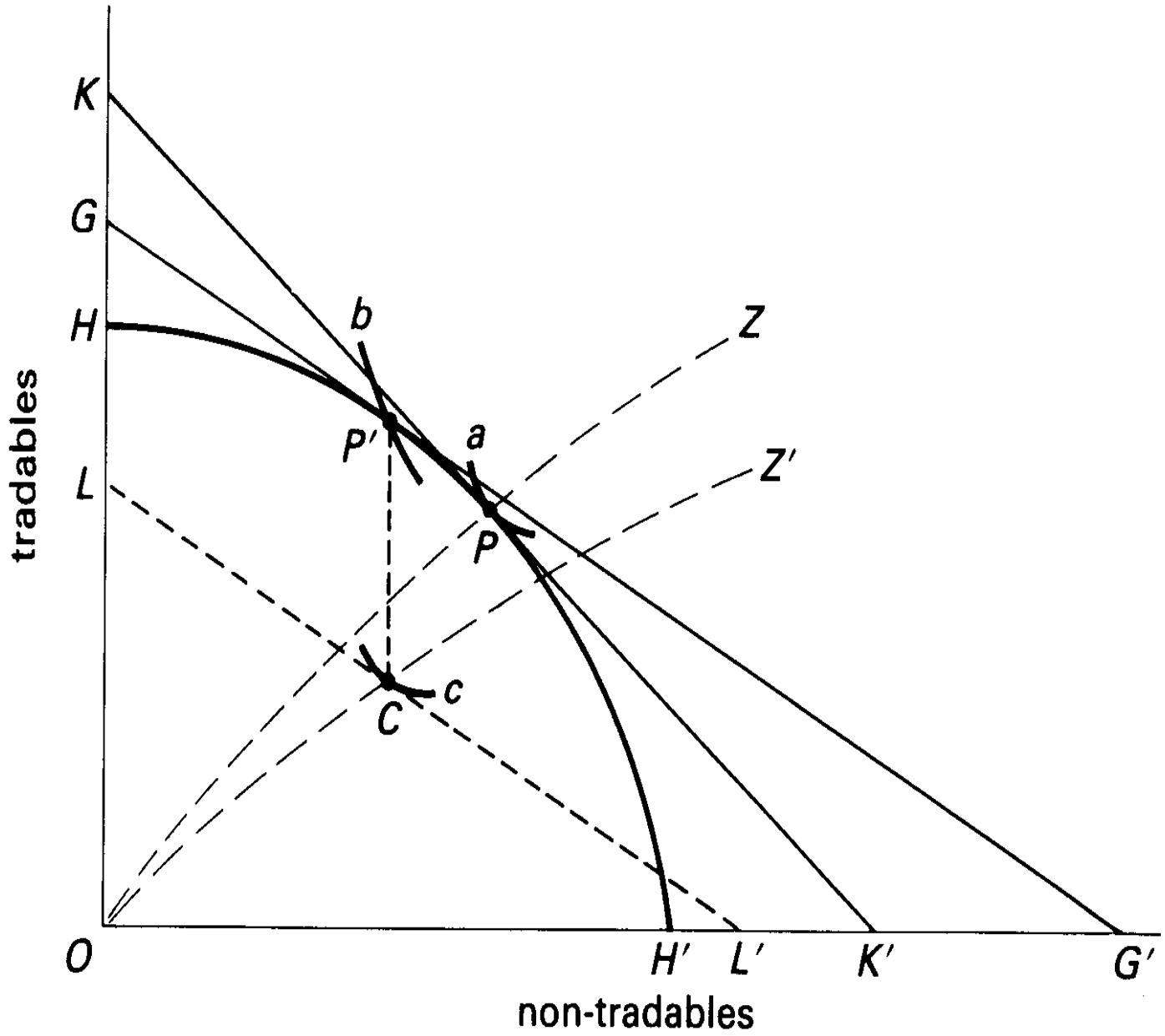
Exchange rate protection

The model

- HH’ is the production possibility frontier
- P is the laissez faire equilibrium, with consumer welfare given by indifference curve (a)
- The slopes of KK’ and GG’ are the real exchange rates (e) at P and P’ respectively

$$e = P_N / E \cdot P_T$$

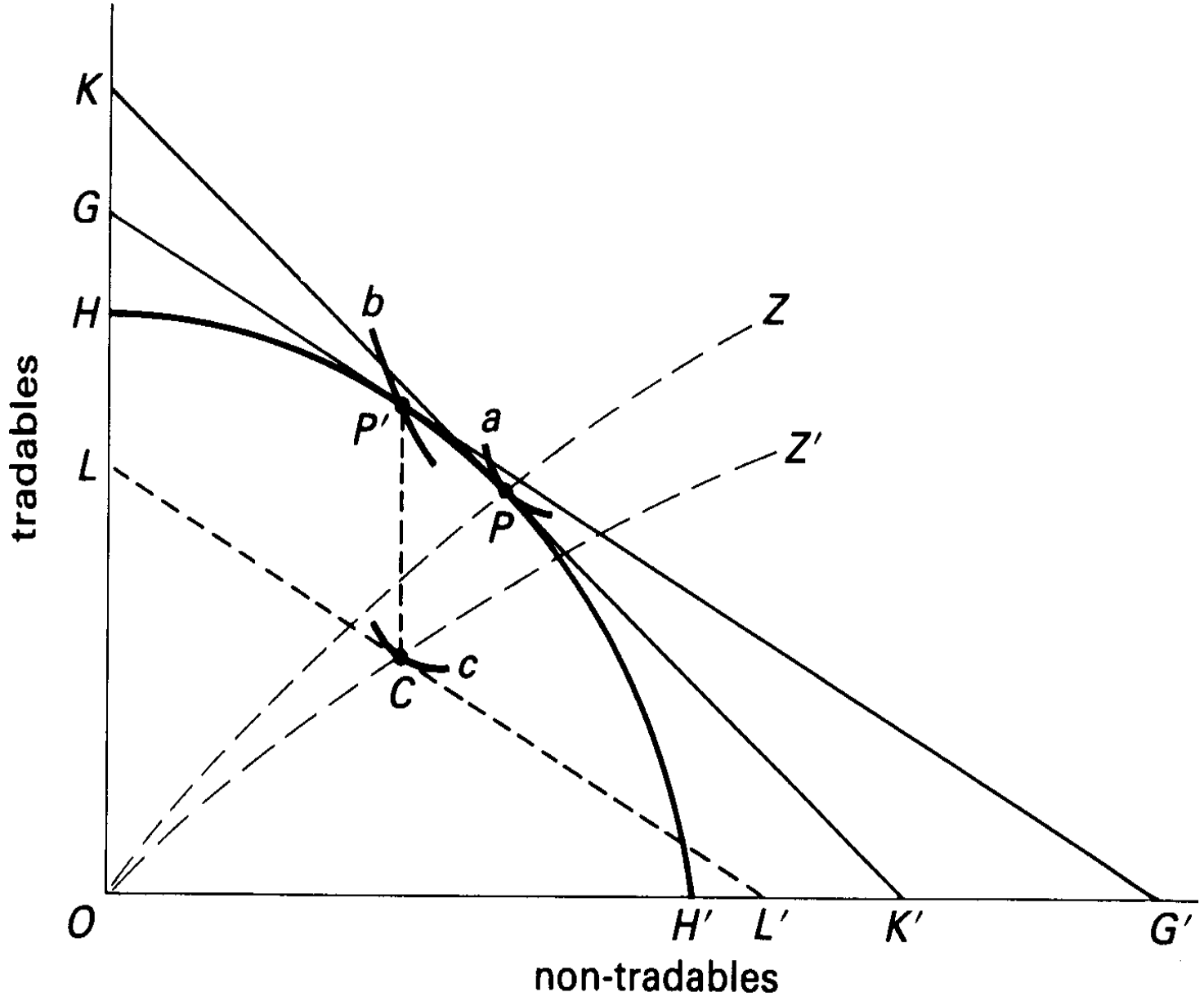
- E is the nominal exchange rate
- P’ is the policy-chosen output
- Z and Z’ are Engels curves for two real exchange rates



Exchange rate protection

Policy options to achieve P'

1. *Production subsidy to tradable plus consumption tax on non-tradable*. no devaluation of E, with both production and consumption at P', with consumer welfare represented by indifference curve (b)
2. *Nominal devaluation plus reduction of absorption to LL'*, with production at P' and consumption at C and a trade surplus of P'C = GL = income minus expenditure, with current consumer welfare represented by indifference curve (c)

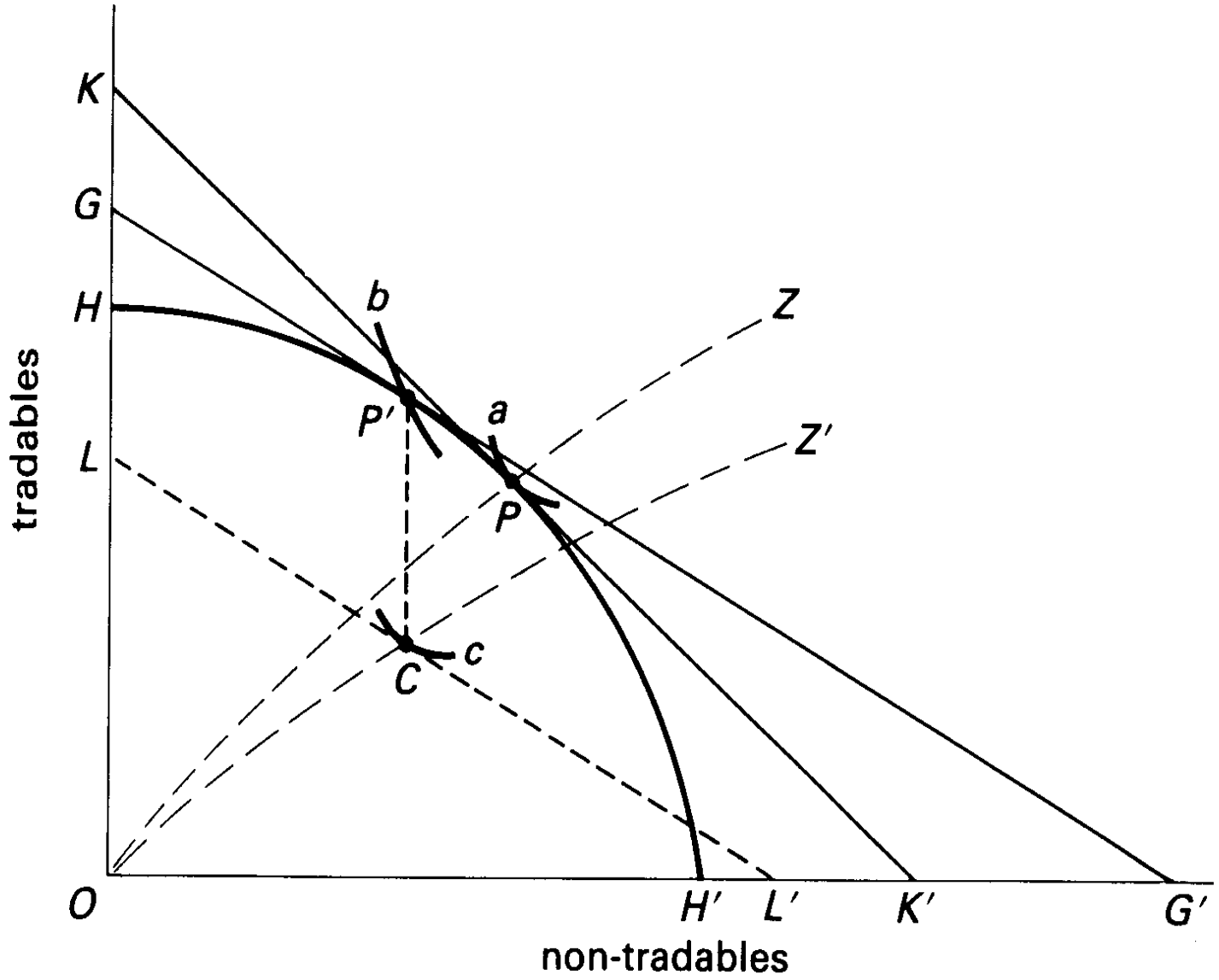


Exchange rate protection

In order for exchange rate protection to be sustained, there must be an increase in reserves equivalent to P'C and to prevent this from increasing money supply and price level the increase in reserves must be sterilized.

The nominal devaluation works only if:

1. Expenditure falls relative to income.
2. The central bank buys the foreign exchange generated by the trade surplus.
3. The central bank sterilizes its monetary effects.



Exchange Rate Protection

Two key points

1. The above illustrates the case where the government's aim is to increase the size of the tradable sector (from P to P'), but the analysis is the same if its aim is to prevent a contraction of the tradable sector. For example, an equilibrium at P' will lead to a real appreciation moving equilibrium to P. If the government uses either of the above policies to prevent real appreciation, then it is practicing exchange rate protection.
2. Suppose there is an exogenous increase in the risk-adjusted return on foreign assets. The relative price of tradeable goods will increase and a current account surplus and equivalent saving-investment balance will emerge. The equilibrium will look exactly like that analyzed above, suggesting exchange rate protection, but since there is no sterilized intervention there is no exchange rate protection.

<u>Currency depreciation and sustained current account surpluses indicate a policy of exchange rate protection only when these outcomes are sustained by sterilized intervention.</u>

Exchange Rate Protection

Cost and Benefits

Exchange rate protection , like other forms of protection, lowers the welfare of the countries practicing it.

When implemented by tax and subsidy policies, welfare (represented by indifference curve b) is lower than the laissez faire level (represented by indifference curve a).

When implemented by absorption-cum-sterilization policies, current welfare is still lower yet (represented by indifference curve c). But the difference between welfare represented by indifference curves b and c is offset by the increase in foreign assets.

If the country's initial (laissez faire) holding of foreign assets was optimal, the absorption contraction cost (bc) must be greater than the gain from increased foreign assets, which indicates that absorption-cum-sterilization is second-best to the tax-subsidy policy approach to exchange rate protection.

Therefore, exchange rate protection can be justified only if there is a market failure that makes the laissez faire outcome suboptimal.

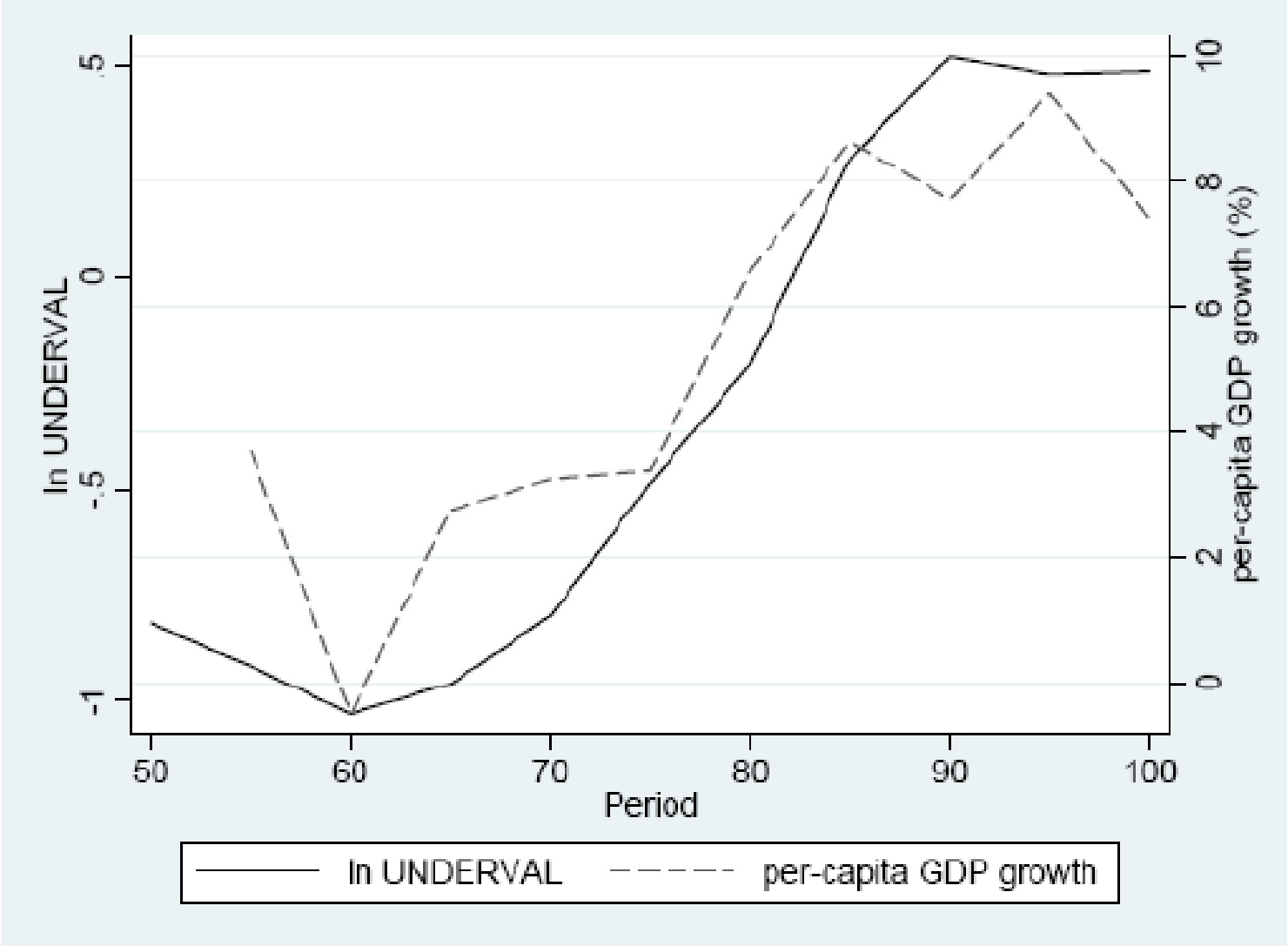
The market failure case for undervaluation (Rodrik, 2008)

A case for exchange rate protection could be made if there are positive externalities in the tradable goods sector.

Rodrik (2008) argues that tradeable goods industries suffer disproportionately from information and coordination failures that undermine the incentive to invest.

As a result a case can be made for protecting the tradable goods sector.

Rodrik's measure of undervaluation and per capita GDP growth in China



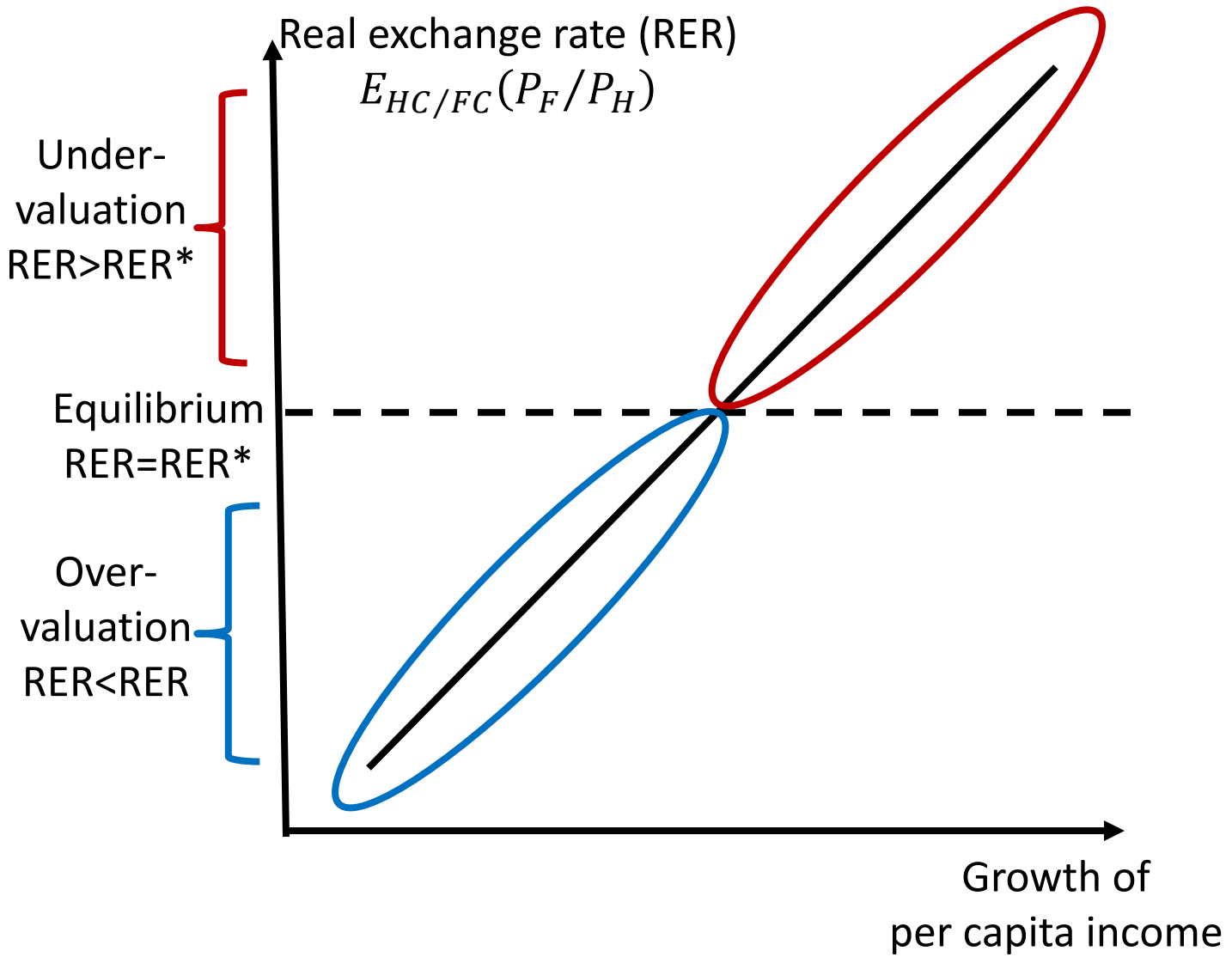
Dani Rodrik, "The Real Exchange Rate and Economic Growth," *Brookings Papers on Economic Activity*, 2008

The market failure case for undervaluation (Rodrik, 2008)

Rodrik's measure of the real exchange, adjusted for the Balassa-Samuelson effect, has been criticized in the literature on grounds that it amounts to circular logic (i.e. growth determines growth).

Aside from the measurement issue, the correlation could simply indicate that raising the real exchange rate in counties where RER < RER* benefits growth, but that is a well-known finding and has nothing to do with externalities.

Pushing the exchange rate above RER* may be justified if there are positive externalities in the tradable goods sector, but Rodrik offers no direct evidence that externalities are present.



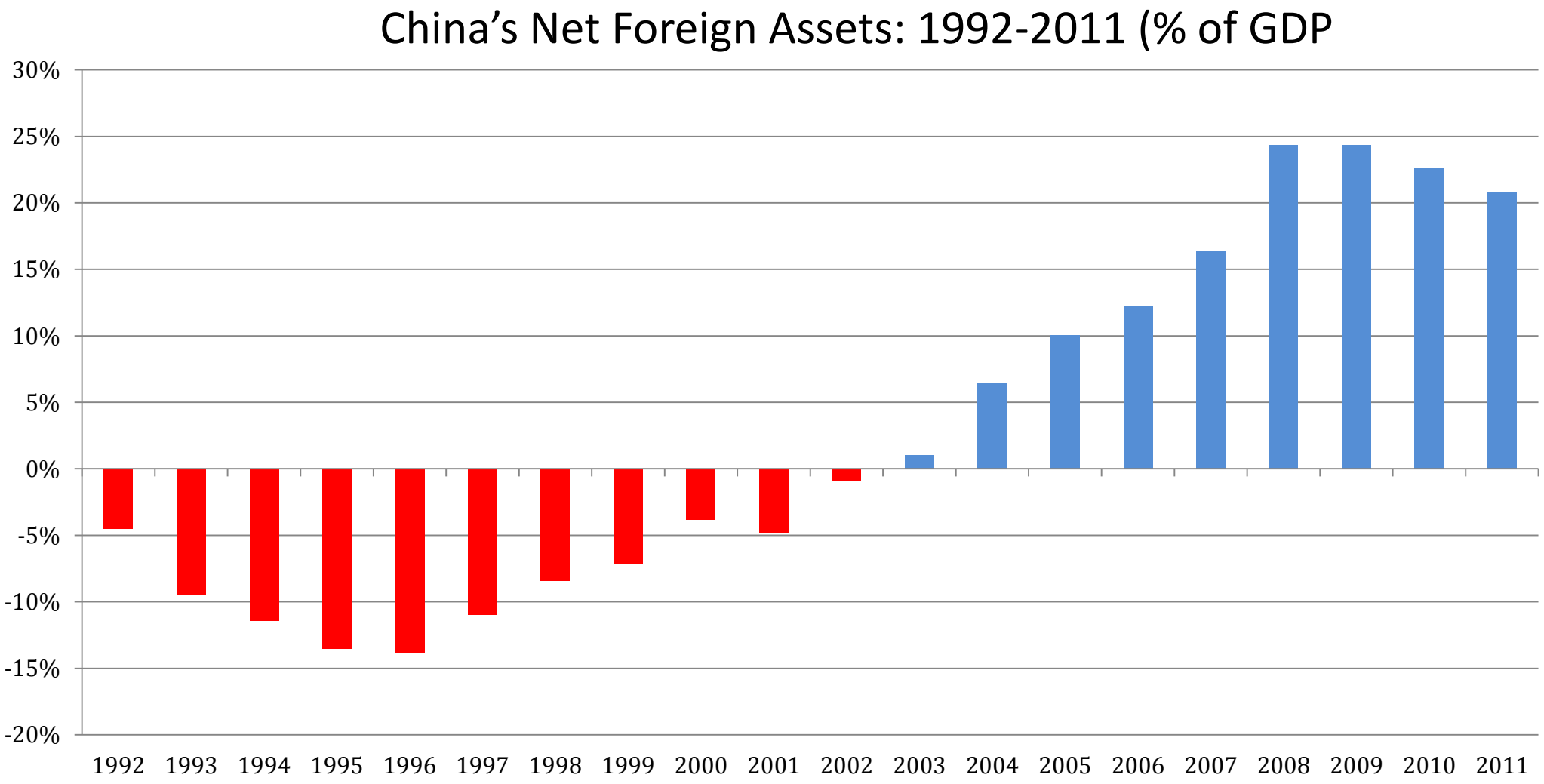
Reducing unemployment in the rural sector (Riedel 2009)

A more compelling case for exchange rate protection in China was the massive unemployment in the rural sector. Whether this constituted a market or a policy failure is beside the point. It constituted a great challenge for which exchange rate protection was an effective solution.

	2003		2013		Annual rate of change (%)
	Millions	%	Million	%	
Urban Employment	262	100	382	100	4
State-owned enterprises	69	26	64	17	-1
Collective enterprises	10	4	6	1	-6
Other (joint ventures and private)	184	70	313	82	5
Urban manufacturing	29	100	53	100	6
State-owned	10	34	2	4	-14
Collectives and cooperatives	3	12	0	0	-44
Other (private and joint ventures)	16	54	50	95	12

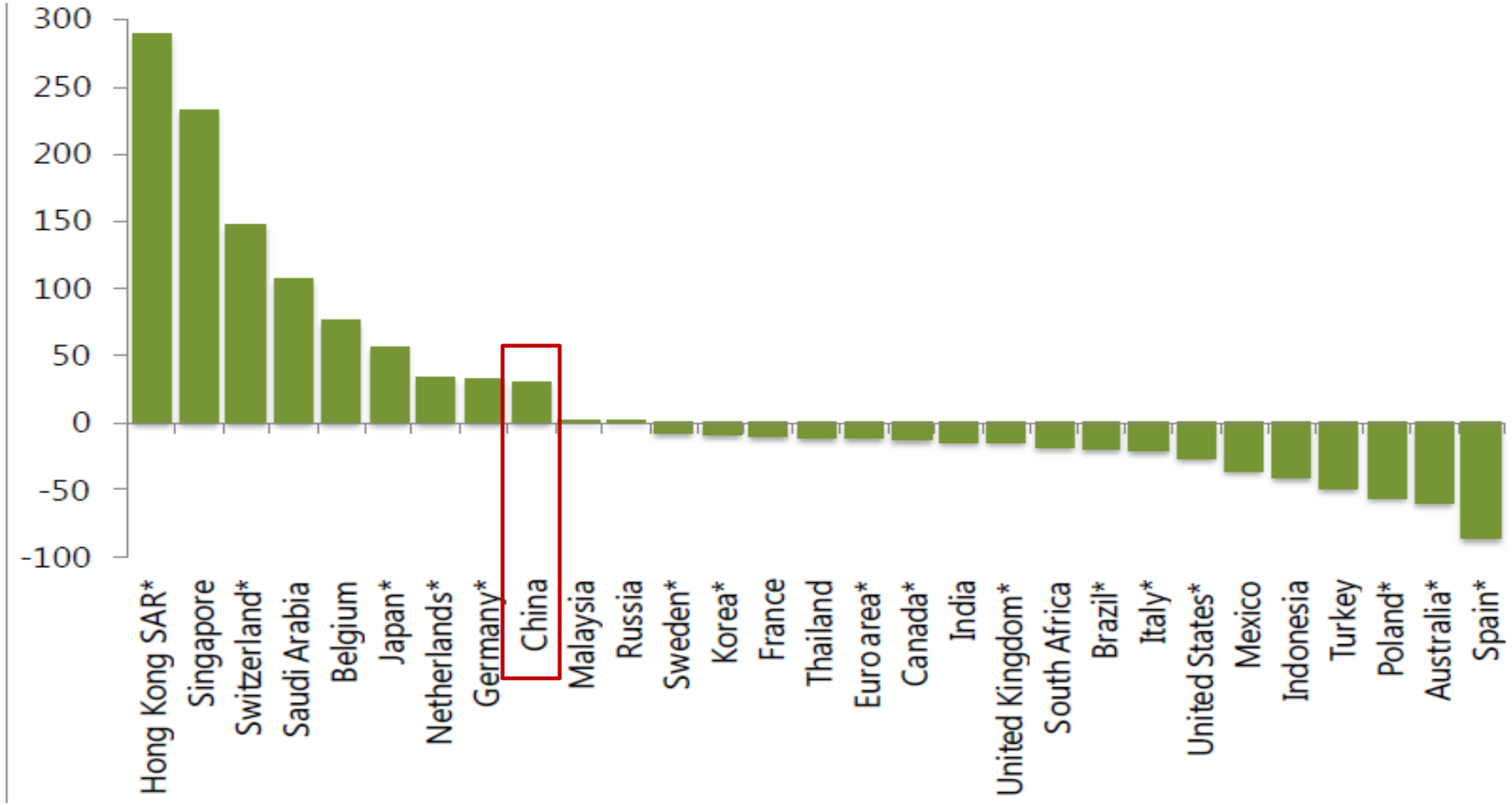
Source: Chinese Statistical Yearbook, 2003 and 2014

From Debtor to Creditor Under the Sterilized Intervention Policy



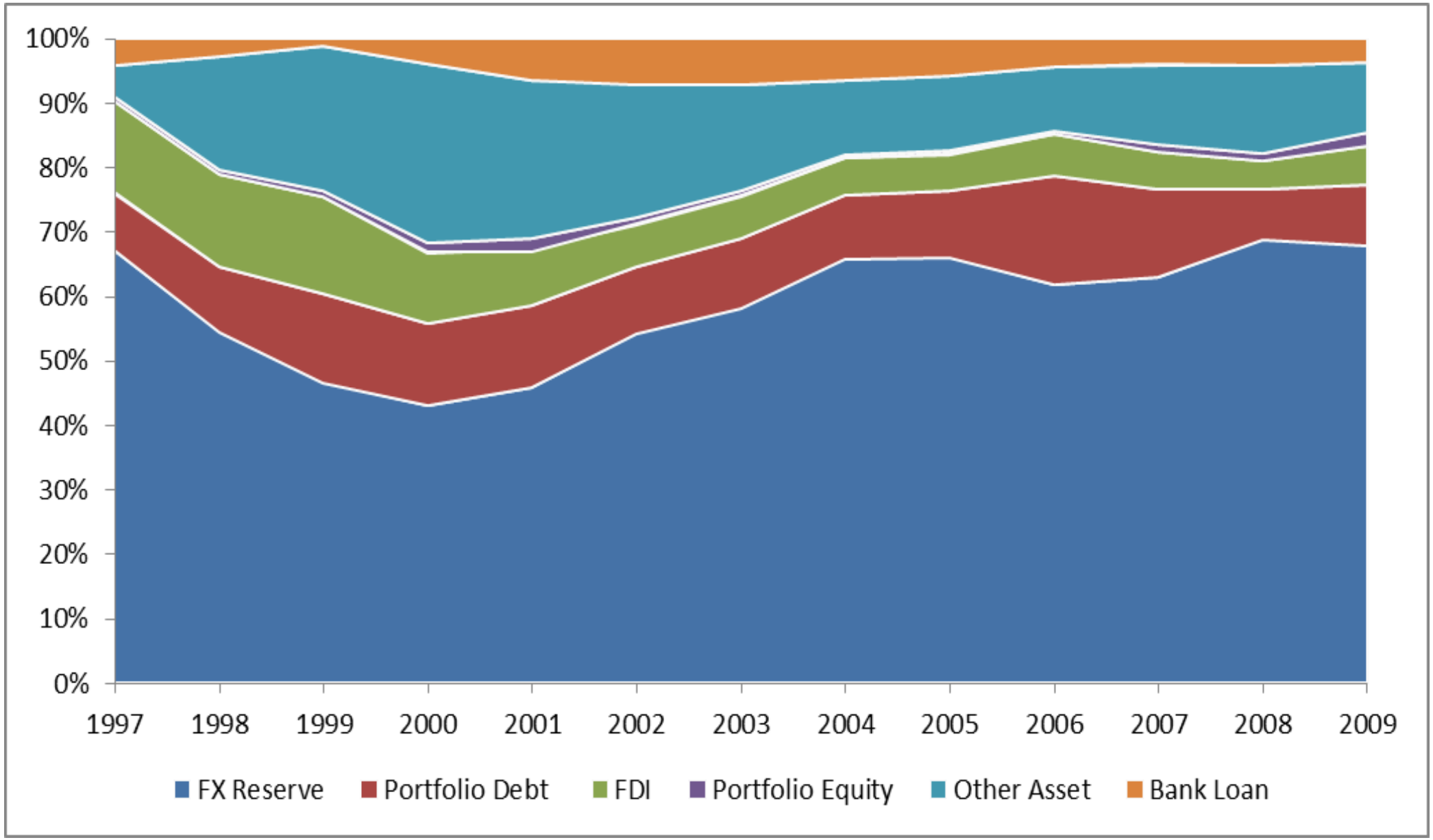
Source: IMF, Lane and Milesi-Ferretti (2013)

International Comparisons of Net Foreign Assets: 2011 (% of GDP)

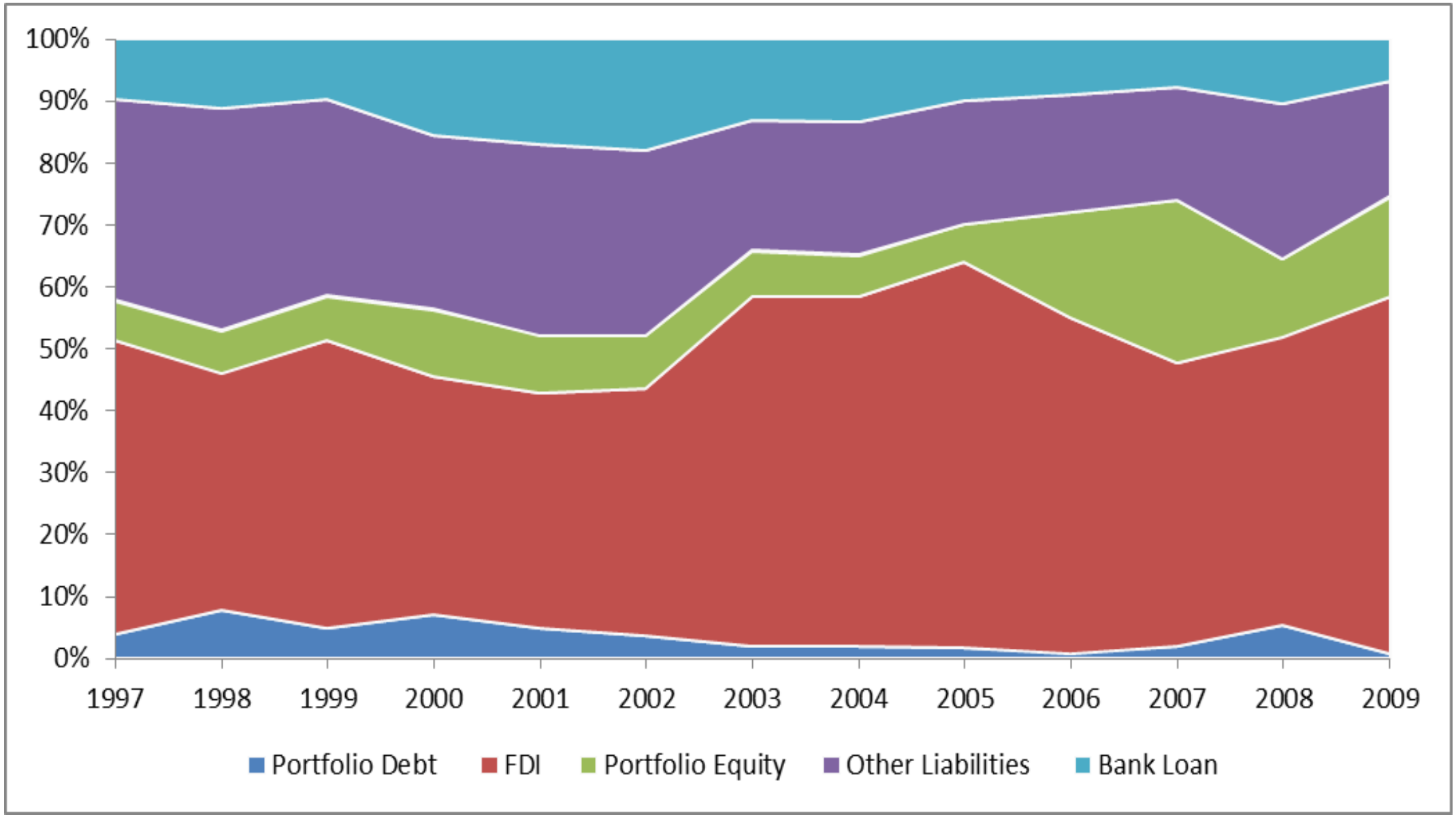


Source: IMF, World Economic Outlook Database(2011)

China's Gross Assets by Asset Class



China's Gross Liabilities by Asset Class



The Financial Cost of China's Policy of Sterilized Intervention

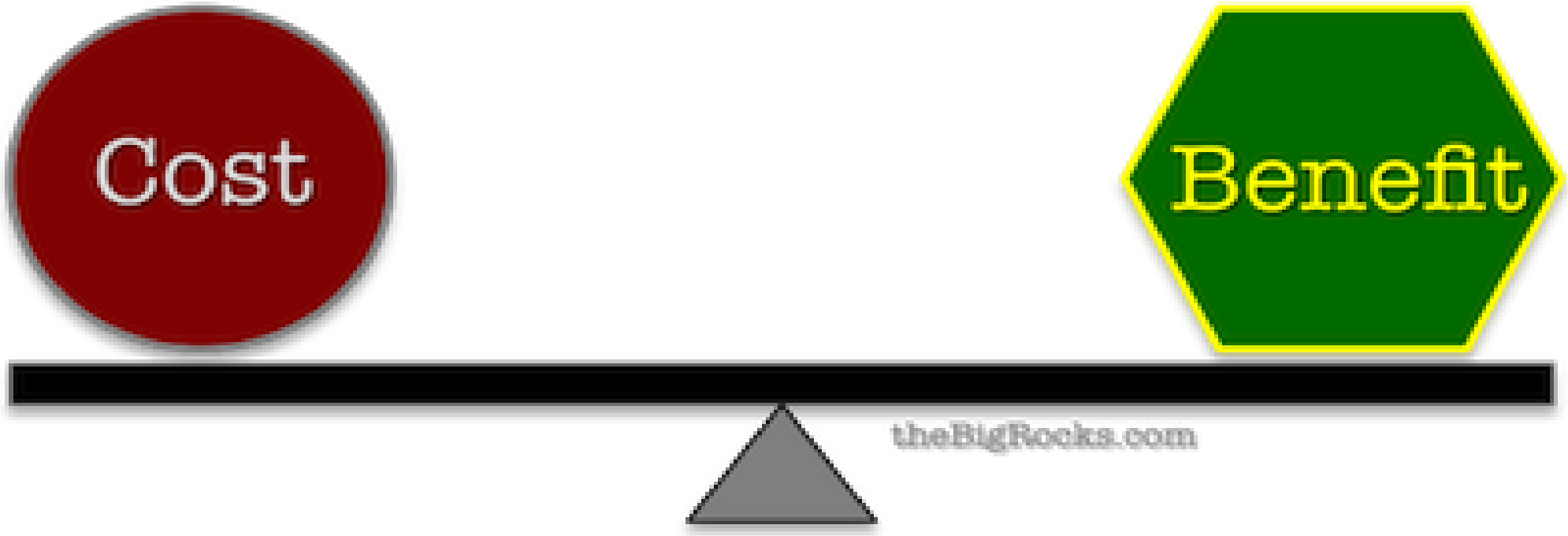
Real Returns on China's Foreign Assets and Foreign Liabilities (%)

	2001-2005	2006-2009
Return on foreign assets (FA)	**-0.5**	**-0.6**
Yield on FA	1.3	1.1
Capital gain on FA	-1.8	-1.7
Return on foreign liabilities (FL)	**5.0**	**6.1**
Yield on FL	4.8	3.7
Capital gain on FL	0.2	2.4
Return on net foreign assets	**-5.5**	**-6.7**

Source: Yi Huang, "From World factory to World Creditor: The External Wealth of China and Excess Returns," 2011

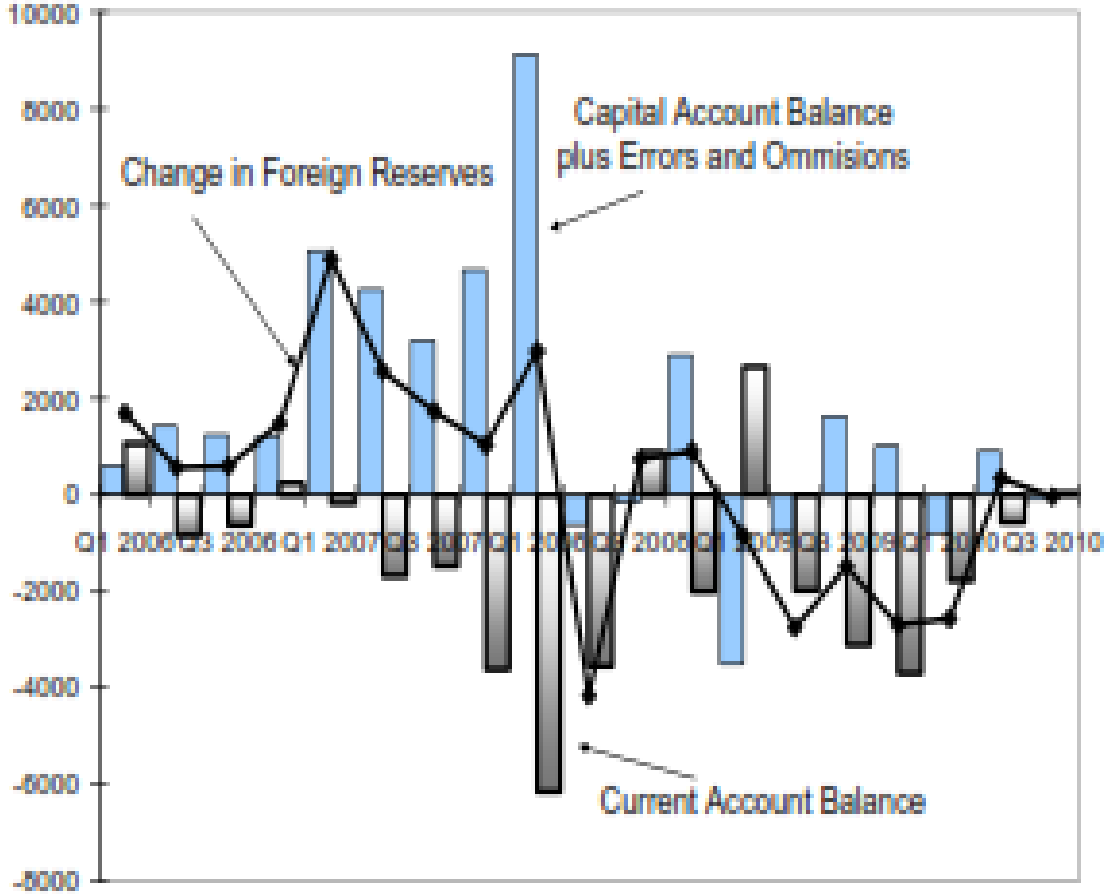
Weighing the Employment Benefits against the Financial Costs of China's Sterilized Intervention Policy

< Work-In-Progress >

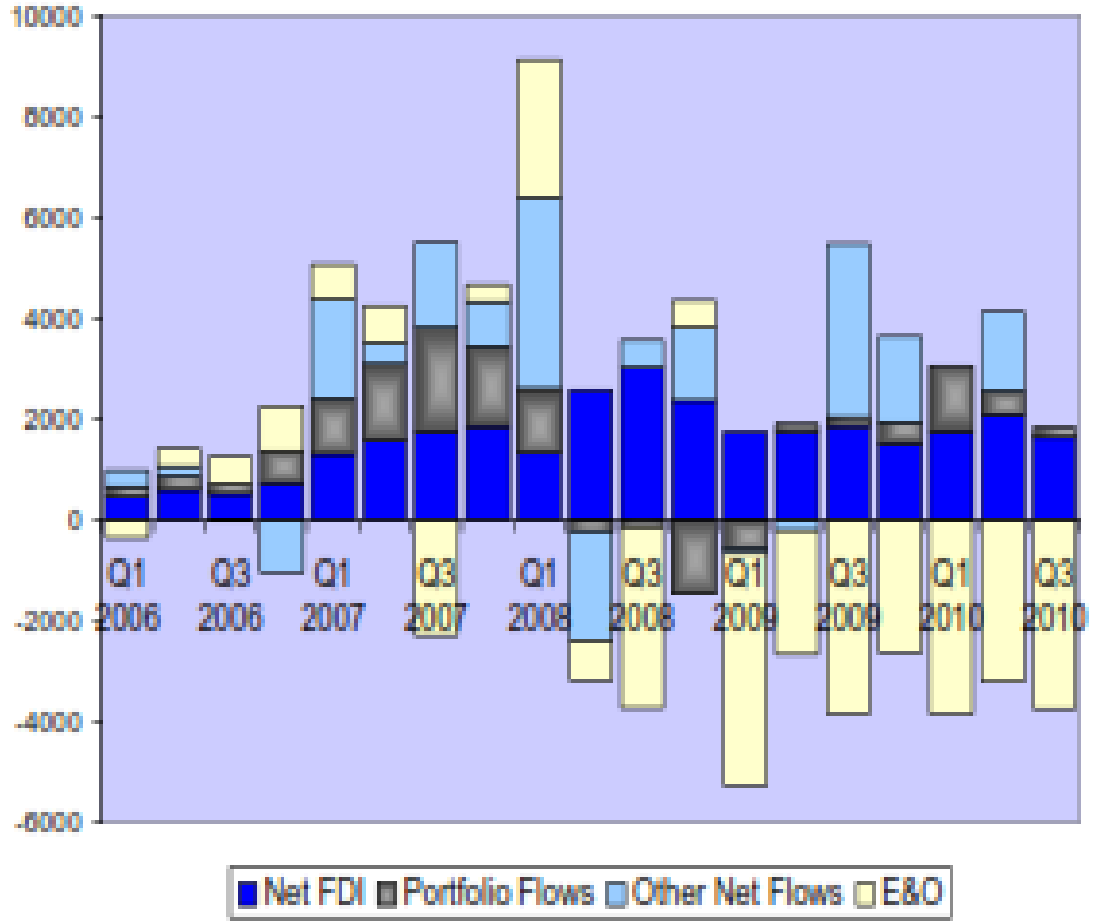


Capital Inflows and Foreign Exchange Market Intervention in Vietnam: 2006-2010

Balance of Payment: Quarterly (USD millions)



Financial Account of BOP: Quarterly (USD millions)

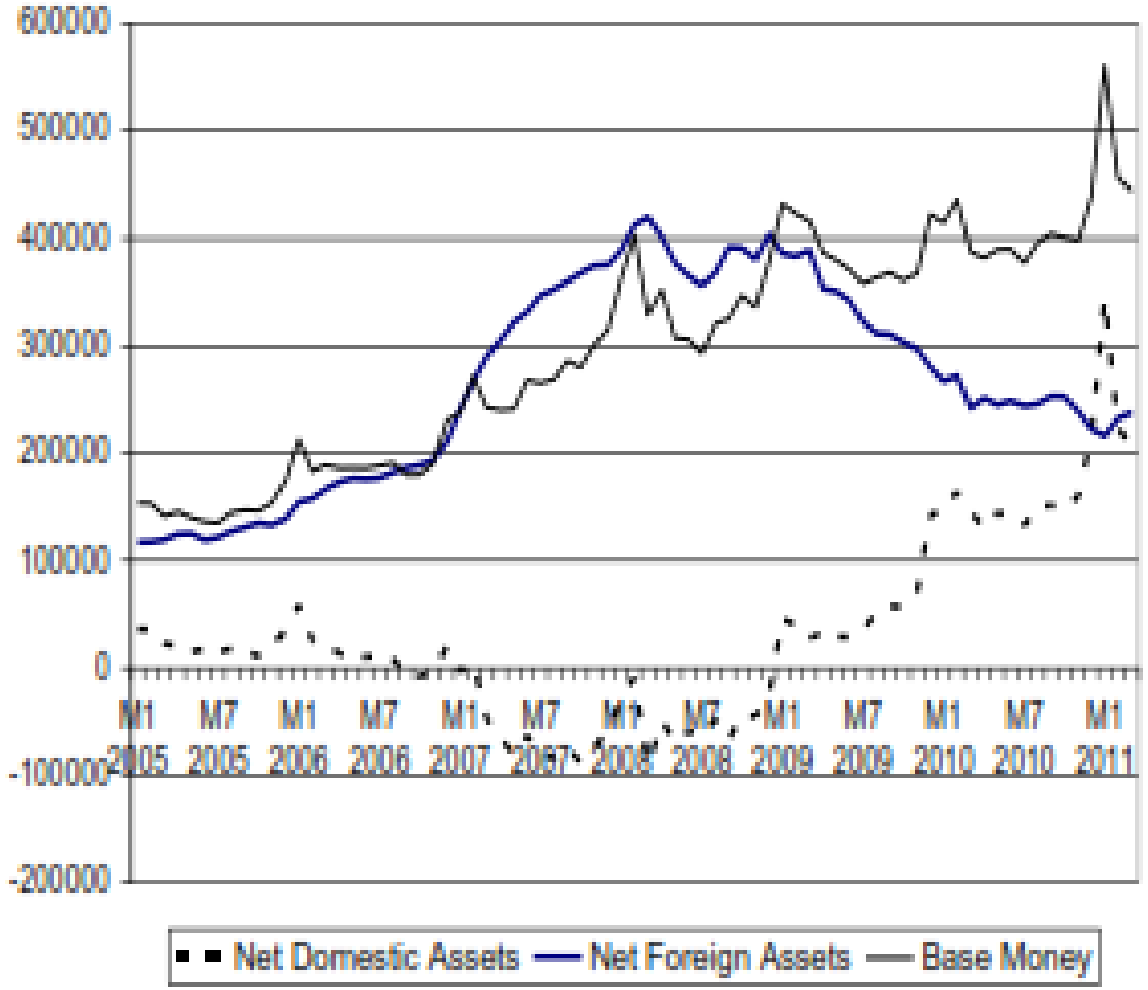


Source: IMF, International Financial Statistics, online.

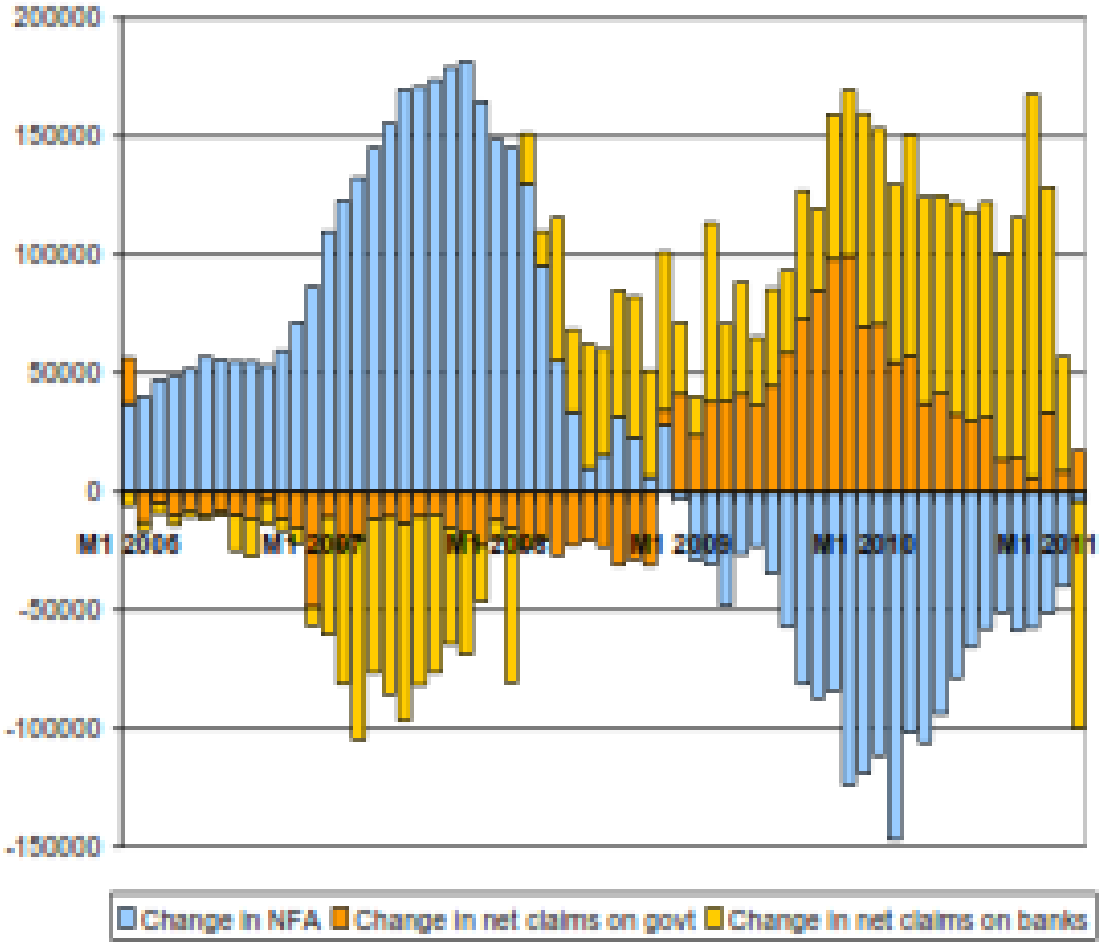
Source: Pham and Riedel, "On the Conduct of Monetary Policy in Vietnam," *Asia Pacific Economic Literature*, 2012.

Foreign Exchange Market intervention and Sterilization in Vietnam: 2005-2012

Base Money and Its Components: Quarterly (VND billions)



Change in Base Money: Quarterly (VND billions)



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