Inflation Targeting by Debtor Central Banks in Emerging Market Economies

Franziska Schobert

Agenda

- Debtor central banks: Global overview & case studies
- Is there an extra inflation bias for inflation targeting debtor central banks? Some answers from an extended Barro-Gordon model.
- Floating exchange rates and monetary policy autonomy under surplus liquidity - a model and some simulated results for South and East Asian central banks
- Central bank losses and exiting from fixed exchange rate regimes – the case of the Deutsche Bundesbank

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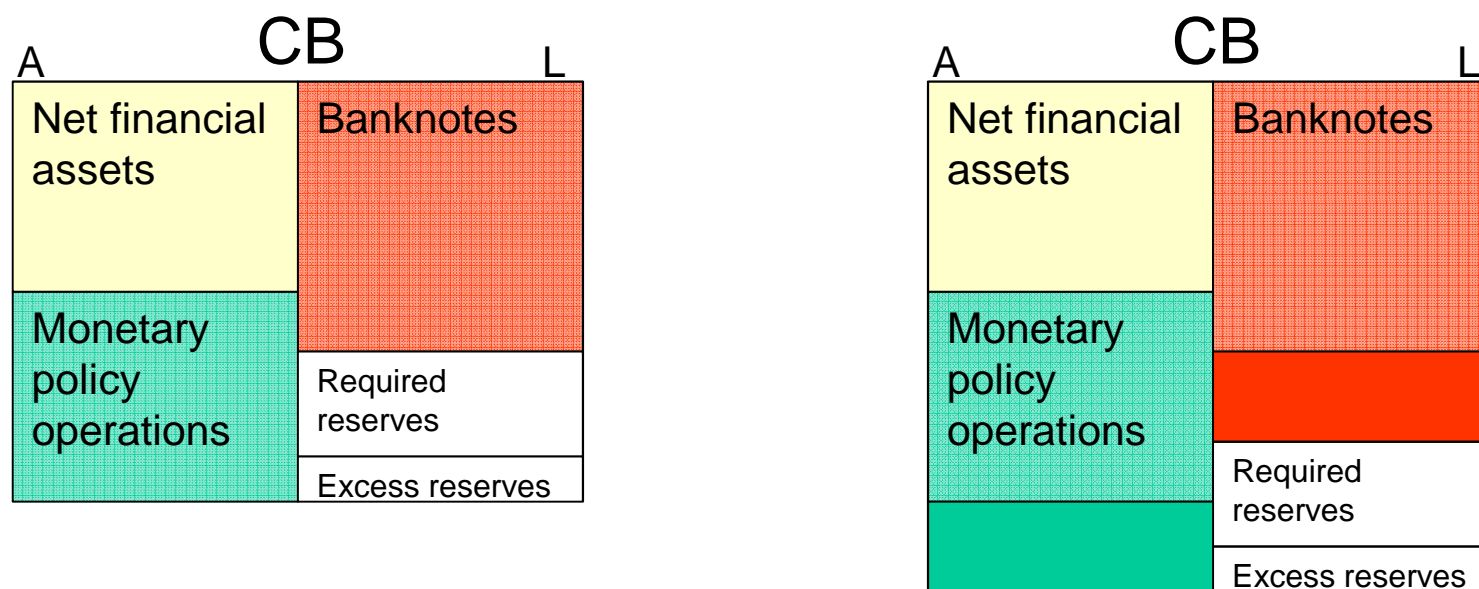
Stylized Central Bank Balance Sheet

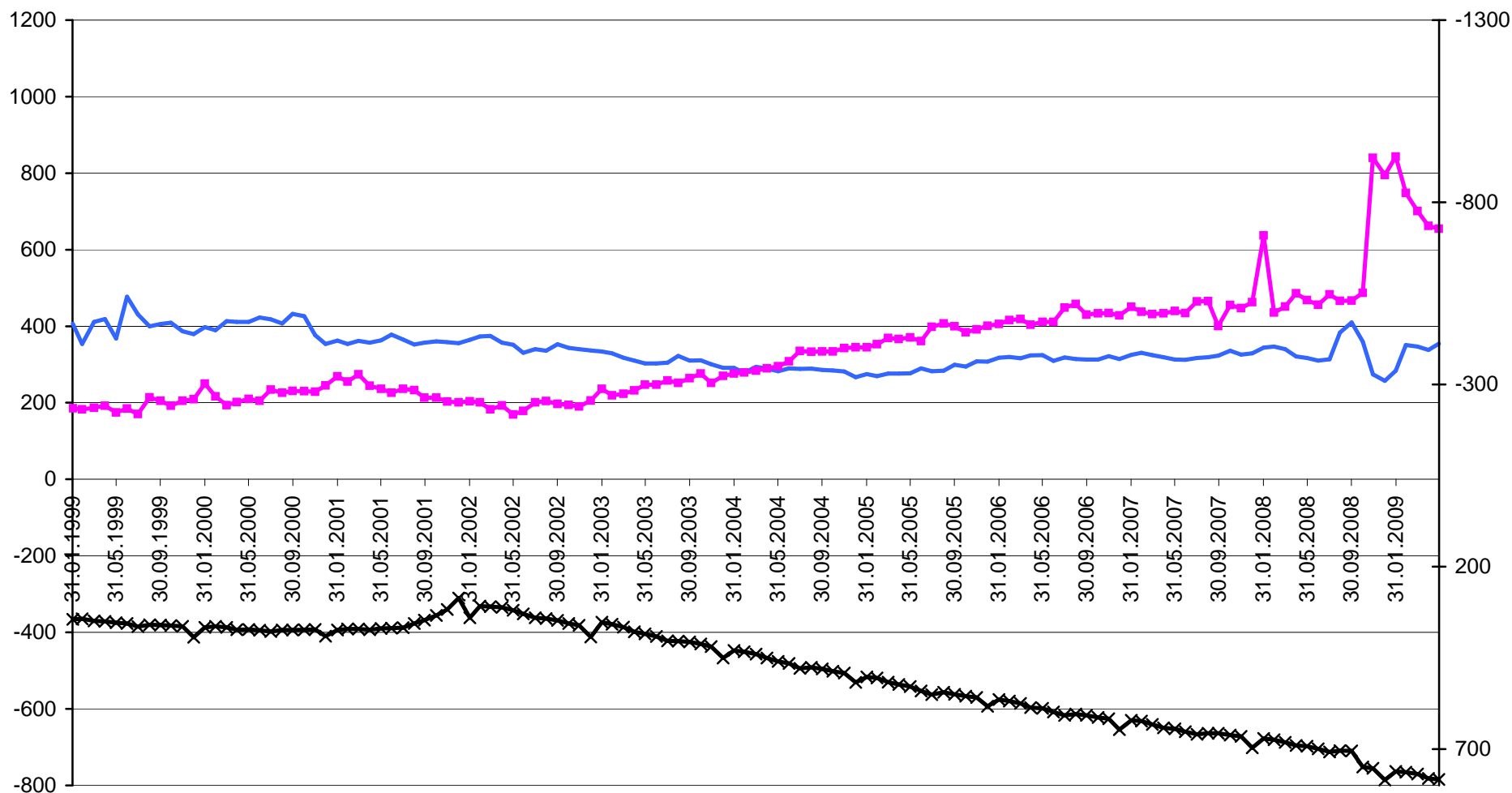| Assets	Liabilities
Net Foreign Assets (NFA)	Currency in Circulation (CIC)
Domestic Assets:	Required Reserves (RR)
Open Market Operations (OMO)	Excess Reserves (X)
Net Private Sector Claims (Net PS claims)	OMO
Net Government Lending (NGL)	Capital accounts

Defining a Liquidity Surplus

• Net monetary policy operations on the liability side

• Alternatively: Sum of autonomous factors on the asset side exceed sum of autonomous factors on the liability side („financing gap")

• Definition depends crucially on distinguishing monetary policy operations from autonomous factors.

Structural Liquidity Deficit

Increasing over time,
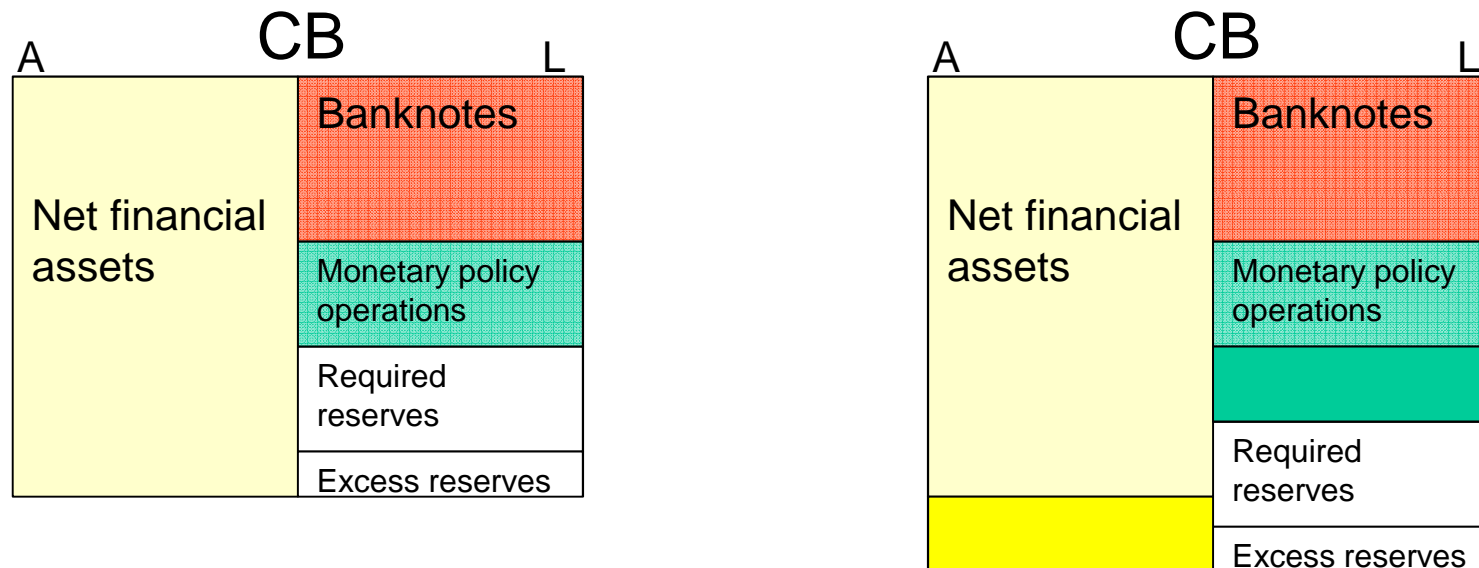stylized evolution in case of the Eurosystem, 1999 - 2010

$\longrightarrow$

CB

A		L
Net financial assets	Banknotes	
Monetary policy operations	Required reserves	
	Excess reserves	

CB

A		L
Net financial assets	Banknotes	
Monetary policy operations		
	Required reserves	
	Excess reserves	

Eurosystem (bn EUR)

Net foreign assets (left scale) — Lending to euro area financial sector (left scale) — Currency (right scale)
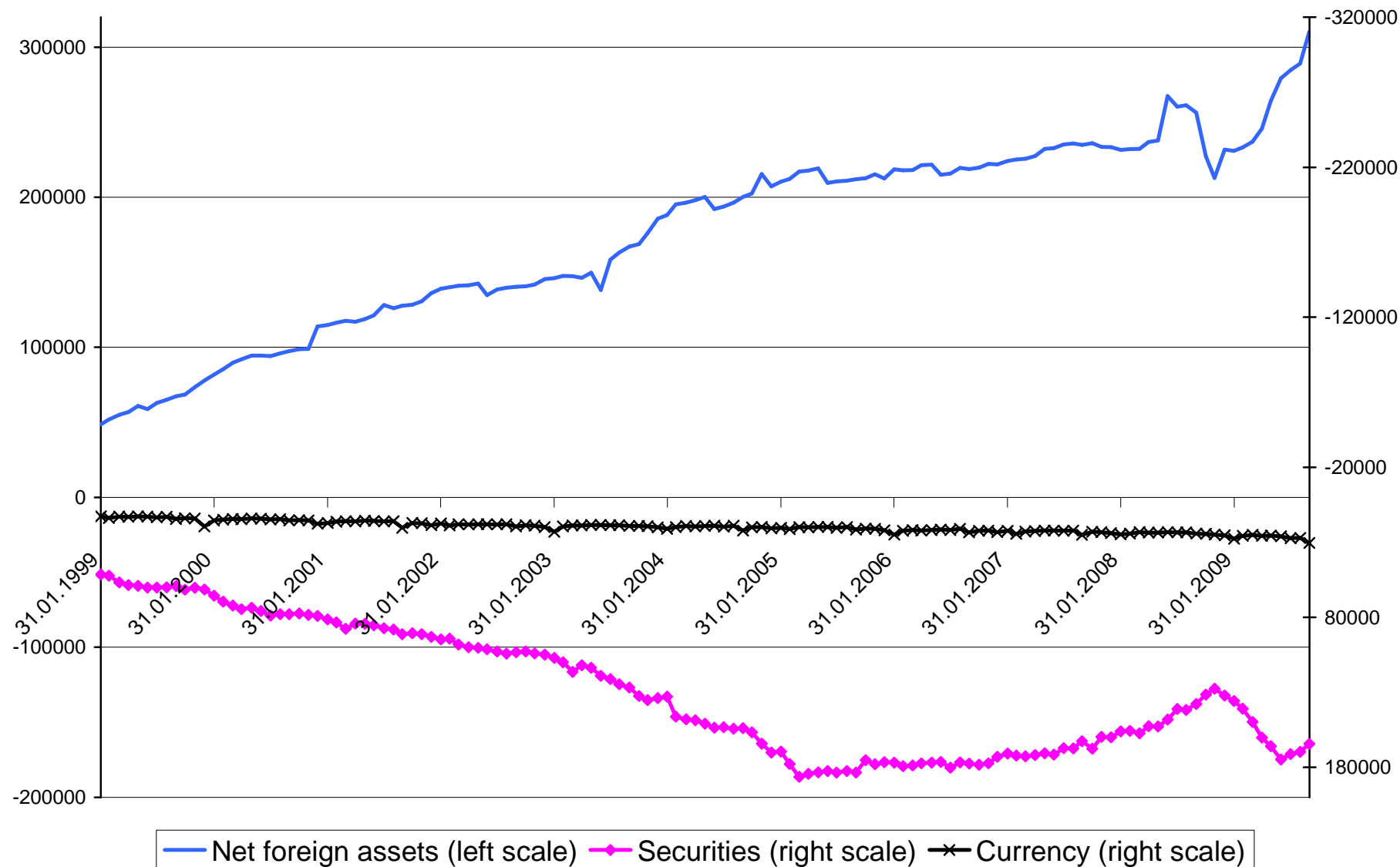
Structural Liquidity Surplus

Increasing over time,
stylized evolution due to the accumulation of foreign reserves or
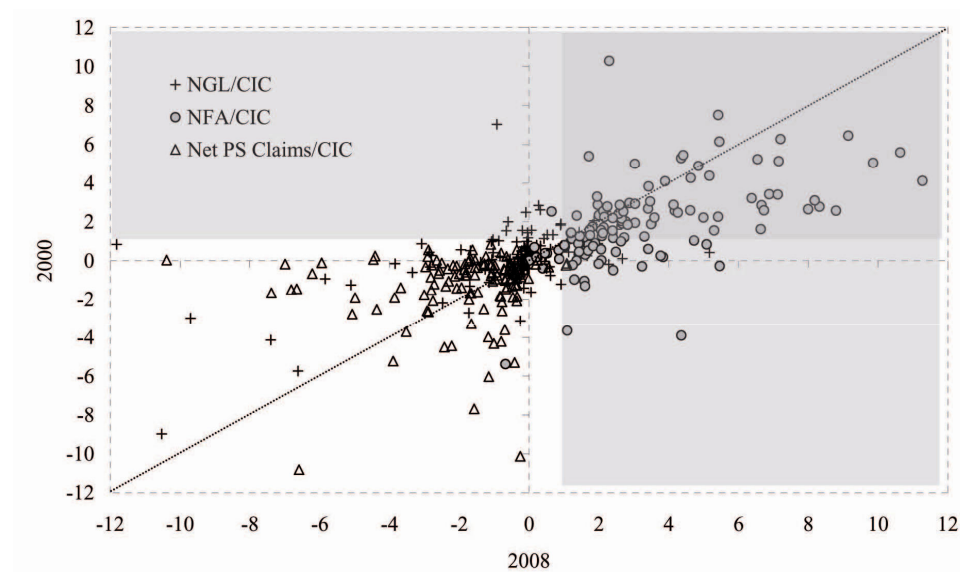due to the accumulation of *domestic* net financial assets

Bank of Korea (bn Won)

Legend: Net foreign assets (left scale) — Securities (right scale) — Currency (right scale)

Left scale: 300000, 200000, 100000, 0, -100000, -200000

Right scale: -320000, -220000, -120000, -20000, 80000, 180000

X-axis: 31.01.1999, 31.01.2000, 31.01.2001, 31.01.2002, 31.01.2003, 31.01.2004, 31.01.2005, 31.01.2006, 31.01.2007, 31.01.2008, 31.01.2009

Sources of the Surplus

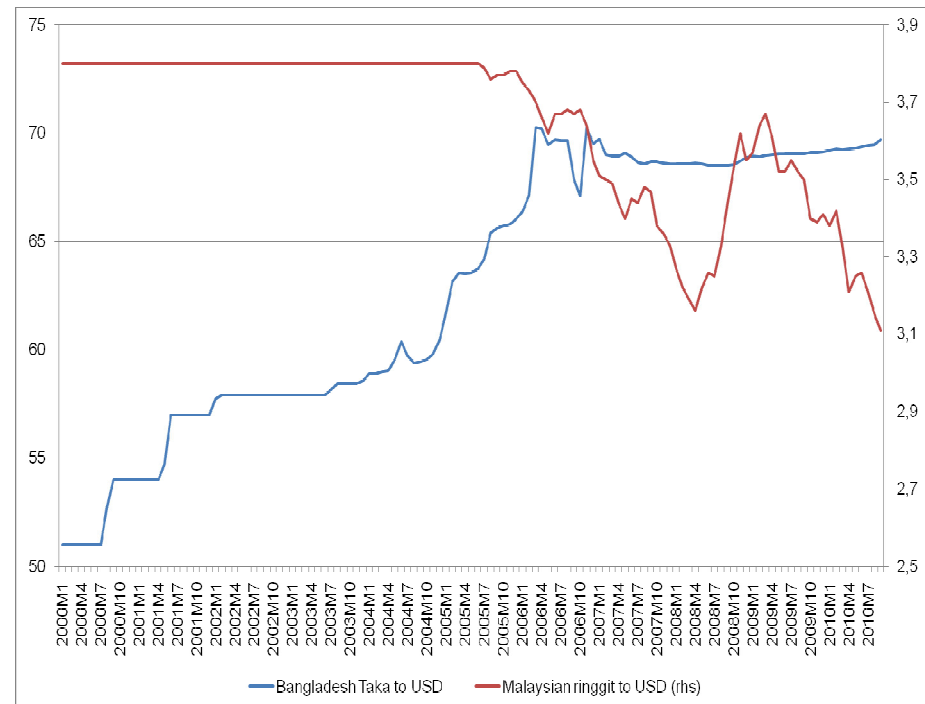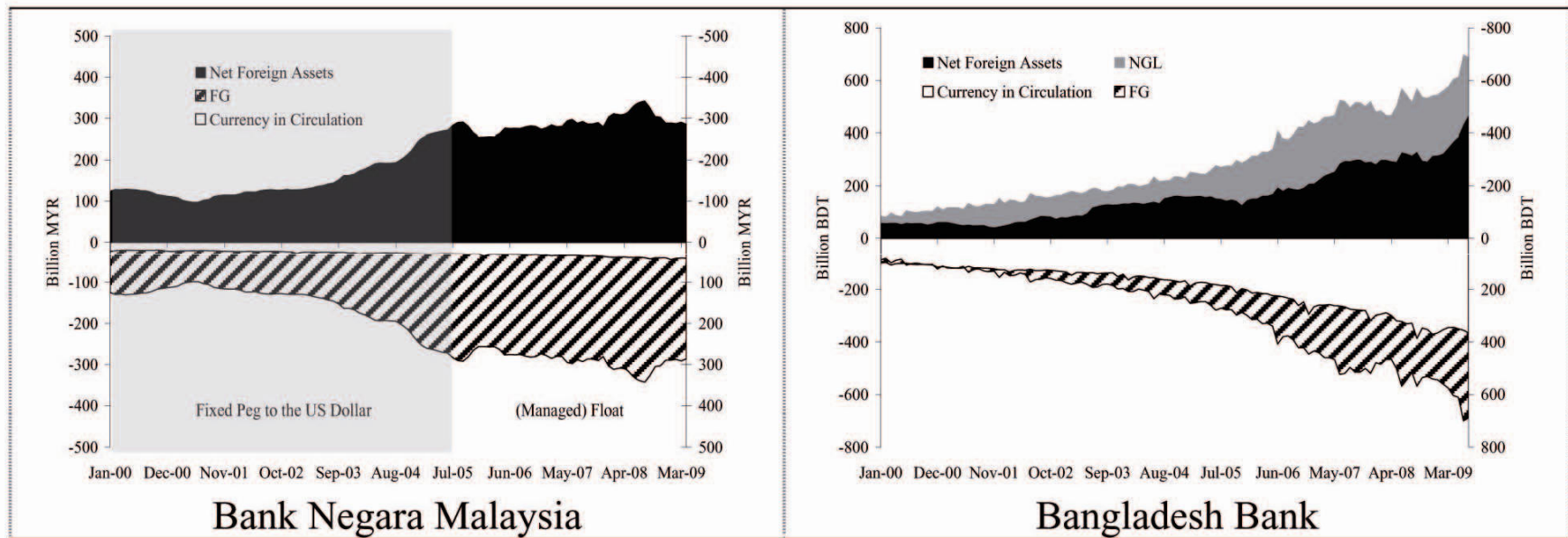| Source	Driving autonomous factor
1. Accumulation of foreign reserves	Net foreign assets
2. Monetary financing	Claims to the government or priority sectors
3. Financial sector stabilisation	Lending to banks or other financial intermediaries, often substituted by claims to government

Global Empirical Evidence:

Löffler/ Schnabl/ Schobert (2011) The Illusion of Monetary Policy Autonomy by Freely Floating Debtor Central Banks in South and East Asia, mimeo

Case Study:
Malaysia & Bangladesh

Exchange Rate Regime

• Malaysia evolved from „pegged" to „managed float".

• Bangladesh evolved from „pegged & devaluations" to „float" to „pegged again".

Case Study:
Malaysia & Bangladesh

Löffler/ Schnabl/ Schobert (2011) The Illusion of Monetary Policy Autonomy by Freely Floating Debtor Central Banks in South and East Asia, mimeo

Liquidity Surplus: Implications

Implementing monetary policy can imply substantial sterilisation costs.

The central bank runs the risk of losses, which can have implications for its reputation and even independence*. Cost considerations may influence the interest rate setting behaviour.

Domestic financial sector development can be slowed (central bank is debtor to the domestic financial sector, however, it is creditor to the financial markets of reserve currency countries).

If the source of the surplus are net foreign assets, an increasing liquidity surplus also implies an increasing currency mismatch and exchange rate risks.

*Stella P. (2005), Central bank financial strength, transparency and policy credibility, *IMF Staff Papers* **52** (2005), pp. 355–365.

Different Ways to Sterilize

1) Market-based monetary policy instruments, e.g. effectively implemented open market operations and standing facilities or reserve requirements remunerated at market rates.

2) Less or non-market-based monetary policy instruments, e.g. reserve requirements with no or low remuneration or the coercive sale of central bank securities below market rates.

Croatian National Bank (bn Kuna)

Legend: Net foreign assets (left scale) — Reserves of banks (right scale) — Currency (right scale)
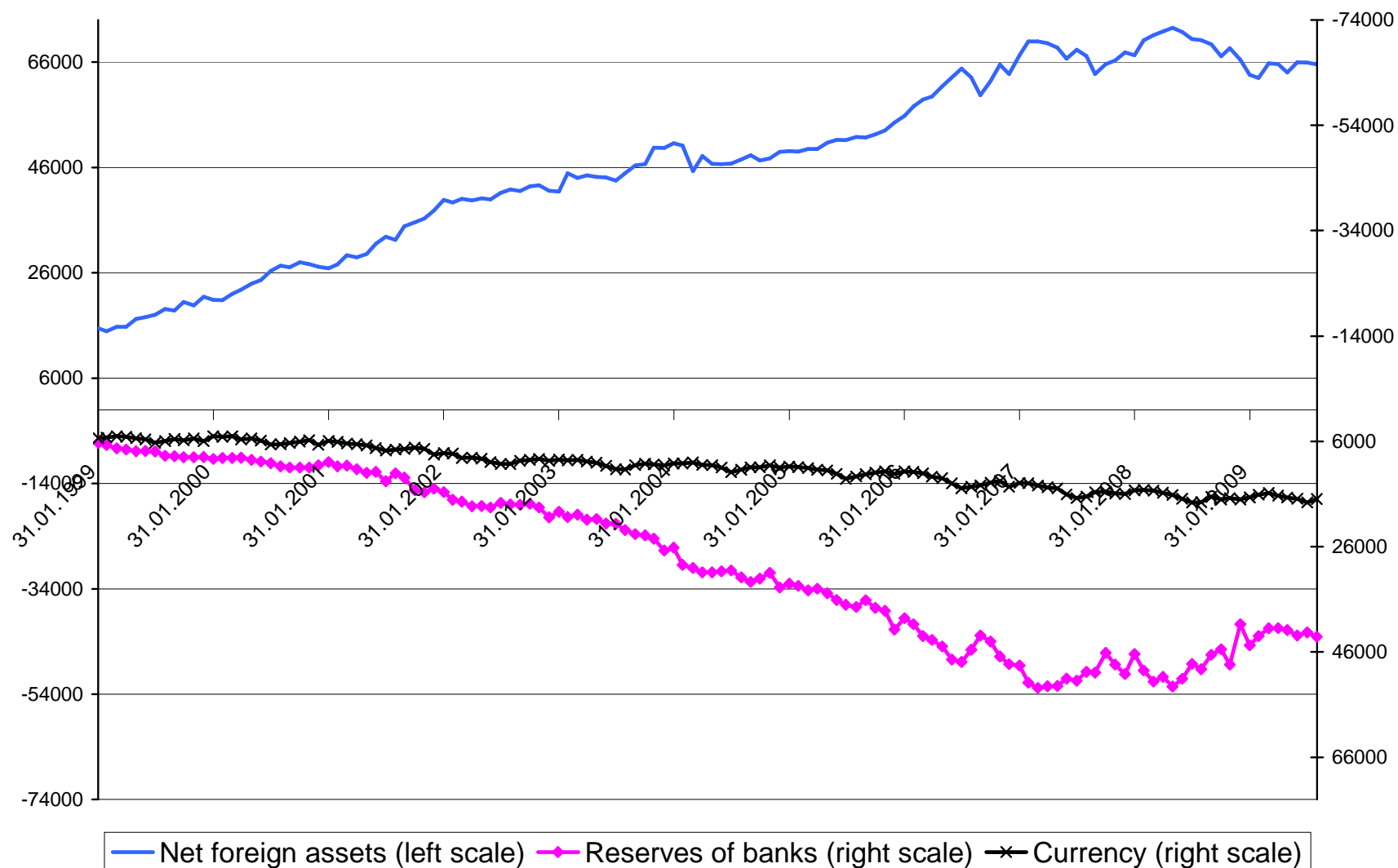
Co-ordination with Fiscal Authorities

Willingness to cooperate? If yes, then consider e.g.

Shifting government deposits from commercial banks to the central bank

Asking the fiscal authorities to issue securities for monetary policy purposes, extra funds are deposited at the central bank

Harmonizing features of securities issued by the fiscal authorities and the central bank in order to enhance market liquidity
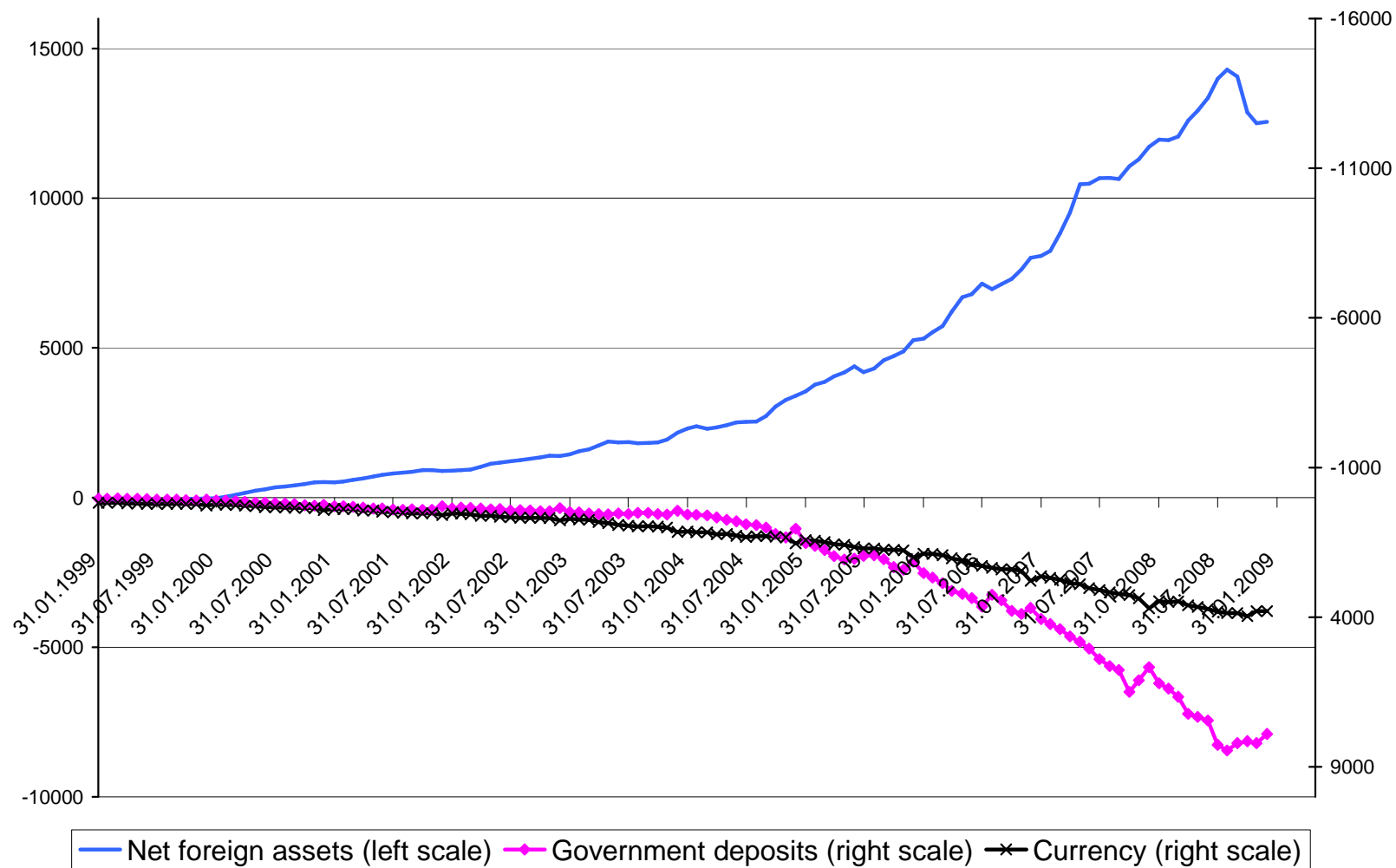
* Gray, S. (2005) Central bank management of surplus liquidity, Handbooks in Central Banking, Lecture Series No. 6, Centre for Central Banking Studies, Bank of England

Sovereign Wealth Fund

In case foreign exchange revenues accrue to the public sector: sterilization costs & surplus liquidity can be avoided, if foreign exchange revenues are saved by the public sector.

In case foreign exchange revenues accrue to the private sector: the central bank and the sovereign wealth fund must decide how to share the sterilization costs.

Bank of Russia (bn Rouble)

Legend: Net foreign assets (left scale) — Government deposits (right scale) — Currency (right scale)

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Escaping the Surplus

Source: Accumulation of Foreign Reserves

- Re-consider the reasons for accumulating foreign reserves and its alternatives (e.g. real exchange rate appreciation)

- Allow „absorption", i.e. increase in imports or private sector foreign exchange outflows (do exchange controls or lack of financial infrastructure prevent „absorption"?)

- Substitute foreign borrowing of the government by domestic borrowing.

Escaping the Surplus cont'd

Source: Accumulation of Domestic Assets due to monetary financing and/ or financial sector stabilisation

- Stop accumulating domestic assets by strengthening the institutional framework of the central bank

- Securitize domestic assets and make them marketable

- Restore central bank capital & reserves by lower or zero profit remittance to the government

Escaping the Surplus cont'd

…eventually depends on currency in circulation

Why Should a Central Bank Care about Financial Strength?

⌃ Central banks aim at maintaining price and financial stability; they are no profit-maximising enterprises.

⌃ Central banks, however, have to be aware of risk management and their financial strength, because financial risks can translate into reputational risks.

⌃ Reporting central bank losses can have an impact on the reputation. In particular, if central bank losses exceed capital, discussions on how to recapitalize the central bank risk a conflict with the government, which can finally fire back on central bank independence.

Twin Goals and Double Whammy

➢ *Twin goals*: A central bank that pursues two objectives, i.e. internal price stability and an exchange rate target, risks to be caught in the „impossible trinity".

➢ *Double whammy*: Sterilization costs can be supplemented by valuation losses, if the exchange rate appreciates against the reserve currencies.

Schobert, F. (2008): Why do central banks make losses? Central Banking, February, pp. 79-83
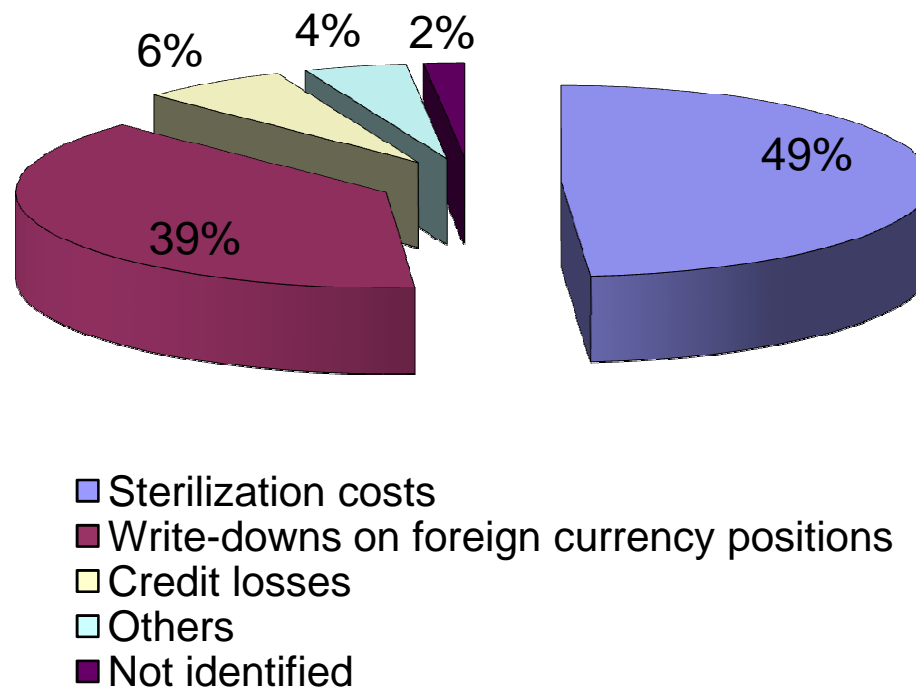
Central Bank Losses in % of GDP

(number in brackets are loss-making years)
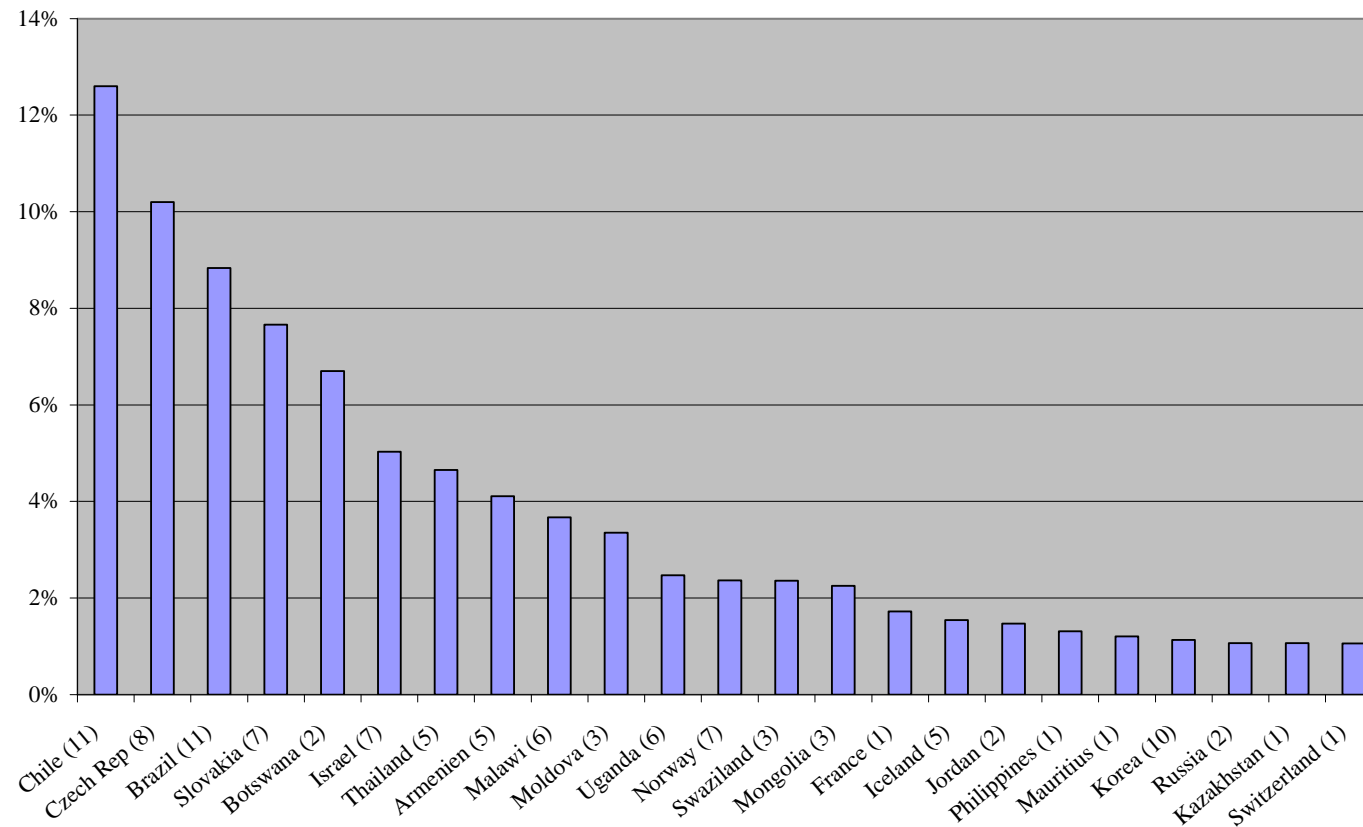
Analysis based on 107 central banks since 1983 (depending on availability)
Sample excludes two outliers and losses below 1% of GDP

Reasons for Central Bank Losses
(weighted by GDP)

Legend:
- Sterilization costs
- Write-downs on foreign currency positions
- Credit losses
- Others
- Not identified

Analysis based on 107 central banks since 1983 (depending on availability)
Sample excludes two outliers and losses below 1% of GDP

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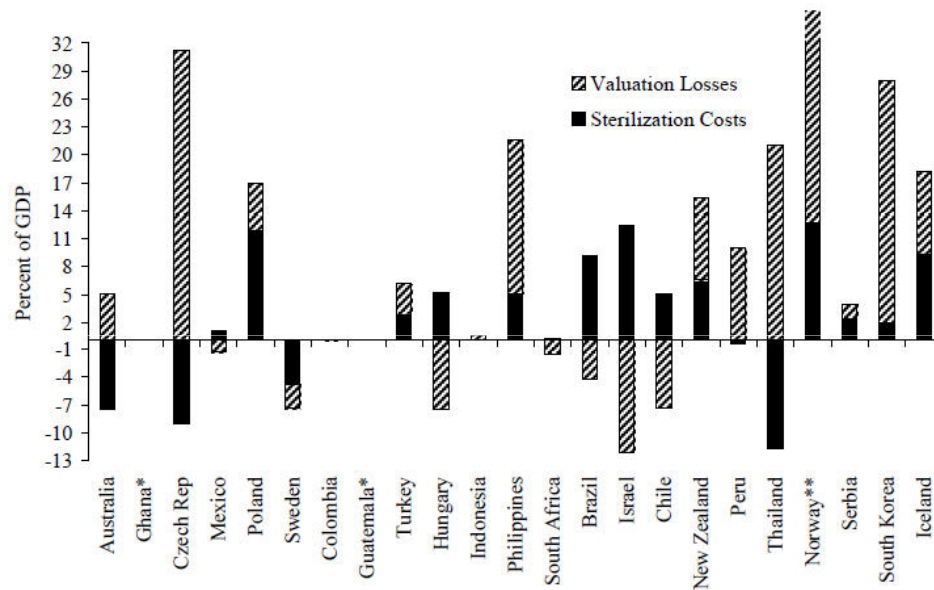
NFA/ CIC Ratios for Inflation Targeting Central Banks (Nov.10*)

UK	-0.1	Indonesia	2.6	Peru	5.4
Canada	0.0	Poland	2.7	New Zealand	5.7
Australia	0.8	Hungary	2.7	Israel (May 10)	6.5
Ghana (Aug. 09)	1.3	Chile	2.8	Norway** (Oct. 04)	6.9
Colombia	1.6	Sweden	3.0	Serbia	8.0
Guatemala	1.9	Brazil	3.5	Iceland	9.3
Czech Rep.	2.0	South Africa	3.6	South Korea (Sep. 10)	9.5
Turkey	2.1	Philippines (Nov. 09)	4.0	Euro area	0.7
Mexico	2.3	Thailand	5.0	US	0.0

* If not stated otherwise   ** includes government pension fund
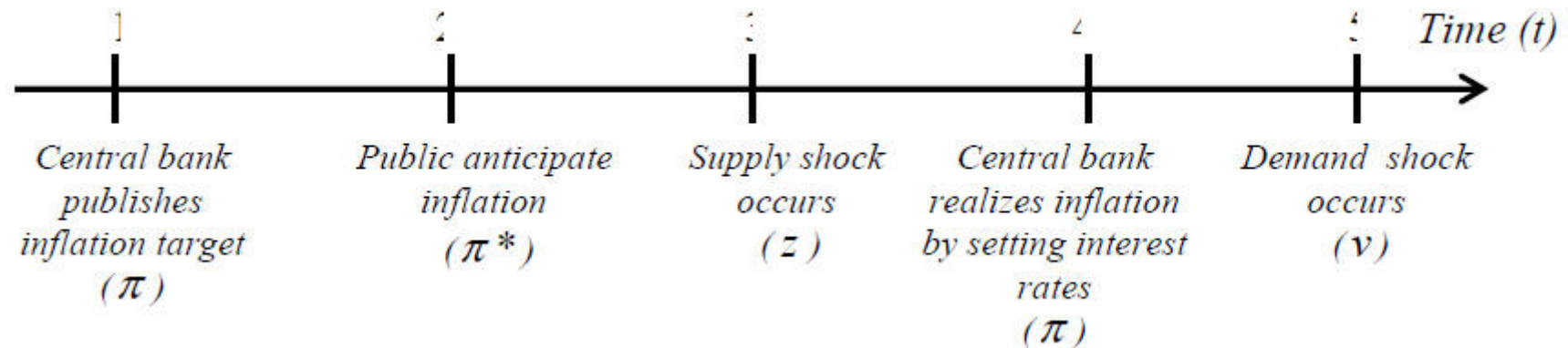
Simulated Losses for Inflation Targeting Central Banks

Source: IFS, National Central Banks. * No data available. ** Government pension fund included and assumed that fund deposits are remunerated at domestic money market rates. The valuation losses of the fund account for 134.5 percent of GDP.

Since the introduction of inflation targeting until 2007

Assumption: Financing gap fully sterlized at domestic money market rates

Löffler/ Schnabl/ Schobert (2010) Inflation Targeting by Debtor Central Banks in Emerging Market Economies, CESifo Working Paper No. 3138

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Extended „Barro-Gordon" Model with Sterilization Costs

Central bank loss function

$$(1) \quad L = \frac{1}{2}\lambda(y - \overline{y} - k)^2 + \frac{1}{2}(\pi)^2 + \gamma(is - i_f nfa).$$

Output

$$(2) \quad y = \overline{y} + a(\pi - \pi^*) + z.$$

Inflation

$$(4) \quad \pi = \pi_{pre} - \phi i + v,$$

Model Central Bank

Assets	Liabilities
NFA	CIC
	Excess Reserves (X)
	Sterilization Debt (S)
DA	

Löffler/ Schnabl/ Schobert (2011) The Illusion of Monetary Policy Autonomy by Freely Floating Debtor Central Banks in South and East Asia, mimeo

Extended „Barro-Gordon" Model with Sterilization Costs cont´d

By substituting (2) and (4) into (1), the central bank seeks to minimize the following expected loss function:

$$(6) \qquad E(L) = \frac{1}{2}\lambda\left(a(\pi_{pre} - \phi i + v - \pi^*) + z - k\right)^2 + \frac{1}{2}(\pi_{pre} - \phi i + v)^2 + \gamma(is - i_f nfa).$$

Optimizing with respect to i and assuming that the public is rational,
but that they do not take into account that their choice of expected inflation has an impact on the central banks's decision, the equilibrium rate of inflation is:

$$(9) \qquad \pi = \lambda ak + \frac{\gamma s}{\phi} + \lambda az + v.$$

Extra inflation bias of a debtor central bank relative to a creditor central bank

Adding Valuation Changes to the Model

Central bank loss function:

$$(12) \quad L = \frac{1}{2}\lambda(y - \bar{y} - k)^2 + \frac{1}{2}(\pi)^2 + \gamma(is - i_f nfa) - \hat{e}(nfa),$$

Change of the spot exchange rate in price notation:

$$(13) \quad \hat{e} = \beta\pi - \xi,$$

Equilibrium inflation:

$$(14) \quad \pi = \lambda ak + \underbrace{\frac{\gamma s}{\phi} + \beta nfa}_{} + \lambda az + v$$

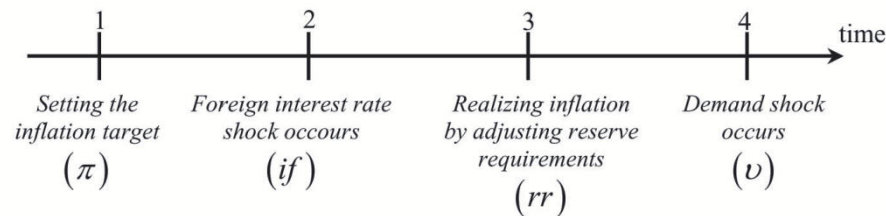Extra inflation bias of a debtor central bank relative to a creditor central bank

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Fixed Exchange Rates & Debtor Central Banks

- Debtor central banks confronted with strong capital inflows and pressures on the exchange rates can use non-market based sterilization, i.e. reserve requirements

- Reserve requirements, however, distort the financial sector, a „loss" to the central bank's objectives.

- Restricting capital inflows will be less effective, if required reserves also lead to higher deposit rates, or if higher lending rates also increase borrowing costs in the capital market and capital inflows are shifted to the securities markets.

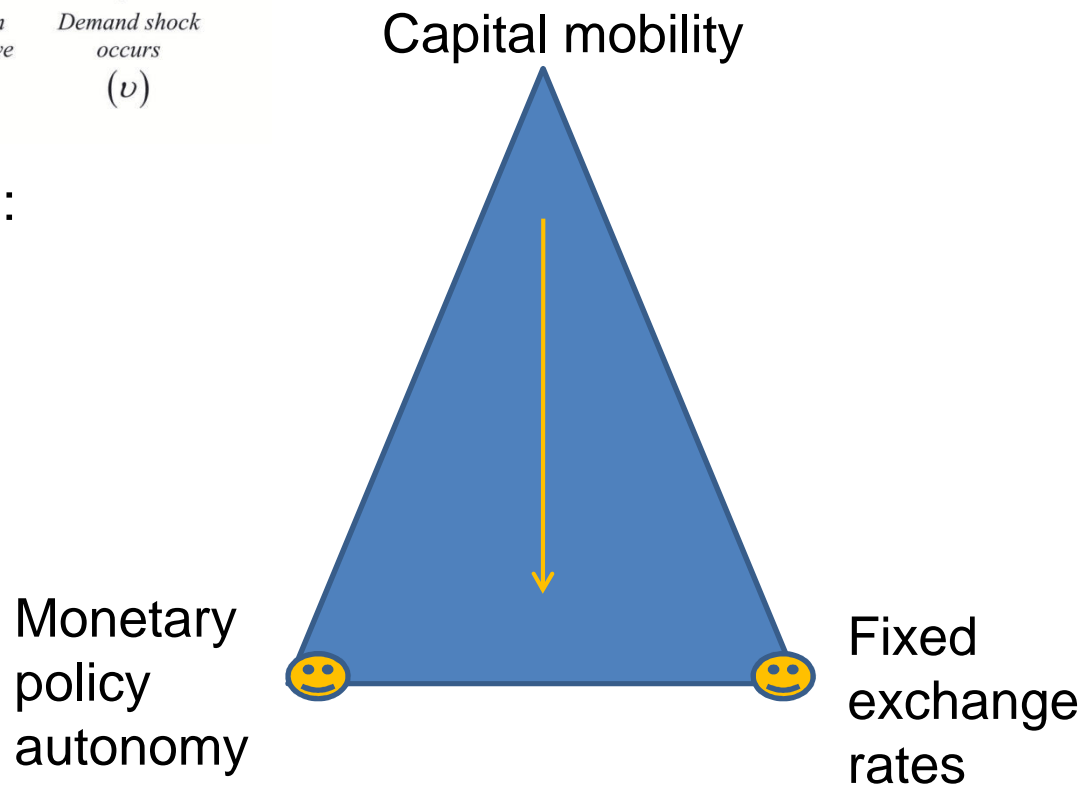# Modelling Monetary Policy Autonomy for Debtor Central Banks in Fixed Regimes

time

1 Setting the inflation target (π)

2 Foreign interest rate shock occours (if)

3 Realizing inflation by adjusting reserve requirements (rr)

4 Demand shock occurs (υ)

Central bank loss function:

(7) $L = 0.5(\pi)^2 + \delta rr$.

Inflation:

(8) $\pi = \pi_{pre} - \varphi i + v$

Interest rate:

(9) $i = \lambda^{if} rr$.

Capital mobility

Monetary policy autonomy

Fixed exchange rates

Löffler/ Schnabl/ Schobert (2011) The Illusion of Monetary Policy Autonomy by Freely Floating Debtor Central Banks in South and East Asia, mimeo

Modelling Monetary Policy Autonomy for Debtor Central Banks in Fixed Regimes cont´d

By substituting (9) and (8) into (7), the central bank seeks to minimize the following expected loss function:

$$(10) \quad E(L) = 0.5(\pi_{pre} - \varphi\lambda^{if} rr + v)^2 + \delta rr .$$

Optimizing with respect to rr, optimal inflation is:

$$(11) \quad \pi_{opt} = \frac{\delta\lambda^{-if}}{\varphi} - \lambda^{if} v .$$

Modelling Monetary Policy Autonomy for Debtor Central Banks in Floating Regimes

- Market-based sterilization triggers costs that depend on the interest rate differential to abroad and the size of the financing gap.

- Though the relationship between the exchange rate and the interest rate differential empirically remains unclear („UIP versus protracted profitability of carry trades"), the exchange rate may rather appreciate temporarily with positive interest rate differentials to abroad.

Model Central Bank

Assets	Liabilities	
	CIC	
NFA	Required Reserves (RR)	Financing gap (FG)
	Sterilization Debt (S)	

Löffler/ Schnabl/ Schobert (2011) The Illusion of Monetary Policy Autonomy by Freely Floating Debtor Central Banks in South and East Asia, mimeo

Modelling Monetary Policy Autonomy for Debtor Central Banks in Floating Regimes cont´d

Central bank loss function:

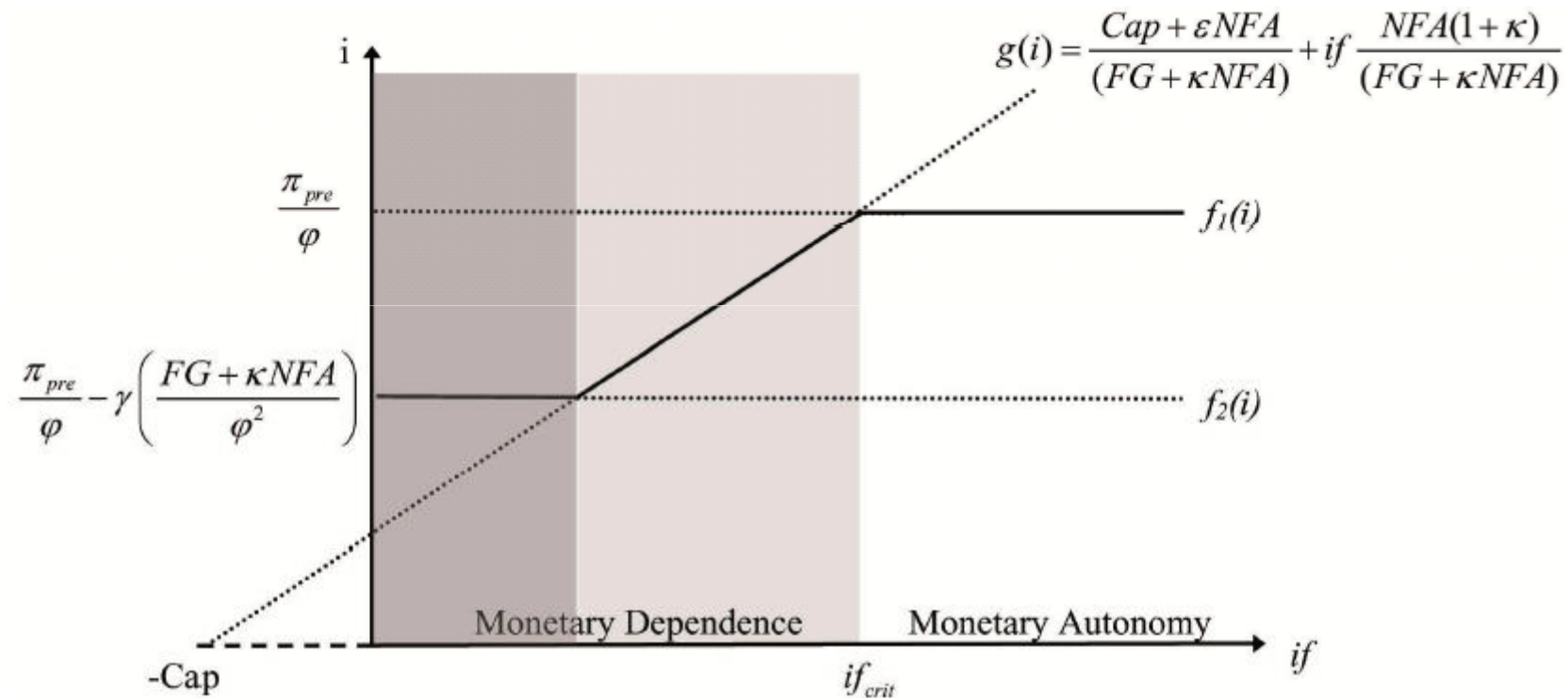$$(12) \quad L = 0.5(\pi)^2 + DUM\,\gamma(iFG - (i^{if} + \hat{e})NFA).$$

Exchange rate changes (in price notation):

$$(14) \quad \hat{e} = \kappa(i^{if} - i) + \varepsilon.$$

By substituting (14) and (8) into (12), the central bank seeks to minimize the following expected loss function:

$$(15) \quad E(L) = 0.5(\pi_{pre} - \varphi i + v)^2 + DUM\,\gamma(i(FG - \kappa NFA) - i^{if}NFA(1+\kappa) - \varepsilon NFA).$$

Policy Dependence of Debtor Central Banks in Floating Regimes

Löffler/ Schnabl/ Schobert (2011) The Illusion of Monetary Policy Autonomy by Freely Floating Debtor Central Banks in South and East Asia, mimeo
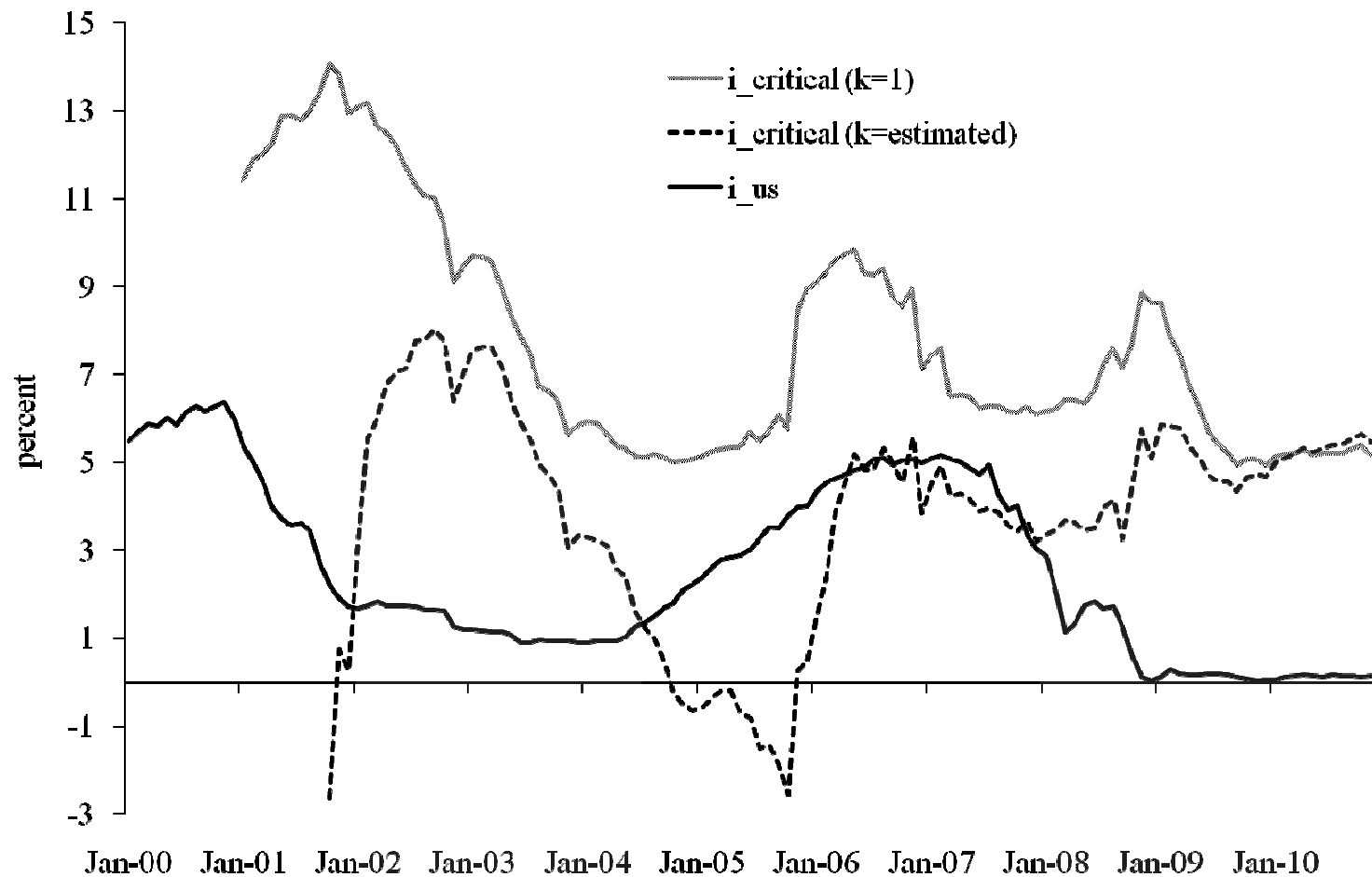
Simulating Results

Solve

$$i = \frac{(Cap + \varepsilon NFA)}{(FG + \kappa NFA)} + i^f \frac{NFA(1+\kappa)}{(FG + \kappa NFA)}$$

for the foreign interest rate, in order to determine a critical value, at which the central bank bank starts to suffer losses.

Compare the critical value with the actual development of the foreign interest rate. If the actual value is below the critical value, monetary policy autonomy is impaired.
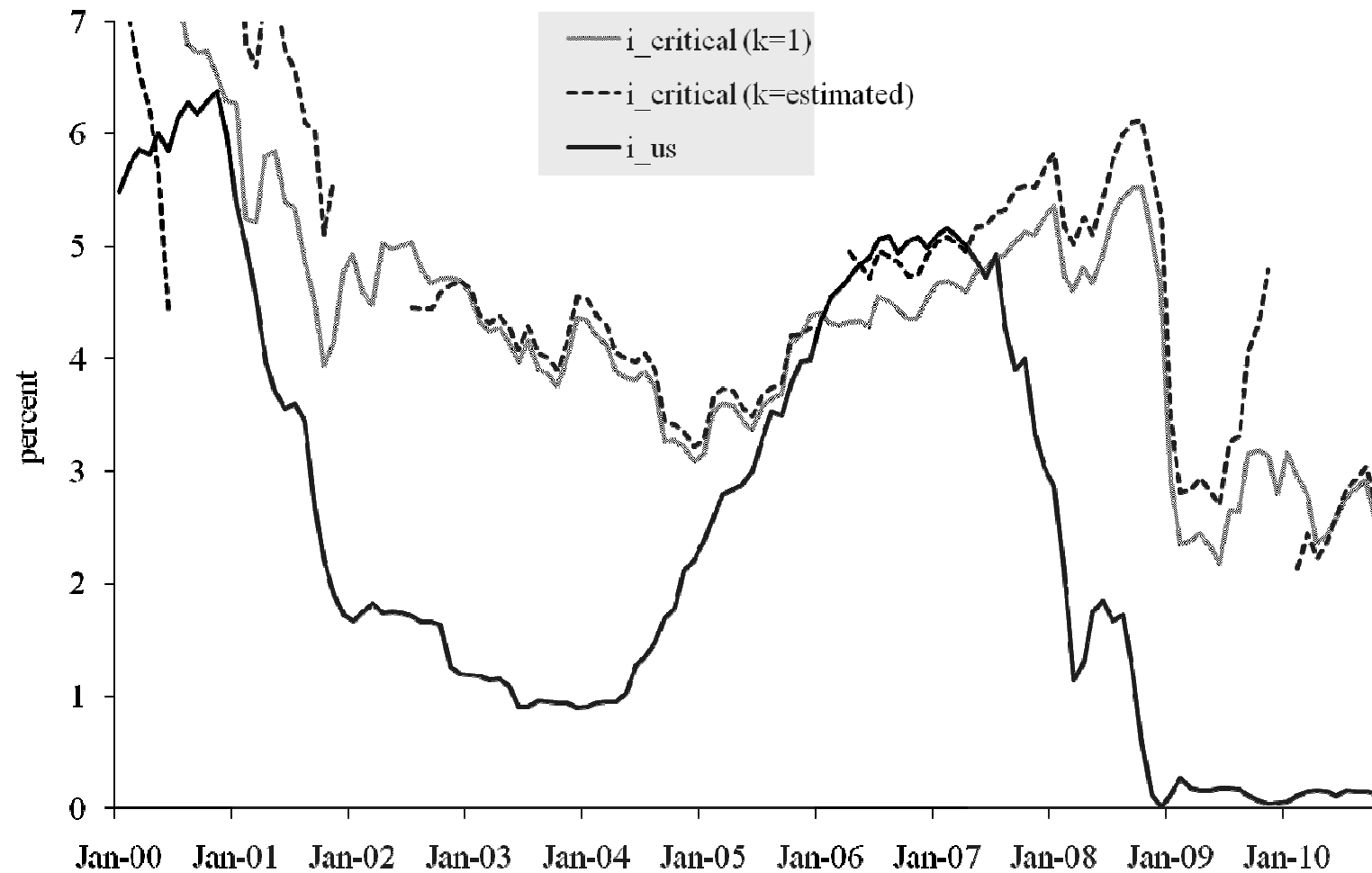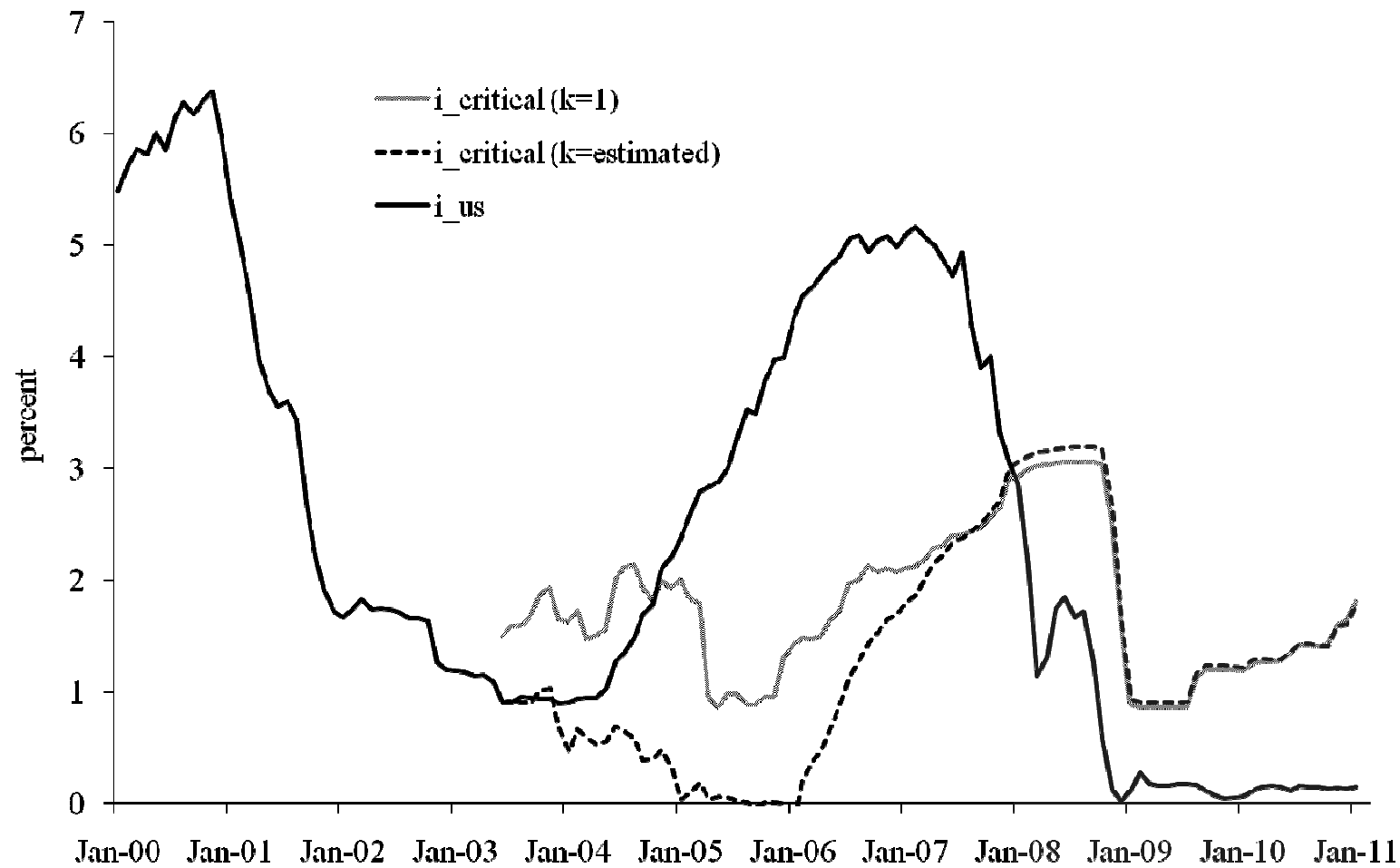
Indonesia

Löffler/ Schnabl/ Schobert (2011) The Illusion of Monetary Policy Autonomy by Freely Floating Debtor Central Banks in South and East Asia, mimeo
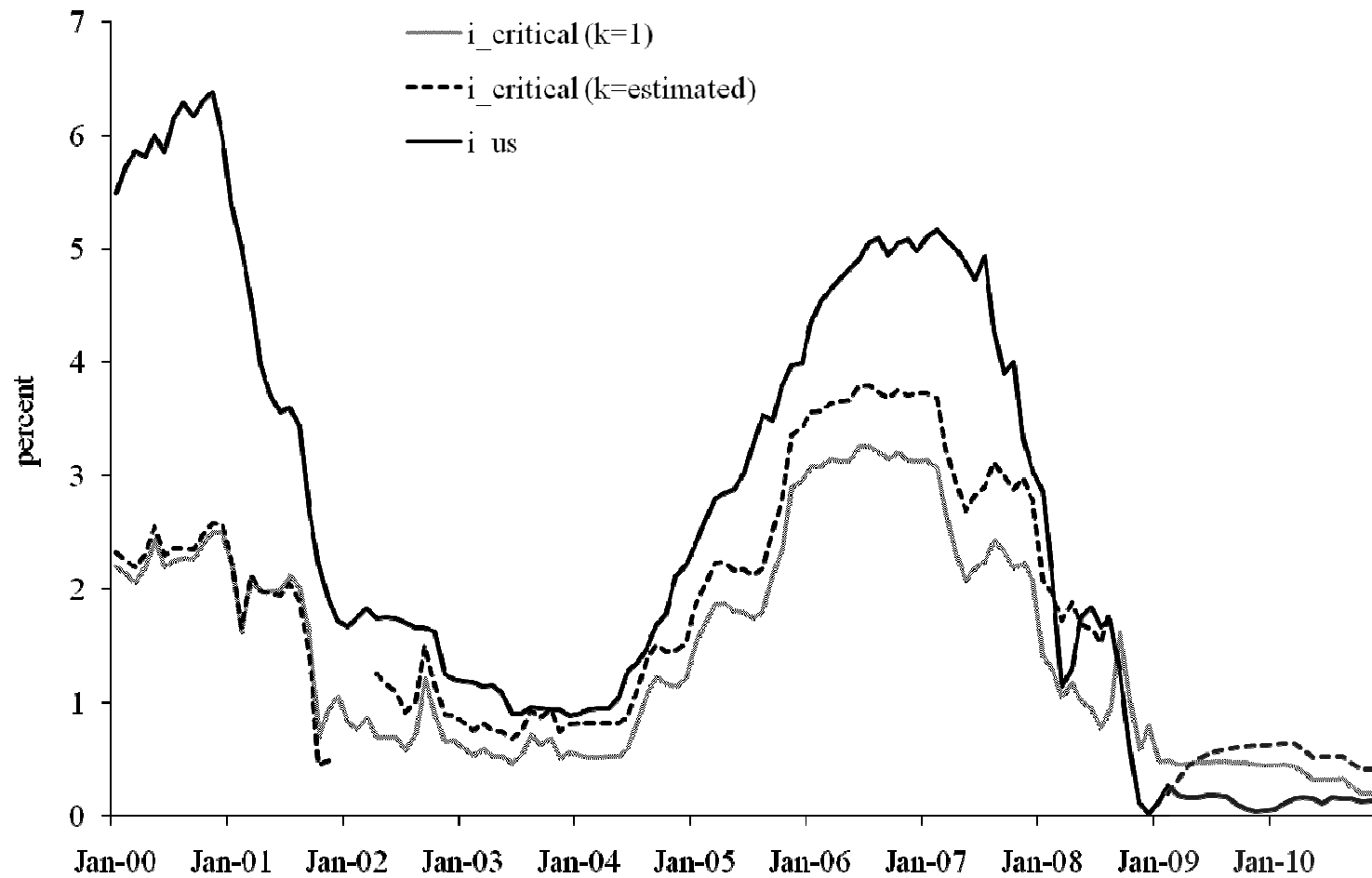
South Korea

Löffler/ Schnabl/ Schobert (2011) The Illusion of Monetary Policy Autonomy by Freely Floating Debtor Central Banks in South and East Asia, mimeo
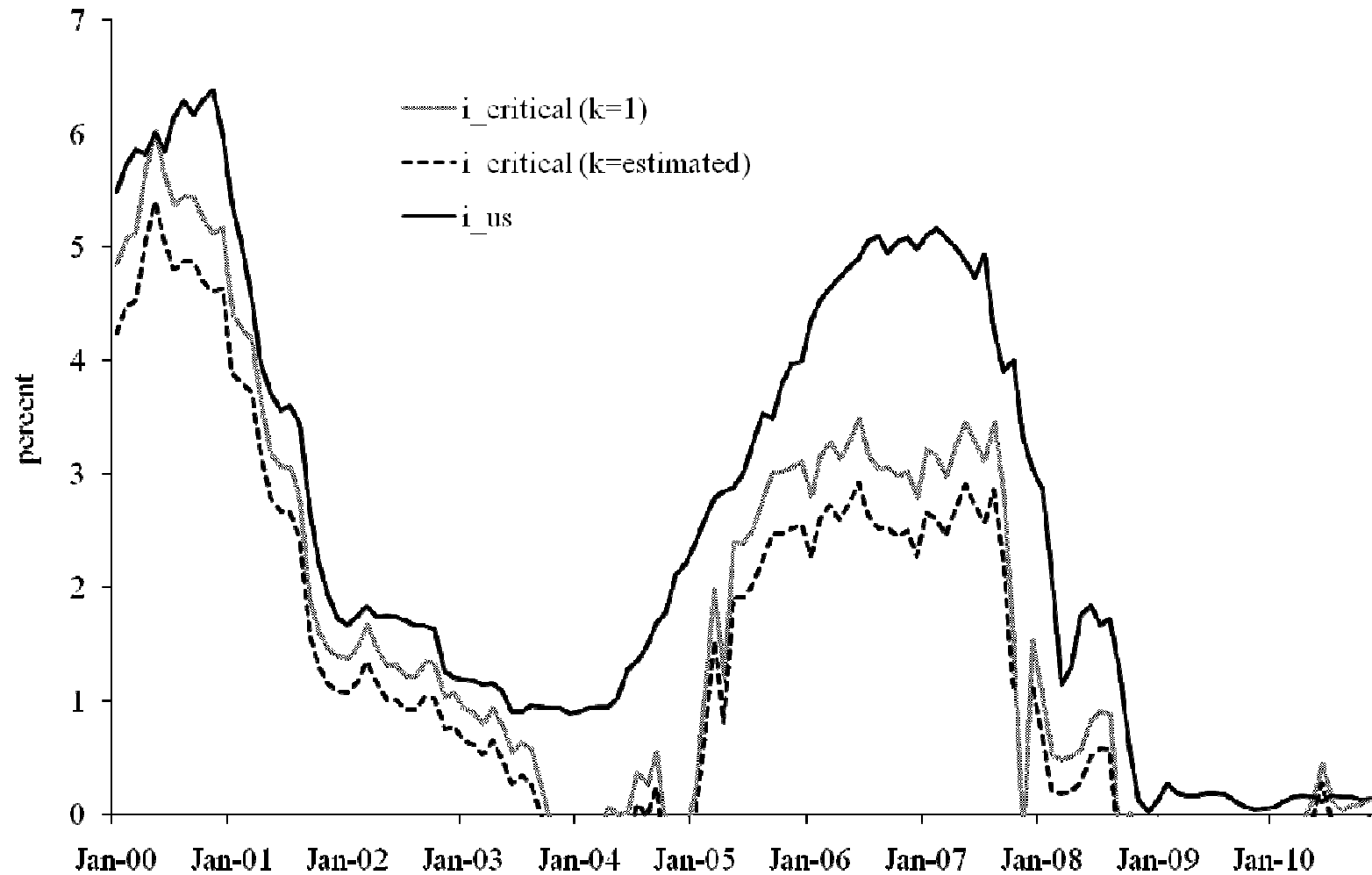
China

Löffler/ Schnabl/ Schobert (2011) The Illusion of Monetary Policy Autonomy by Freely Floating Debtor Central Banks in South and East Asia, mimeo

Singapore (Special Case)

Löffler/ Schnabl/ Schobert (2011) The Illusion of Monetary Policy Autonomy by Freely Floating Debtor Central Banks in South and East Asia, mimeo

Hong Kong (Currency Board)

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Profit/ Loss of the Deutsche Bundesbank, 1957 - 2008
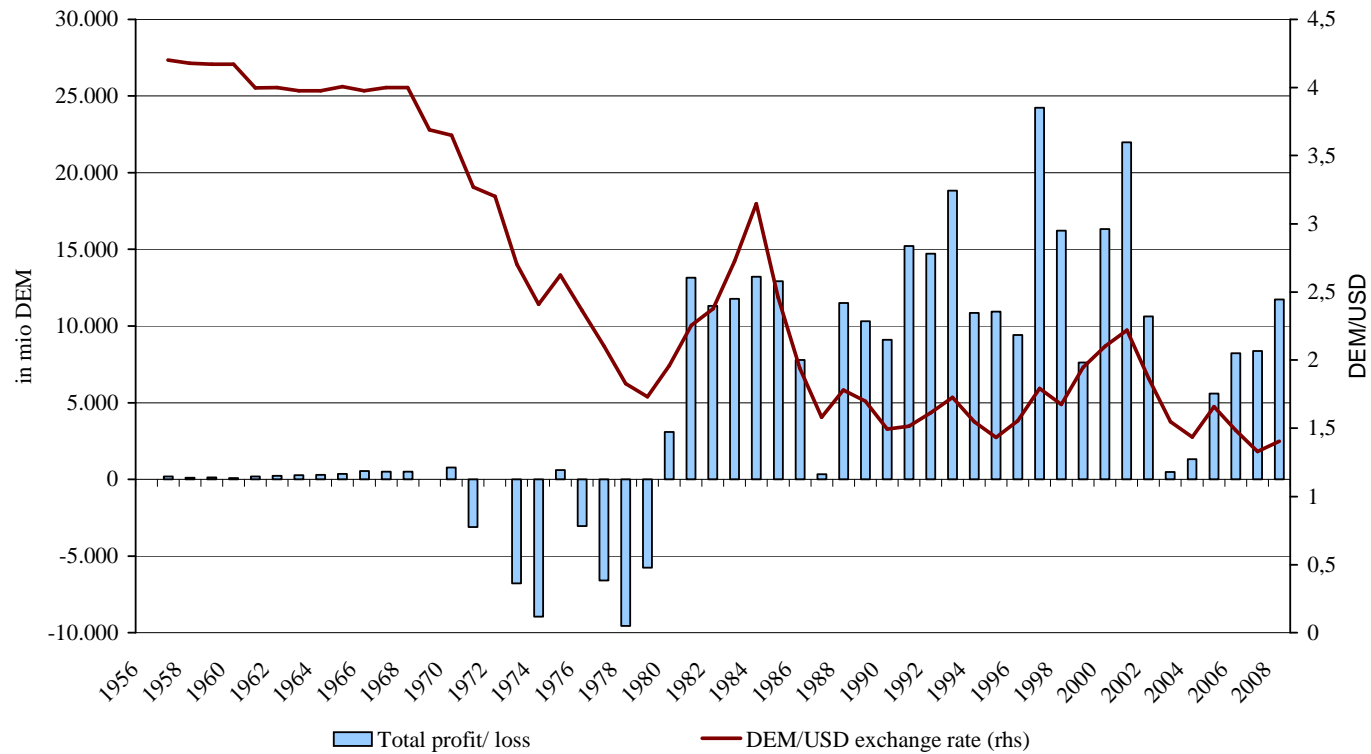
Net Foreign Assets/ Currency in Germany, 1949 - 1998
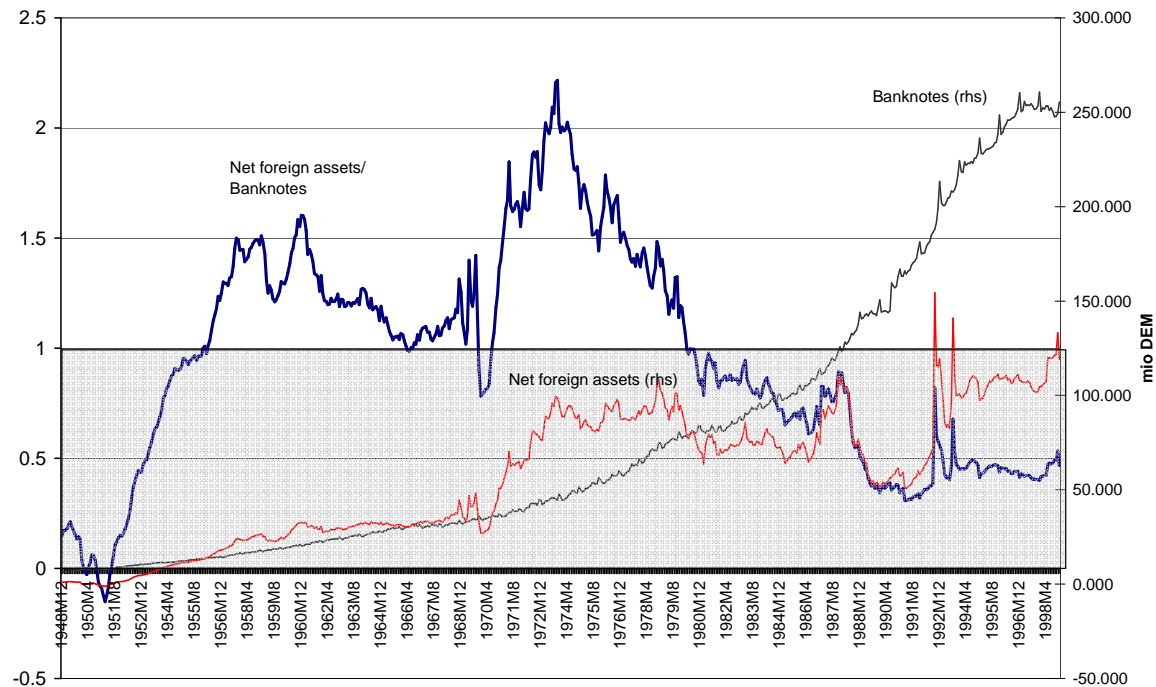
Pontzen/ Schobert (2011) Central bank losses and the case of the Deutsche Bundesbank after the breakdown of the Bretton Woods System, forthcoming

Sources of the Losses at the Deutsche Bundesbank

Accumulated losses from 1971 until 1979 reached almost 4 percent of the GDP.

The main reason was write-downs on foreign currency positions due to the appreciation of the D-Mark against its reserve currency, the US dollar.

These write-downs far exceeded interest expenses on sterilization operations. They accumulated to about 46 billion D-Mark during the seven loss-making years, whereas interest expenses on 'mobilization' and 'liquidity' paper, special forms of sterilization instruments, only accumulated to about 3 billion D-Mark.

Pontzen/ Schobert (2010) Central bank losses and the case of the Deutsche Bundesbank after the breakdown of the Bretton Woods System, mimeo

Dealing with the Losses of the Deutsche Bundesbank

The Directorate decided to record a loss carry forward on the balance sheet.

An alternative, but rejected proposal was:

• Covering losses with an unremunerated claim to the government which could be amortized by future central bank profits.

Pontzen/ Schobert (2010) Central bank losses and the case of the Deutsche Bundesbank after the breakdown of the Bretton Woods System, mimeo