Boom-and-bust cycles marked by capital inflows, current account deterioration and a rise and fall of the real exchange rate

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Outline

- **Introduction**
- **Model**
- **Simulation of boom-and-bust cycles**
- **Case studies**
  - International debt crisis of the 1980s
  - Currency crises of the 1990s
  - US dollar since 1973
  - Natural resource discoveries
- **Conclusions**

Introduction

Understanding boom-and-bust cycles

- **Macroeconomic dynamics**
  - Consumption and saving
  - Investment
  - Output and income
  - Balance of payments
- **Real exchange rate behaviour**
  - International payment flows

Literature

	Boom-and-bust cycles	Consumption and saving	Real investment	Current account (BoP)	Financial investment flows (BoP)	Money flows (BoP) and FX market	Microeconomic underpinning
Conley & Maloney (1995)	●	●					
McKinnon & Pill (1996, 1997)	●	●					
Obstfeld & Rogoff (1995)		●		●	●		●
Kraay & Ventura (2000, 2003)		●	●	●	●		●
Didier & Lowenkron (2012)		●	●	●	●		●
Hau & Rey (2006)				○	●	●	●
Müller-Plantenberg (2006, 2010)				●	●	●	
Present study	●	●	●	●	●	●	●

Table 1: Theoretical components of the present study and of related earlier analyses.

Model

Nominal exchange rate:

$$S_0 = \frac{\frac{1}{P_0^{\mathrm{H}}}}{\frac{1}{P_0^{\mathrm{F}}}} \times \text{index of exchange market pressure.} \tag{1}$$

In logarithms:

$$s_0 = -(p_0^{\mathrm{H}} - p_0^{\mathrm{F}}) + \xi \tilde{m}_0. \tag{2}$$

Exchange market pressure measures the scarcity of the domestic currency relative to the foreign currency (details on the next slide):

$$\begin{aligned} \tilde{m}_0 &= m_0^{\mathrm{H:FC}} - m_0^{\mathrm{F:HC}} \\ &= x_0^{\mathrm{H}} - b_0^{\bar{\mathrm{H}}\mathrm{F}} + b_0^{\bar{\mathrm{F}}\mathrm{H}}. \end{aligned} \tag{3}$$

Real exchange rate:

$$\begin{aligned} q_0 &= s_0 + p_0^{\mathrm{H}} - p_0^{\mathrm{F}} \\ &= [-(p_0^{\mathrm{H}} - p_0^{\mathrm{F}}) + \xi \tilde{m}_0] + p_0^{\mathrm{H}} - p_0^{\mathrm{F}} \\ &= \xi \tilde{m}_0. \end{aligned} \tag{4}$$

Cumulative currency holdings:

$$\begin{aligned} m_{0,t}^{\mathrm{H:FC}} &= S_{0,t}^{-(1-\upsilon)} \int_{-\infty}^{t} S_{0,\tau}^{1-\upsilon} \left(b_{1,\tau}^{\bar{\mathrm{F}}\mathrm{H}} + \phi\, x_{1,\tau}^{\mathrm{H}} \right) d\tau \\ &\approx b_{0,t}^{\bar{\mathrm{F}}\mathrm{H}} + \phi\, x_{0,t}^{\mathrm{H}}, \end{aligned} \tag{5a}$$

$$\begin{aligned} m_{0,t}^{\mathrm{F:HC}} &= S_{0,t}^{\upsilon} \int_{-\infty}^{t} S_{0,\tau}^{-\upsilon} \left(b_{1,\tau}^{\bar{\mathrm{H}}\mathrm{F}} - (1-\phi)\, x_{1,\tau}^{\mathrm{H}} \right) d\tau \\ &\approx b_{0,t}^{\bar{\mathrm{H}}\mathrm{F}} - (1-\phi)\, x_{0,t}^{\mathrm{H}}. \end{aligned} \tag{5b}$$

A subindex 0 refers to a stock, a subindex 1 to a flow.

Variables:

$$\begin{aligned} x_0^{\mathrm{H}} &= z_0^{\mathrm{H}} - e_0^{\mathrm{HF}} + e_0^{\mathrm{FH}} - b_0^{\mathrm{HF}} + b_0^{\mathrm{FH}} \\ &= \text{cumulative international cash flow} \\ &= \text{cumulative current account plus net cumulative equity and bond inflows} \\ b_0^{\bar{\mathrm{H}}\mathrm{F}} &= \text{domestic official reserves,} \\ b_0^{\bar{\mathrm{F}}\mathrm{H}} &= \text{foreign official reserves.} \end{aligned}$$

To do: Now we need to **explain the variables that determine exchange market pressure, $\tilde{\mathrm{m}}_0$.**

Reassessing the balance of payments

Conventional balance of payments:

Current account			z_1^{H}	$= -z_1^{\mathrm{F}}$
Financial account	Direct investment		$e_1^{\mathrm{FH}} - e_1^{\mathrm{HF}}$	
	Portfolio investment	Equity	$e_1^{\mathrm{FH}} - e_1^{\mathrm{HF}}$	
		Bonds	$b_1^{\mathrm{FH}} - b_1^{\mathrm{HF}}$	
	Other investment	Loans, trade credits	$b_1^{\mathrm{FH}} - b_1^{\mathrm{HF}}$	
	Official reserve changes		$b_1^{\bar{\mathrm{F}}\mathrm{H}} - b_1^{\bar{\mathrm{H}}\mathrm{F}}$	

Balance of payments with monetary payment flows:

Current account			z_1^{H}	$= -z_1^{\mathrm{F}}$
Financial account	Direct investment		$e_1^{\mathrm{FH}} - e_1^{\mathrm{HF}}$	
	Portfolio investment	Equity	$e_1^{\mathrm{FH}} - e_1^{\mathrm{HF}}$	
		Bonds	$b_1^{\mathrm{FH}} - b_1^{\mathrm{HF}}$	
	Other investment	Loans, trade credits	$b_1^{\mathrm{FH}} - b_1^{\mathrm{HF}}$	
		Monetary payments	$\mathbf{m_1^{\mathrm{FH}}}$	$= -\mathbf{m_1^{\mathrm{HF}}}$
	Official reserve changes		$b_1^{\bar{\mathrm{F}}\mathrm{H}} - b_1^{\bar{\mathrm{H}}\mathrm{F}}$	

Balance of payments identity:

$$z_0^{\mathrm{H}} = e_0^{\mathrm{HF}} - e_0^{\mathrm{FH}} + b_0^{\mathrm{HF}} - b_0^{\mathrm{FH}} + \mathbf{m_0^{\mathrm{HF}}} + b_0^{\bar{\mathrm{H}}\mathrm{F}} - b_0^{\bar{\mathrm{F}}\mathrm{H}} \tag{6}$$

Thus **net payment inflows equal to exchange market pressure:**

$$\begin{aligned} \tilde{\mathbf{m}}_{\mathbf{0}} &= x_0^{\mathrm{H}} - b_0^{\bar{\mathrm{H}}\mathrm{F}} + b_0^{\bar{\mathrm{F}}\mathrm{H}} \\ &= z_0^{\mathrm{H}} - e_0^{\mathrm{HF}} + e_0^{\mathrm{FH}} - b_0^{\mathrm{HF}} + b_0^{\mathrm{FH}} - b_0^{\bar{\mathrm{H}}\mathrm{F}} + b_0^{\bar{\mathrm{F}}\mathrm{H}} \\ &= \mathbf{m_0^{\mathrm{HF}}}. \end{aligned} \tag{7}$$

Intermediate results

The **real appreciation of the domestic currency** is the stronger:

1. the higher the **current account** balance is,
2. the higher **net FDI and equity investment inflows** into the home country are,
3. the higher **net lending inflows (bonds, loans, trade credits etc.)** into the home country are,
4. the more **official reserves** the domestic central bank is selling and the foreign central bank is buying.

Inflation matters

- for the **nominal exchange rate,**
- but **not** for the **real exchange rate.**

Now we need to determine in a **theoretical model:**

Variable		**Determination** (T = theorical input)	
Consumption	$c_1^{\mathrm{H}}, c_1^{\mathrm{F}}$	Consumption smoothing	T
Cross-border investment	$e_1^{\mathrm{HF}}, e_1^{\mathrm{FH}}, b_1^{\mathrm{HF}}, b_1^{\mathrm{FH}}$	Optimal portfolio choice (risk-return trade-off)	T
Real investment	$k_1^{\mathrm{H}}, k_1^{\mathrm{F}}$	Real options theory (simplified)	T
Wealth	$a_0^{\mathrm{H}}, a_0^{\mathrm{F}}$	Stochastic wealth accumulation equation	
Output	$\tilde{y}_1^{\mathrm{H}}, \tilde{y}_1^{\mathrm{F}}$	Domestic output and spending identity (only assuming constant import shares)	
National income	$y_1^{\mathrm{H}}, y_1^{\mathrm{F}}$	Output plus net cross-border factor income	
Current account	$z_1^{\mathrm{H}}, z_1^{\mathrm{F}}$	Saving minus real investment	
Net foreign asset position	$z_0^{\mathrm{H}}, z_0^{\mathrm{F}}$	Accumulation of past current accounts	

Model details

Maximize lifetime utility:

$$\mathrm{E}\int_0^\infty e^{-\rho t}\ln(c_{1,t}^{\mathrm{H}})dt. \tag{8}$$

Asset prices represented by **geometric Brownian motions:**

$$dP_{i,t} = P_{i,t}\pi_i dt + P_{i,t}\zeta_i d\omega_{i,t}, \tag{9}$$

where $i \in \{e^{\mathrm{HH}}, e^{\mathrm{FF}}, b^{\bar{\mathrm{H}}\mathrm{H}}, b^{\bar{\mathrm{F}}\mathrm{F}}, e^{\mathrm{HF}}, e^{\mathrm{FH}}, b^{\mathrm{HF}}, b^{\mathrm{FH}}, b^{\bar{\mathrm{H}}\mathrm{F}}, b^{\bar{\mathrm{F}}\mathrm{H}}\}$, $\omega_{i,t}$ is a Wiener process and π_i and ζ_i are, respectively, the percentage drift and percentage volatility of the price process of asset i.

Wealth accumulation:

$$\begin{aligned} a_1^{\mathrm{H}}dt = &\left(\sum_i(\pi_i - r)i_0 - \sum_j(\pi_j - r)j_0 + ra_0^{\mathrm{H}} - c_1^{\mathrm{H}}\right)dt \\ &+ \sum_i i_0\zeta_i d\omega_i - \sum_j j_0\zeta_j d\omega_j, \end{aligned} \tag{10}$$

where $i \in \{e^{\mathrm{HH}}, e^{\mathrm{HF}}, b^{\mathrm{HF}}\}$, $j \in \{e^{\mathrm{FH}}, b^{\mathrm{TH}}\}$ and $b_0^{\mathrm{TH}} = b_0^{\mathrm{FH}} + b_0^{\bar{\mathrm{H}}\mathrm{H}} + b_0^{\bar{\mathrm{F}}\mathrm{H}}$.

Bellman equation:

$$\begin{aligned}\rho V(a_0^H) = \max_{c_1^{\mathrm{H}}, e_0^{\mathrm{HH}}, e_0^{\mathrm{HF}}, b_0^{\mathrm{HF}}} \Bigg\{ & u(c_1^{\mathrm{H}}) \\ & + \left(\sum_i (\pi_i - r) i_0 - \sum_j (\pi_j - r) j_0 + r a_0^{\mathrm{H}} - c_1^{\mathrm{H}} \right) V'(a_0^{\mathrm{H}}) \\ & + \frac{1}{2} \Bigg(\sum_i \sum_{i'} i_0 i_0' \zeta_i \zeta_{i'} \eta_{ii'} - \sum_i \sum_j i_0 j_0 \zeta_i \zeta_j \eta_{ij} \\ & \qquad + \sum_j \sum_{j'} j_0 j_0' \zeta_j \zeta_{j'} \eta_{jj'} \Bigg) V''(a_0^{\mathrm{H}}) \Bigg\}, \end{aligned} \tag{11}$$

where $i, i' \in \{e^{\mathrm{HH}}, e^{\mathrm{HF}}, b^{\mathrm{HF}}\}$, $j, j' \in \{e^{\mathrm{FH}}, b^{\mathrm{TH}}\}$, $\eta_{ii'} = 1$ if $i = i'$ and $\eta_{jj'} = 1$ if $j = j'$.

Optimal consumption and portfolio allocation derived from first-order conditions:

$$u'(c_1^{\mathrm{H}}) = V'(a_0^{\mathrm{H}}), \tag{12}$$

$$\begin{aligned} i_0 = {} & \frac{\pi_i - r}{\zeta_i^2} \left[-\frac{V'(a_0^{\mathrm{H}})}{a_0^{\mathrm{H}} V''(a_0^{\mathrm{H}})} \right] a_0^{\mathrm{H}} \\ & - \frac{1}{2\zeta_i^2} \left(\sum_{i' \neq i} i_0' \zeta_i \zeta_{i'} \eta_{ii'} - \sum_j j_0 \zeta_i \zeta_j \eta_{ij} \right), \end{aligned} \tag{13}$$

where $i, i' \in \{e^{\mathrm{HH}}, e^{\mathrm{HF}}, b^{\mathrm{HF}}\}$ and $j \in \{e^{\mathrm{FH}}, b^{\mathrm{TH}}\}$.

Value function:

$$V(a_0^{\mathrm{H}}) = \frac{1}{A} \ln(a_0^{\mathrm{H}}) + B, \tag{14}$$

where $A = \rho$ and B is a constant to be determined.

Domestic output:

$$\sum_i \tilde{y}_1^i = \sum_i (c_1^i + k_1^i), \qquad i \in \{\mathrm{H}, \mathrm{F}\}. \tag{15}$$

$$\tilde{y}_1^{\mathrm{H}} = (1-\alpha)c_1^{\mathrm{H}} + \alpha c_1^{\mathrm{F}} + (1-\alpha)k_1^{\mathrm{H}} + \alpha k_1^{\mathrm{F}}. \tag{16}$$

$$\tilde{\alpha}^{\mathrm{H}} = \frac{\alpha(c_1^{\mathrm{H}} + k_1^{\mathrm{H}})}{\tilde{y}_1^{\mathrm{H}}}. \tag{17}$$

National income:

$$y_1^{\mathrm{H}} = \tilde{y}_1^{\mathrm{H}} + \sum_i \pi_i i_0 - \sum_j \pi_j j_0 + r m_0^{\mathrm{HF}}, \tag{18}$$

where $i \in \{e^{\mathrm{HF}}, b^{\mathrm{HF}}, b^{\bar{\mathrm{H}}\mathrm{F}}\}$ and $j \in \{e^{\mathrm{FH}}, b^{\mathrm{FH}}, b^{\bar{\mathrm{F}}\mathrm{H}}\}$.

International investment position and balance of payments identity:

$$z_0^{\mathrm{H}} = f_0^{\mathrm{H}}, \qquad z_1^{\mathrm{H}} = f_1^{\mathrm{H}}. \tag{19}$$

International investment position:

$$f_0^{\mathrm{H}} = e_0^{\mathrm{HF}} - e_0^{\mathrm{FH}} + b_0^{\mathrm{HF}} - b_0^{\mathrm{FH}} + m_0^{\mathrm{HF}} + b_0^{\bar{\mathrm{H}}\mathrm{F}} - b_0^{\bar{\mathrm{F}}\mathrm{H}} = -f_0^{\mathrm{F}}. \tag{20}$$

Balance of payments identity:

$$\begin{aligned} z_1^{\mathrm{H}} &= y_1^{\mathrm{H}} - c_1^{\mathrm{H}} - k_1^{\mathrm{H}} \\ &= \alpha(c_1^{\mathrm{F}} + k_1^{\mathrm{F}}) - \alpha(c_1^{\mathrm{H}} + k_1^{\mathrm{H}}) + \sum_i \pi_i i_0 - \sum_j \pi_j j_0 + r m_0^{\mathrm{HF}} \\ &= -\left(y_1^{\mathrm{F}} - c_1^{\mathrm{H}} - k_1^{\mathrm{H}}\right) \\ &= -z_1^{\mathrm{F}}, \end{aligned} \tag{21}$$

where $i \in \{e^{\mathrm{HF}}, b^{\mathrm{HF}}, b^{\bar{\mathrm{H}}\mathrm{F}}\}$ and $j \in \{e^{\mathrm{FH}}, b^{\mathrm{FH}}, b^{\bar{\mathrm{F}}\mathrm{H}}\}$.

Initial portfolio weights:

$$w_{e^{\text{HH}}} = 1.00 - w_{m^{\text{HH}}}, \quad w_{e^{\text{FF}}} = 1.00 - w_{m^{\text{FF}}}, \tag{22}$$

$$w_{e^{\text{HF}}} = w_{e^{\text{FH}}} = 0.25, \tag{23}$$

$$w_{b^{\text{HF}}} = w_{b^{\text{FH}}} = 0.25. \tag{24}$$

Asset returns:

$$\pi_{e^{\text{HH}}} = \pi_{e^{\text{FF}}} = 5.5\%, \qquad \pi_{e^{\text{HF}}} = \pi_{e^{\text{FH}}} = 5.5\%, \qquad \pi_{b^{\text{HF}}} = \pi_{b^{\text{FH}}} = 1.6\%. \tag{25}$$

Return correlations:

$$\eta_{j_1} = 0.25, \quad j_1 \in F \setminus \{(e^{\text{HH}}, e^{\text{FH}}), (e^{\text{FF}}, e^{\text{HF}})\}, \tag{26}$$

$$\eta_{j_2} = 1.00, \quad j_2 \in \{(e^{\text{HH}}, e^{\text{FH}}), (e^{\text{FF}}, e^{\text{HF}})\}. \tag{27}$$

Calibrated return volatilities:

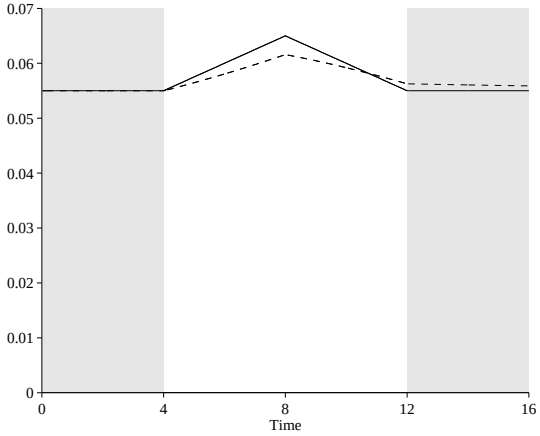
$$\zeta_{e^{\text{HH}}} = \zeta_{e^{\text{FF}}} = 0.284, \qquad \zeta_{e^{\text{HF}}} = \zeta_{e^{\text{FH}}} = 0.395, \qquad \zeta_{b^{\text{HF}}} = \zeta_{b^{\text{FH}}} = 0.166. \tag{28}$$

Simulation of boom-and-bust cycles

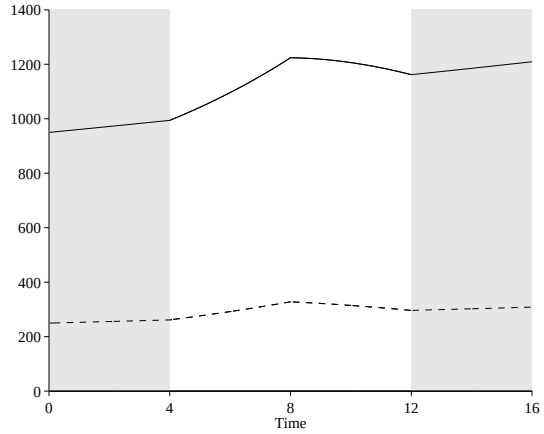
Boom-and-bust cycles are generated by a **temporary rise in the return on domestic capital.**

The following graphs show the **effects on:**

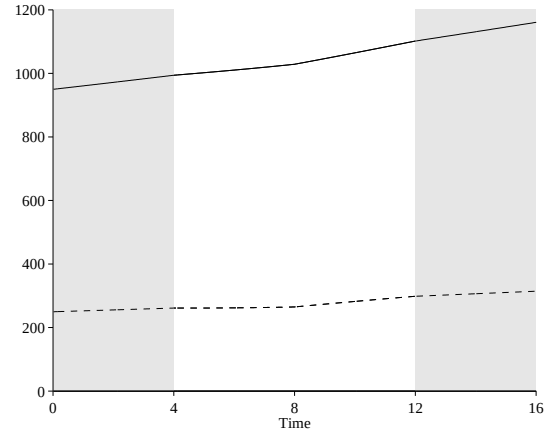
- **Portfolio allocation decisions**
- **Stock market behaviour**
- **National income and spending**
  - Income
  - Consumption
  - Saving
  - Investment
  - Current account
- **Exchange market pressure**



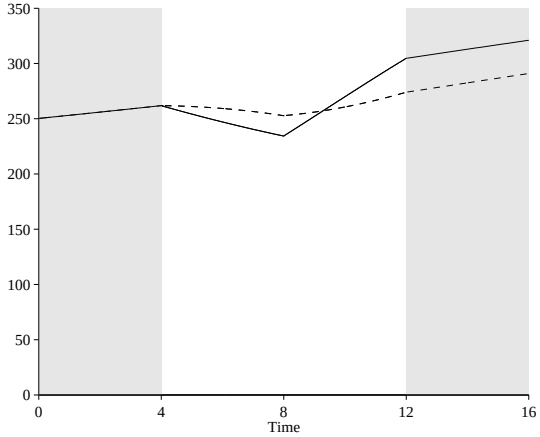
(a) Return on domestic real capital ($\pi_{k^{\text{H}}}$: solid line) and on domestic equity ($\pi_{e^{\text{TH}}}$: dashed line)



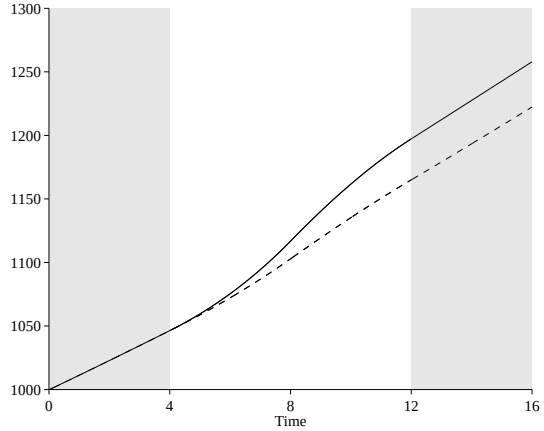
(b) Domestic equity held by domestic residents (e_0^{HH}: solid line) and foreign residents (e_0^{FH}: dashed line)



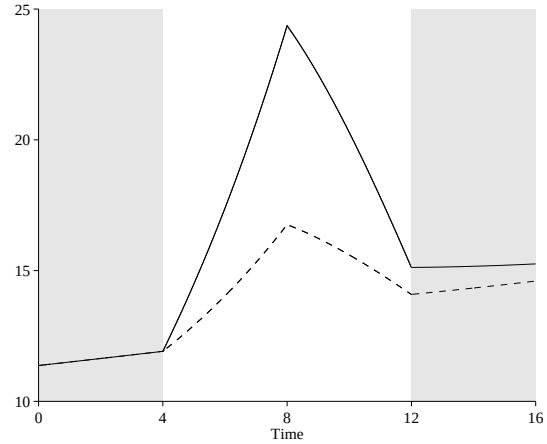
(c) Foreign equity held by foreign residents (e_0^{FF}: solid line) and domestic residents (e_0^{HF}: dashed line)



(d) Foreign bonds held by domestic residents (b_0^{HF}: solid line) and domestic bonds held by foreign residents (b_0^{FH}: dashed line)

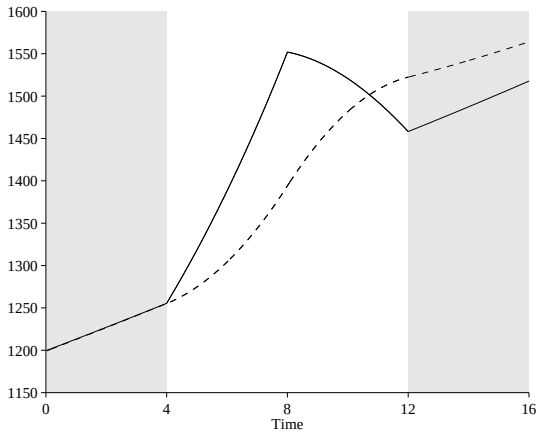


(e) Domestic wealth (a_0^{H}: solid line) and foreign wealth (a_0^{F}: dashed line)

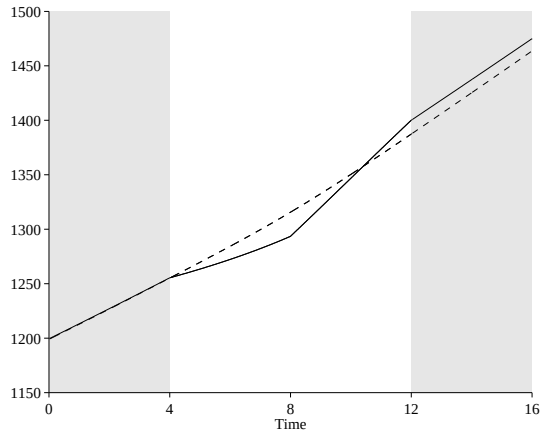


(f) Absolute growth of domestic wealth (a_1^{H}: solid line) and foreign wealth (a_1^{F}: dashed line)

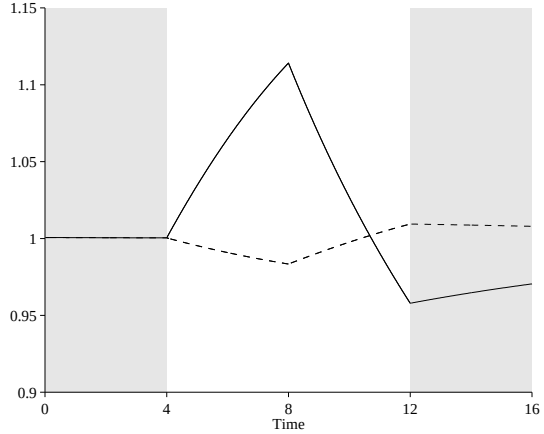
Figure 1: **Asset returns and portfolio allocation.** Asset returns, portfolio holdings of domestic and foreign investors and domestic and foreign wealth.



(a) Domestic stock market value (e_0^{TH}: solid line) and capital stock (k_0^{H}: dashed line)

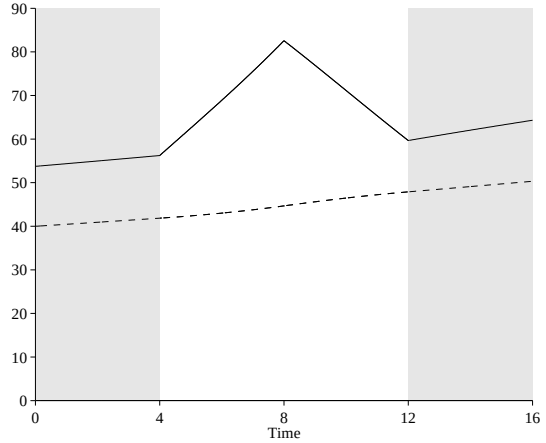


(b) Foreign stock market value (e_0^{TF}: solid line) and capital stock (k_0^{F}: dashed line)

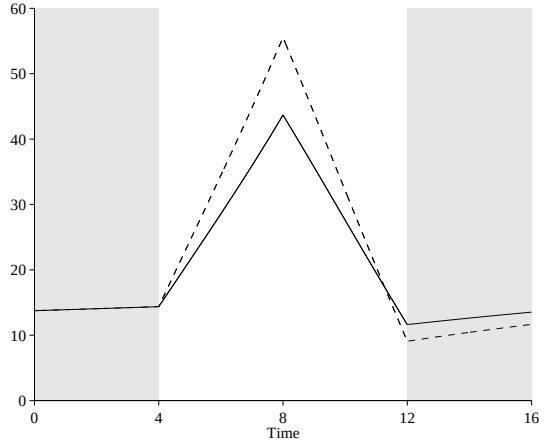


(c) Overvaluation of the domestic stock market (β^{H}: solid line) and the foreign stock market (β^{F}: dashed line)

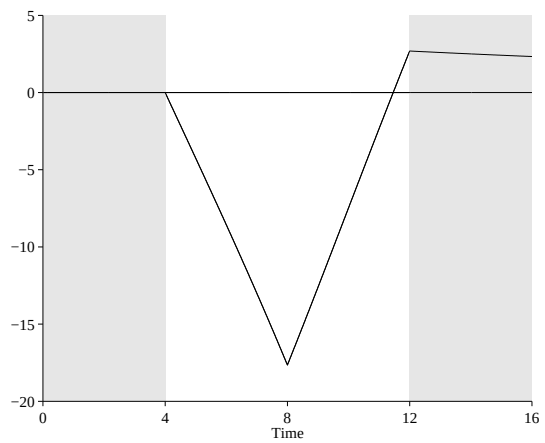
Figure 2: **Stock market overvaluations.** Domestic and foreign capital stocks, stock market values and stock market overvaluations.



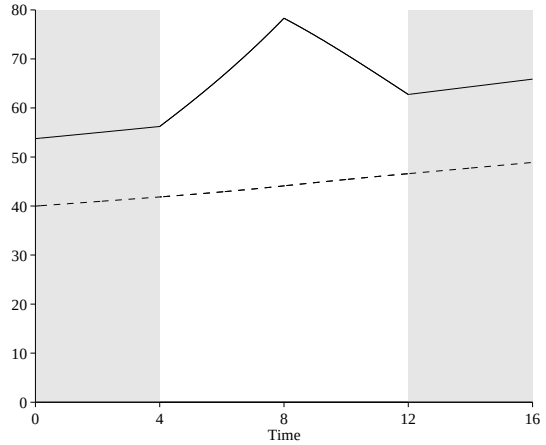
(a) Domestic national income (y_1^{H}: solid line) and consumption (c_1^{H}: dashed line)



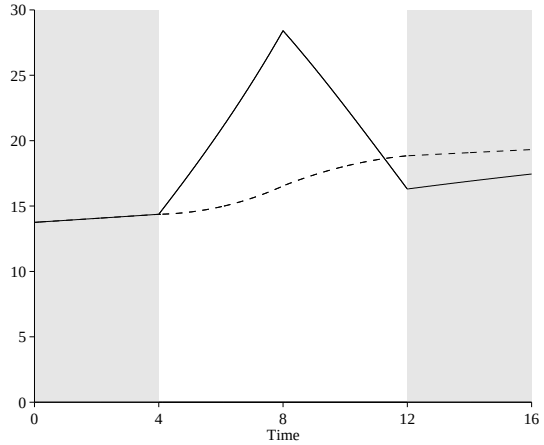
(b) Domestic saving ($y_1^{\mathrm{H}} - c_1^{\mathrm{H}}$: solid line) and investment (k_1^{H}: dashed line)



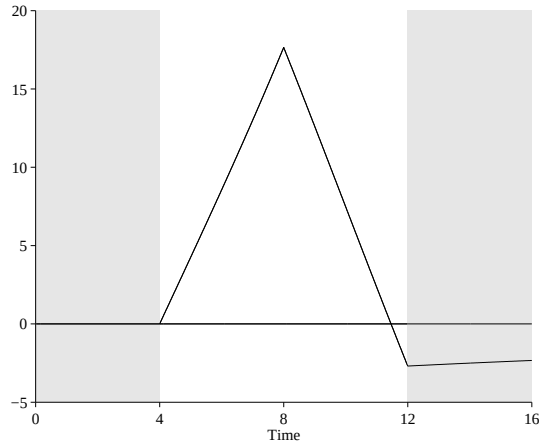
(c) Domestic current account (z_1^{H})



(d) Foreign national income (y_1^{F}: solid line) and consumption (c_1^{F}: dashed line)

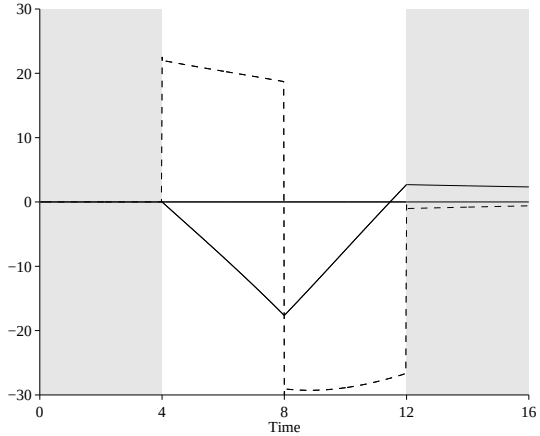


(e) Foreign saving ($y_1^{\mathrm{F}} - c_1^{\mathrm{F}}$: solid line) and investment (k_1^{F}: dashed line)

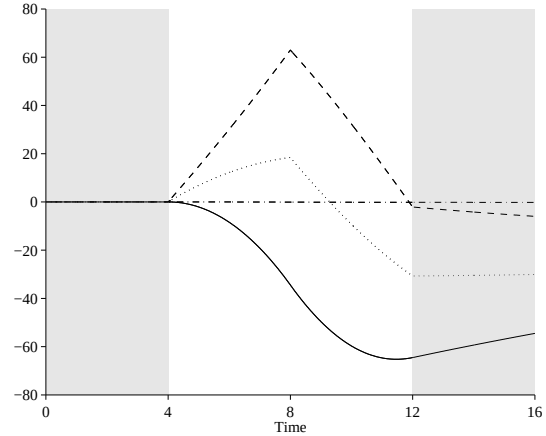


(f) Foreign current account (z_1^{F})

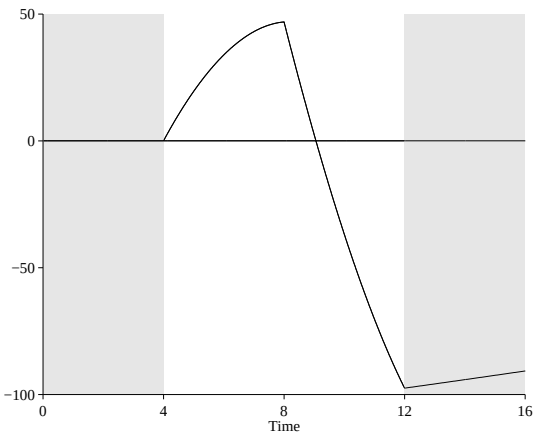
Figure 3: **National income and spending.** National income, consumption, saving, investment and current account balance at home and abroad.



(a) Domestic current account (z_1^{H}: solid line) and net capital inflows ($b_1^{\mathrm{FH}} - b_1^{\mathrm{HF}} + e_1^{\mathrm{FH}} - e_1^{\mathrm{HF}}$: dashed line)



(b) Components of exchange market pressure: z_0^{H} (solid line), $e_0^{\mathrm{FH}} - e_0^{\mathrm{HF}}$ (dashed line), $b_0^{\mathrm{FH}} - b_0^{\mathrm{HF}}$ (dotted line) and $b_0^{\bar{\mathrm{F}}\mathrm{H}} - b_0^{\bar{\mathrm{H}}\mathrm{F}}$ (dash-dotted line)



(c) Exchange market pressure ($\tilde{m}_0 = m_0^{\mathrm{HF}}$)

Figure 4: **Exchange market pressure.** Comparison of the current account balance with capital inflows as well as exchange market pressure and its components.

Case studies

Debt crisis of the 1980s

Mexico - 1982

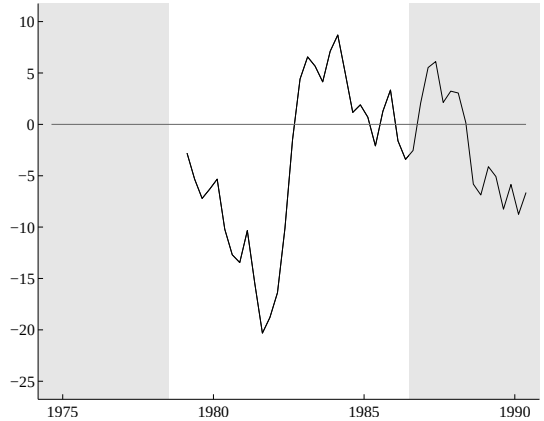
- **Policies of economic and social development in the 1970s:** nationalization of the mining and electrical industries, redistribution of land and increased spending on health, housing construction, education and food subsidies
- Boosts in public spending facilitated by the **discovery in 1974 of vast oil fields** and the surge in the price of oil
- **Mexico borrowing heavily** from international capital markets
- **1977–1981: consumption rising by 7.6%** annually, **real investment by 17.2%, GDP by 8.6%**
- **Current account:**
  - **Largest deficit** in the world in **1981**
  - **Second-largest surplus** in the world in **1983**
- **Real exchange rate: rising until 1981,** then **falling by 50.3% between 1981 and 1987**

(a) Private consumption volume of Mexico (in logarithms)

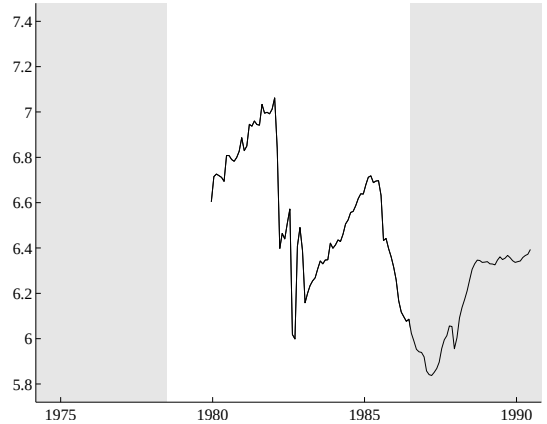
(b) Investment volume of Mexico (in logarithms)

(c) GDP volume of Mexico (GDP 2005 = 100, in logarithms)

(d) Net direct and portfolio investment inflows of Mexico (in billions of US dollars, annual moving average)



(e) Current account of Mexico (in billions of US dollars)



(f) Real effective exchange rate of Mexico (CPI-based, in logarithms)

Figure 5: **Case study: Mexico - 1982.**

Chile - 1982

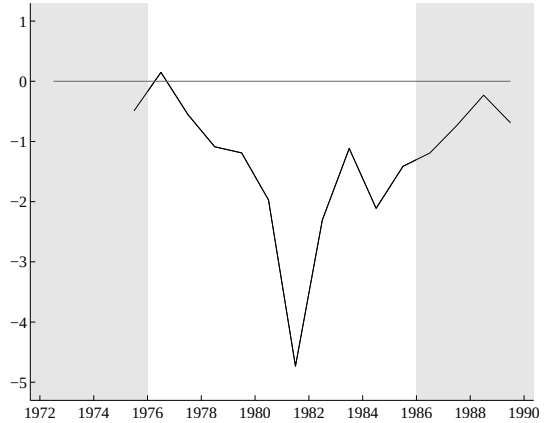
- Implementation of **market-oriented economic reforms** by the ”Chicago Boys” (since 1975): **privatization** of the **pension system** as well as **state-owned companies and banks, liberalization** of the country’s **current and financial accounts, consolidation of public finances** (while cutting taxes) and **stabilization of inflation.**
- **1976–1981: consumption rising by 9.2%** annually, **real investment by 15.2%, GDP by 7.5%**
- **Current account deficit of 14.5% of GDP in 1981**
- **Households and firms taking on great debts,** often in the form of foreign loans
- **Crash in 1982** following the hike in international interest rates:
  - **GDP dropping by 16.5% between 1981 and 1983**
  - **Largest per capita debt in Latin America**
- **Real exchange rate:**
  - **Rising by 30.0%** between 1980Q1 and 1982Q1
  - **Falling by 58.4%** between 1982Q1 and the end of the 1980s

(a) Private consumption volume of Chile (in logarithms)

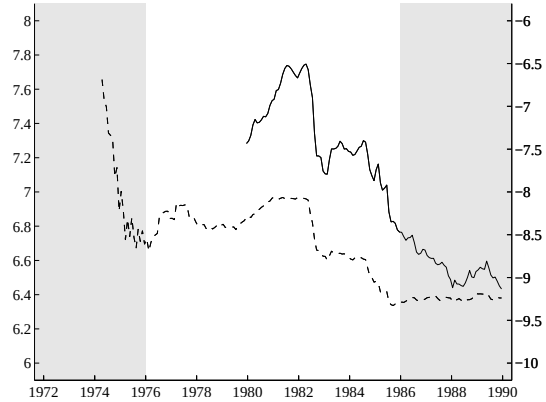
(b) Investment volume of Chile (in logarithms)

(c) GDP volume of Chile (GDP 2005 = 100, in logarithms)

(d) Net direct and portfolio investment inflows of Chile (in billions of US dollars)



(e) Current account of Chile (in billions of US dollars)



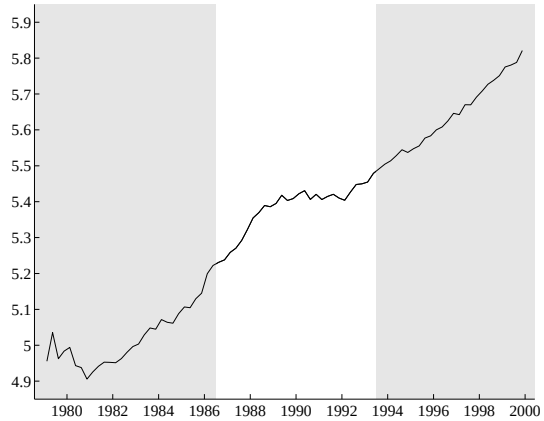
(f) Real effective exchange rate of Chile (CPI-based, in logarithms, solid line, left scale) and bilateral real exchange rate between Chile and the United States (CPI-based, in logarithms, dashed line, right scale)

Figure 6: **Case study: Chile - 1982.**

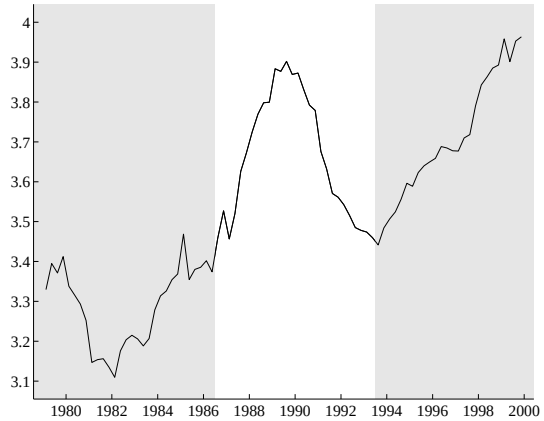
Currency crises of the 1990s

United Kingdom - 1992

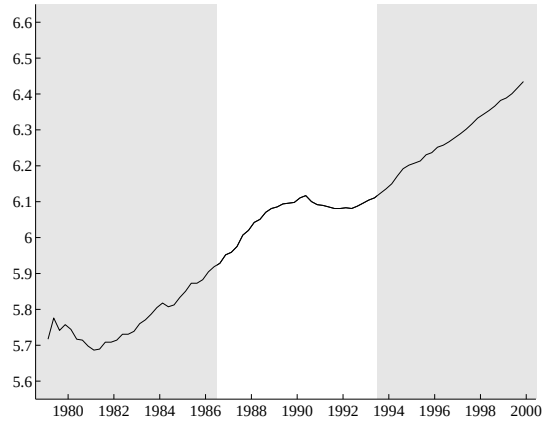
- Margaret Thatcher pursuing **economic reforms in the 1980s** (influenced by the monetarist and supply-side economics ideologies of the time): **rise in interest rates, fiscal consolidation, tax reductions for high-income earners, liberalization of the financial sector, privatization of state-owned industries, crushing of the trade unions**
- **”Lawson boom”** until the recession of 1992: **strong growth** in the second half of the 1980s (around 4% in real terms), accompanied by **falling unemployment** (from from 11.8% in 1984 to 7.0% in 1990) and a **boom in residential and commercial real estate**
- **Second-largest current account deficit in the world** from 1988 to 1990 due to surge in consumption and investment
- **Exchange rate:**
  - United Kingdom **joining the European Exchange Rate Mechanism (ERM) in October 1990** and **abandoning it on 16 September 1992** (”Black Wednesday”)
  - **Real exchange rate appreciating since mid-1986,** yet **very low for several years after the devaluation in late 1992.**



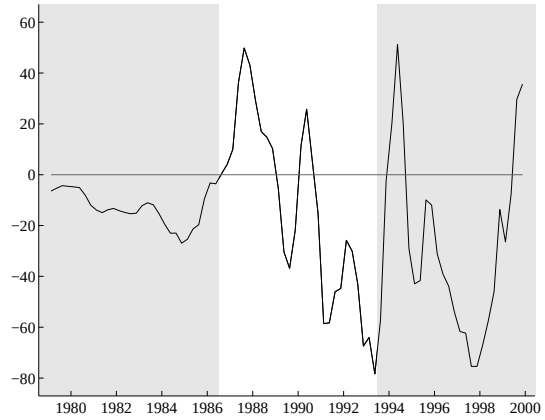
(a) Private consumption volume of the United Kingdom (in logarithms)



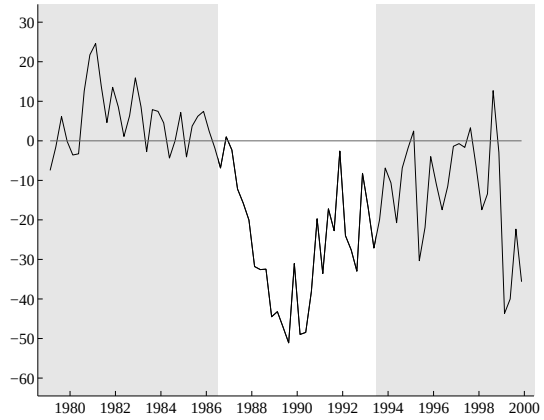
(b) Investment volume of the United Kingdom (in logarithms)



(c) GDP volume of the United Kingdom (GDP 2005 = 100, in logarithms)



(d) Net direct and portfolio investment inflows of the United Kingdom (in billions of US dollars, annual moving average)



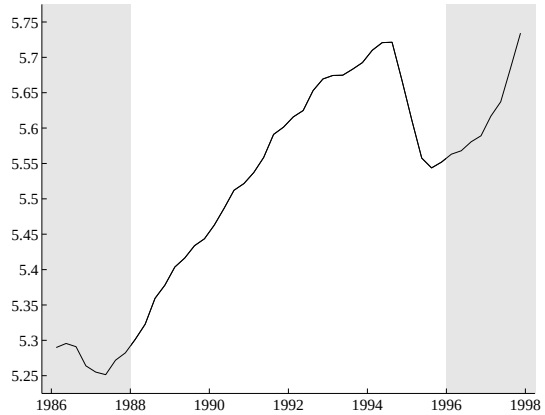
(e) Current account of the United Kingdom (in billions of US dollars)

(f) Real effective exchange rate of the United Kingdom (CPI-based, in logarithms)

Figure 7: **Case study: United Kingdom - 1992.**

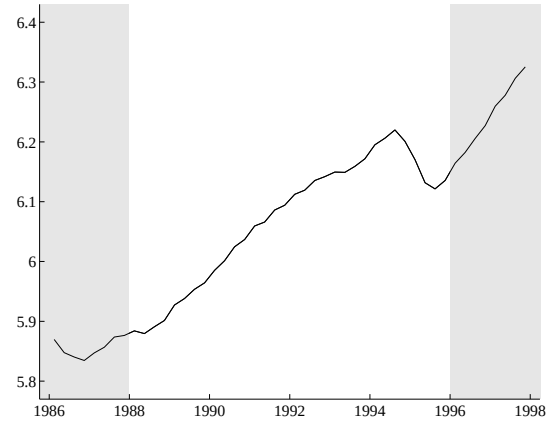
Mexico - 1994

- **Mexico's "tequila crisis" of 1994–1995 after** a period of good macroeconomic performance, which followed the **implementation of a stabilization programme, privatization policies and structural reforms in the mid-1980s.**
- **1988–1994: consumption rising by 4.9%** per year in real terms, **investment by 4.7%** and **GDP by 3.9%**
- **Current account deficit** reaching 6.8% of GDP in 1992 - **second-largest deficit in the world** in 1993–1994
- Massive **capital inflows** in the first half of the 1990s
- **Large debts of the private and public sectors**
- **Exchange rate:**
  - **Real exchange rate almost doubling** in the years leading up to the crisis
  - **Crawling peg** with the dollar **abandoned in December 1994,** initiating a **50% nominal depreciation over the next six months**



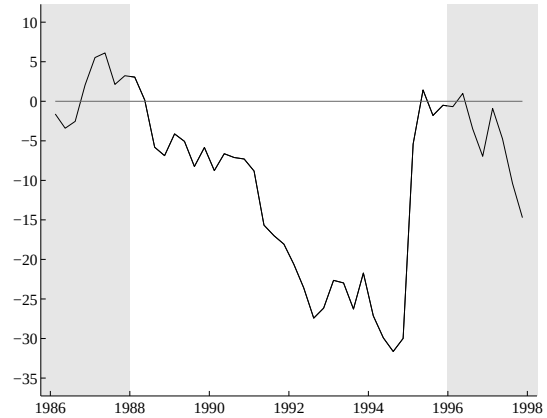
(a) Private consumption volume of Mexico (in logarithms, annual moving average)

(b) Investment volume of Mexico (in logarithms, annual moving average)



(c) GDP volume of Mexico (GDP 2005 = 100, in logarithms, annual moving average)

(d) Net direct and portfolio investment inflows of Mexico (in billions of US dollars, annual moving average)



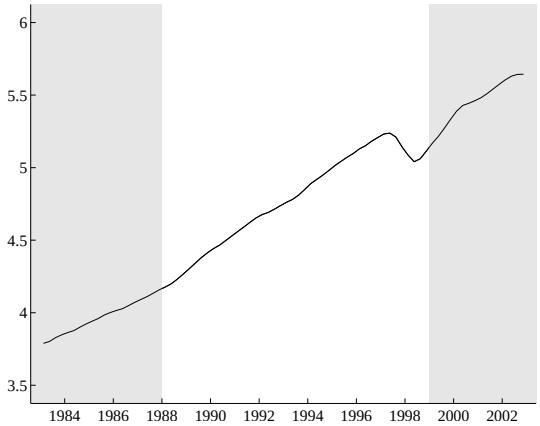
(e) Current account of Mexico (in billions of US dollars)

(f) Real effective exchange rate of Mexico (CPI-based, in logarithms)

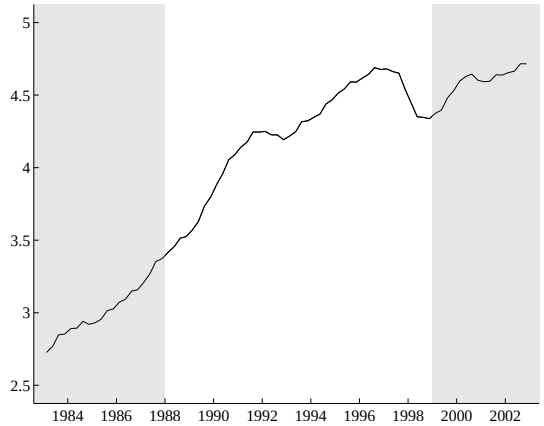
Figure 8: **Case study: Mexico - 1994.**

Korea - 1997

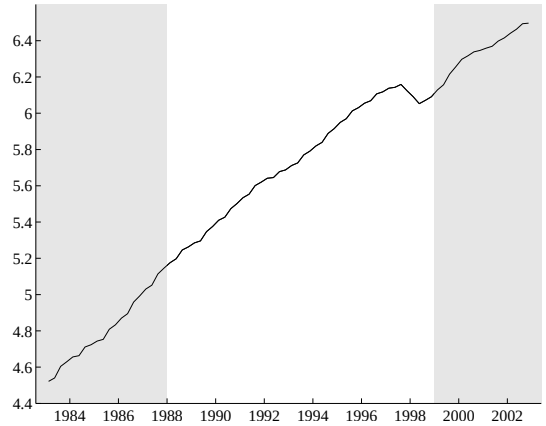
- From around 1991: **capital inflows** on an unprecedented scale
  - **Liberalization** of the country's **financial account**
  - Growing importance of **institutional investors and mutual funds**
  - **Low interest rates in the developed world** in the early 1990s
- **1988–1996: private consumption growing by 8.5%** per year in real terms, **investment by firms by 10.9%** and **overall production by 7.8%**
- **Current account:**
  - **Third-largest deficit** in the world in 1996
  - **Second-largest surplus** in the world in 1998 (equivalent to 10.2% of GDP).
- **Exchange rate:**
  - **Appreciation** of the Korean won **by 41.7% in real terms** between 1986 and 1996
  - Dollar exchange rate of the won dropping by half in 1997, contributing to a **trade-weighted real depreciation of 39.5%** of the Korean currency between 1996 and 1998



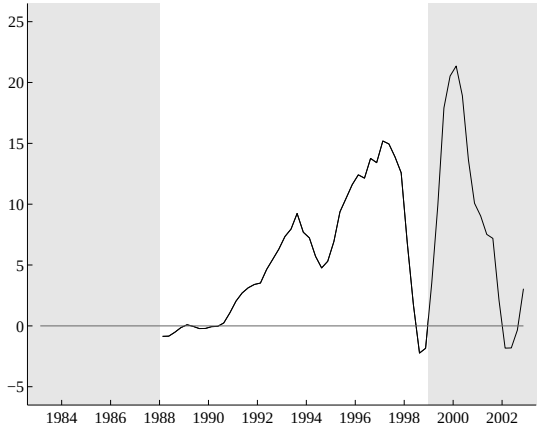
(a) Private consumption volume of Korea (in logarithms, annual moving average)



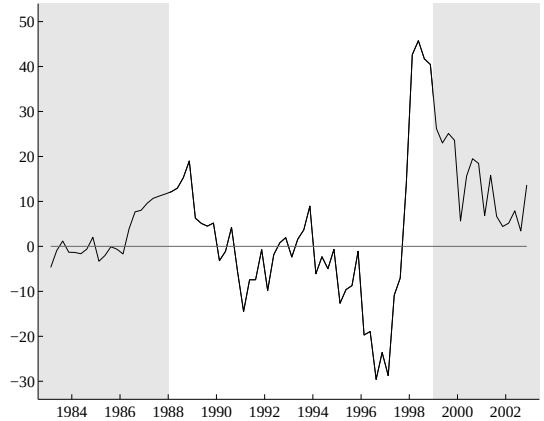
(b) Investment volume of Korea (in logarithms, annual moving average)



(c) GDP volume of Korea (GDP 2005 = 100, in logarithms, annual moving average)



(d) Net direct and portfolio investment inflows of Korea (in billions of US dollars, annual moving average)



(e) Current account of Korea (in billions of US dollars)

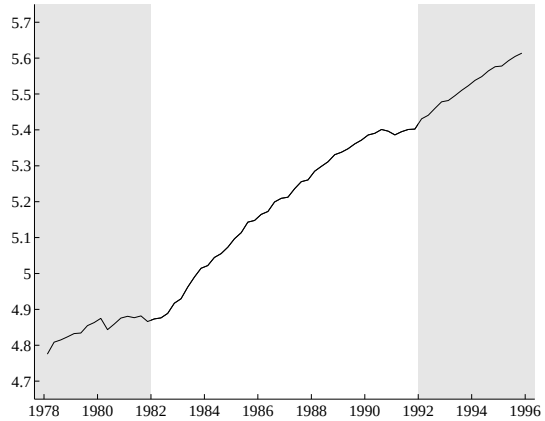
(f) Real effective exchange rate of Korea (ULC-based, in logarithms)

Figure 9: **Case study: Korea - 1997.**

Movements of the US dollar since 1973

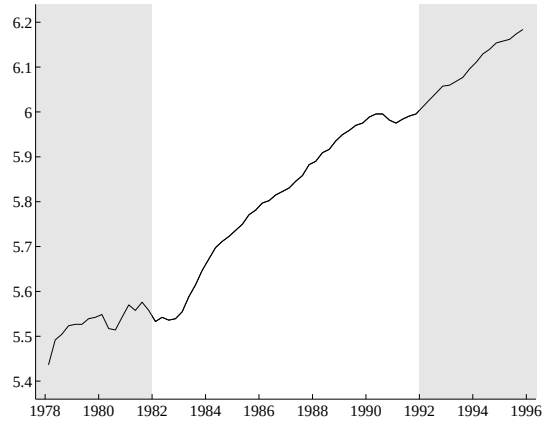
United States - 1980s

- **Ronald Reagan's economic policies:** based on **supply-side economics** and a laissez-faire philosophy, yet nevertheless led to **large budget deficits** due to tax cuts and public spending increases
- Paul Krugman: **"secret of the long climb after 1982** was the **economic plunge that preceded it".**
- **1982–1989: consumption rising by 4.7%** per year in real terms, **investment by 3.7%** and **output by 4.3%**
- 1980–1989: **real US stock market return totalling 184%**
- **Current account:**
  - **Largest current account deficit** in the world from 1983 to 1990 (reaching 3.4% of GDP in 1987)
  - **Eighth-largest current account surplus** in the world in 1991
- **Exchange rate:**
  - **Real exchange rate rising by about a third** between 1980 and 1985, **only to fall by two-fifths from its peak value** between 1985 and 1992.

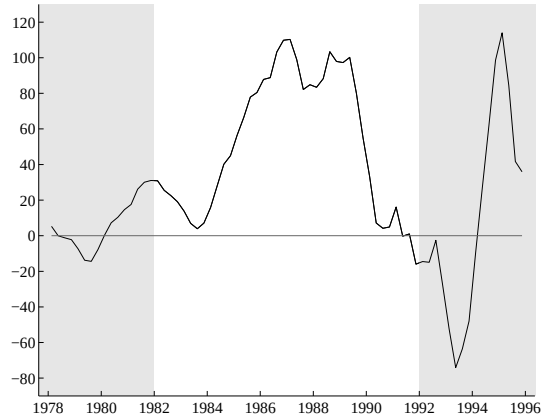


(a) Private consumption volume of the United States (in logarithms)

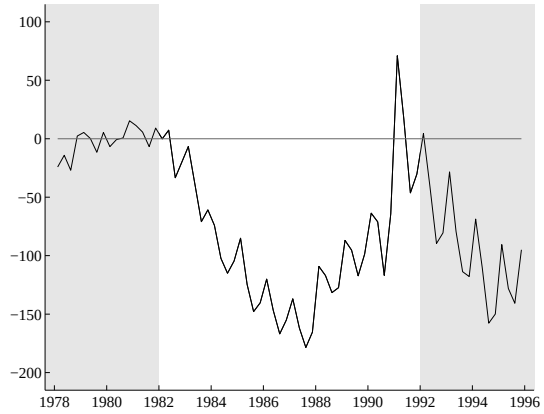
(b) Investment volume of the United States (in logarithms)



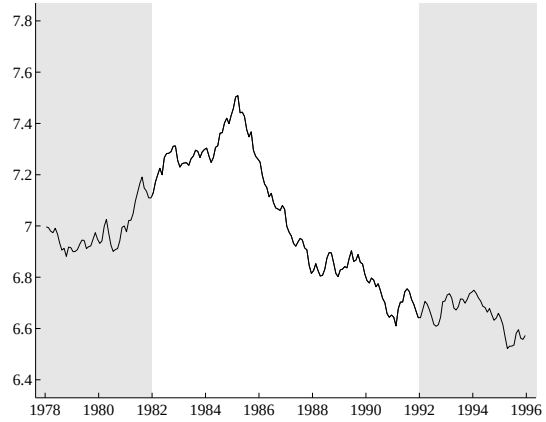
(c) GDP volume of the United States (GDP 2005 = 100, in logarithms)



(d) Net direct and portfolio investment inflows of the United States (in billions of US dollars, annual moving average)



(e) Current account of the United States (in billions of US dollars)

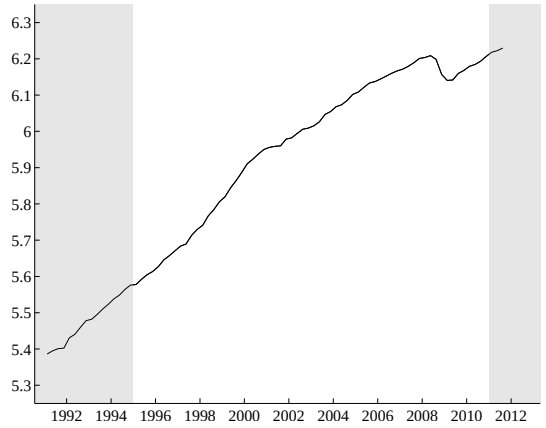


(f) Real effective exchange rate of the United States (RULC-based, in logarithms)

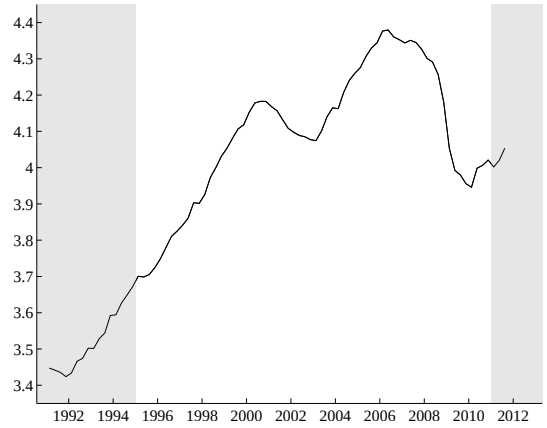
Figure 10: **Case study: United States - 1980s.**

United States - 1990s and 2000s

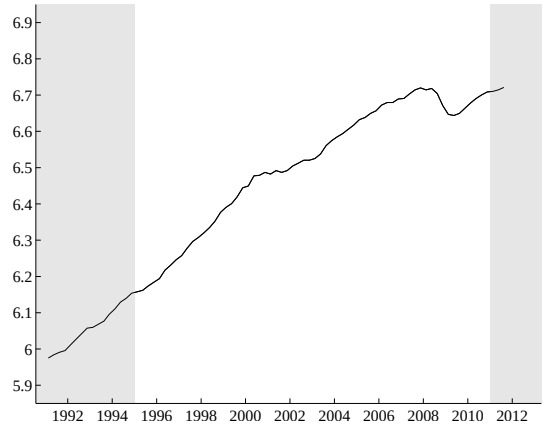
- **Economic boom from 1991 to 2001,** followed by another, **more moderateexpansion from 2002 to 2008**
- **Causes: accelerated productivity growth** (especially in the IT sector) or **speculative bubble,** facilitated by the **easy-money policies** of the Federal Reserve
- **1990–1999: real stock market return in the United States of 279%,** compared to 188% in Britain, 148% in Germany, -42% in Japan and 114% in the world as a whole
- 1992–2006: **private consumption rising by 3.5%** per year in real terms, **investment by 4.5%** and **GDP by 3.2%**
- **Largest current account deficit** in the world since 1992 (reaching 6.0% of GDP in 2006), financed by **large capital inflows**
- **Exchange rate:**
  - **Real exchange rate appreciating by roughly a quarter** between 1992 and 2002
  - **Real exchange rate falling by an even greater amount** until the end of the 2000s



(a) Private consumption volume of the United States (in logarithms)



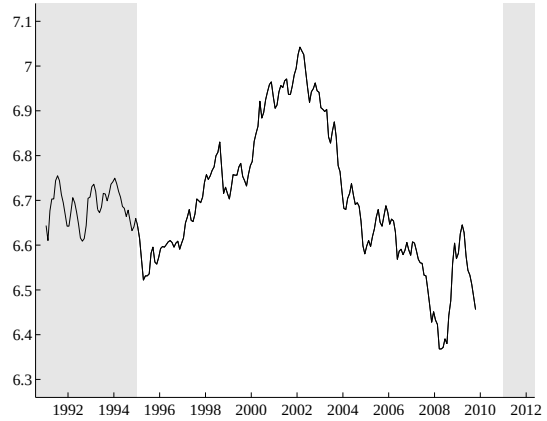
(b) Investment volume of the United States (in logarithms)



(c) GDP volume of the United States (GDP 2005 = 100, in logarithms)

(d) Net direct and portfolio investment inflows of the United States (in billions of US dollars, annual moving average)

(e) Current account of the United States (in billions of US dollars)



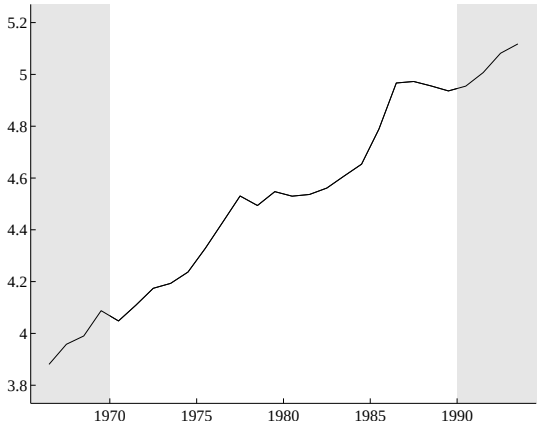
(f) Real effective exchange rate of the United States (RULC-based, in logarithms)

Figure 11: **Case study: United States - 1990s and 2000s.**

Natural resource discoveries

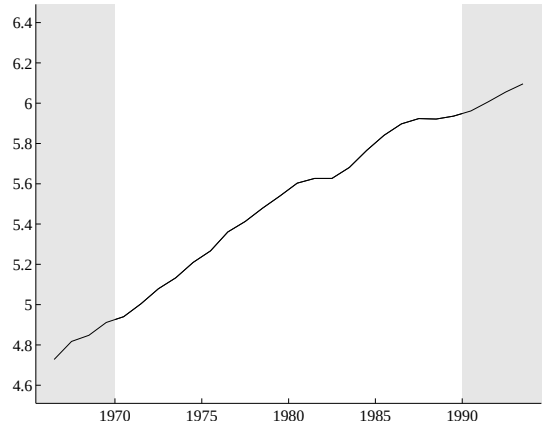
Norway - 1970–1990

- **North Sea oil** off the coast of Norway **discovered in 1969**
- **Two booms: 1970s and late 1980s**
- **1970–1976: private consumption rising by 5.0%** annually in real terms, **investment by 10.6%** and **GDP by 4.5%**
- **Current account:**
  - 1977: **third-largest deficit** in the world **(14% of GDP)**
  - 1980: **ninth-largest surplus**
  - 1986–1987: **ninth-largest deficit**
  - 1991: **fifth-largest surplus**
- **Exchange rate:**
  - **Real appreciation** during the early 1970s, **real depreciation by 21.6%** from 1975 to 1991
  - **Again rise and fall** during the second sub-boom of the **late 1980s**

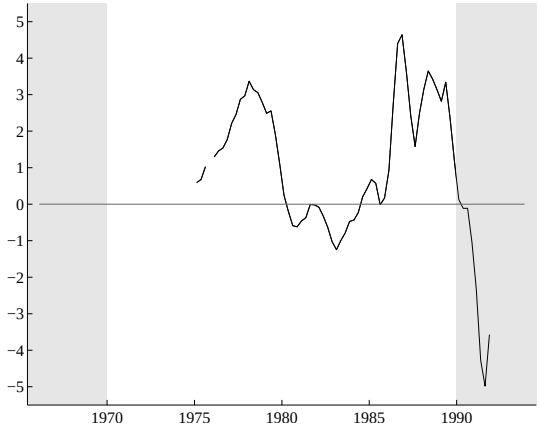


(a) Private consumption volume of Norway (in logarithms)

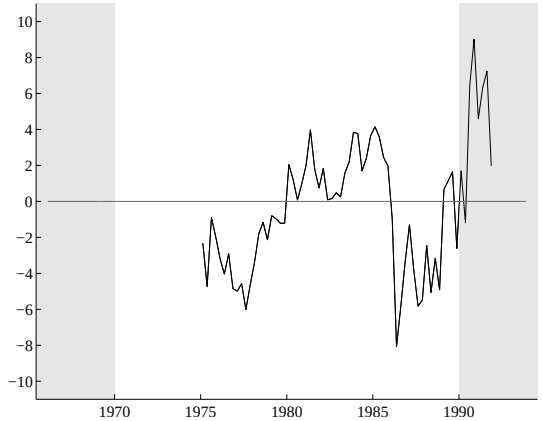
(b) Investment volume of Norway (in logarithms)



(c) GDP volume of Norway (GDP 2005 = 100, in logarithms)



(d) Net direct and portfolio investment inflows of Norway (in billions of US dollars, annual moving average)



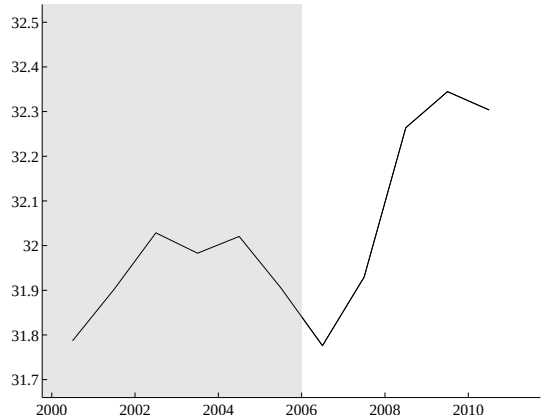
(e) Current account of Norway (in billions of US dollars)

(f) Real effective exchange rate of Norway (WPI-based, in logarithms)

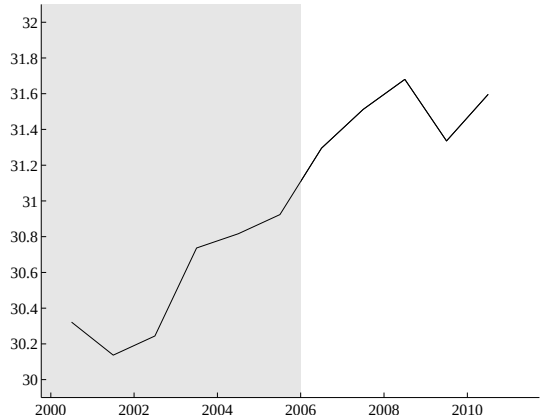
Figure 12: **Case study: Norway - 1970–1990.**

Mongolia - since 2006

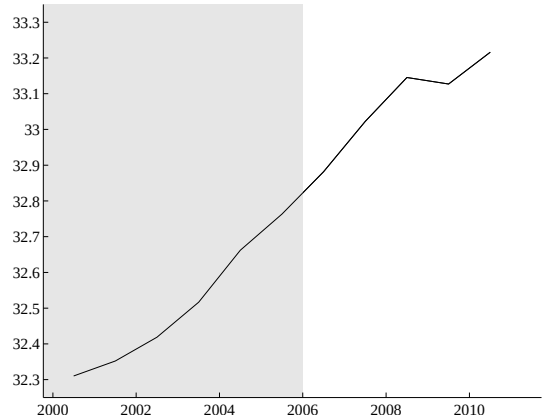
- Country with **vast reserves of copper, coal, gold, silver, uranium, molybdenum and other minerals,** many of which have been discovered just a few years ago
- **Since 2006: boom in the mining sector,** with the biggest development site (Oyu Tolgoi in the Gobi desert) accounting for one third of Mongolian GDP
- **2006–2008: consumption rising by 13.2%** per year in real terms, **real investment by 30.0%, output by 14.2%**
- **Current account deficit** equivalent to **12.9% of GDP** in 2008 and **14.9% of GDP** in 2010
- **Net capital inflows** accounting for **14.3% of GDP** in 2008 and **36.9% of GDP** in 2010 (considering only direct investment and portfolio investment)
- **Exchange rate:**
  - Bilateral **real exchange rate** between Mongolia and the United States was **up by 28.4% since 2006 and by 46.8% since 2003**
  - Model predicts even greater **real depreciation in the future**



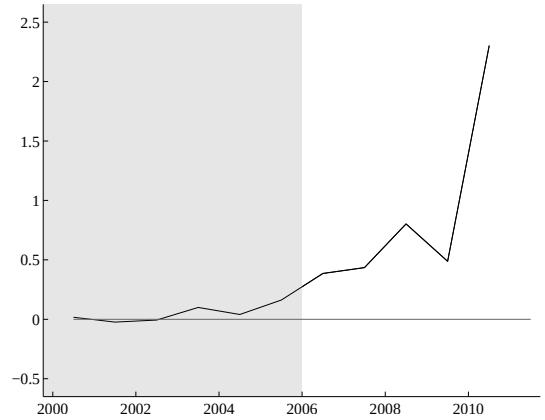
(a) Private consumption of Mongolia (in 2005 Int$, in logarithms)



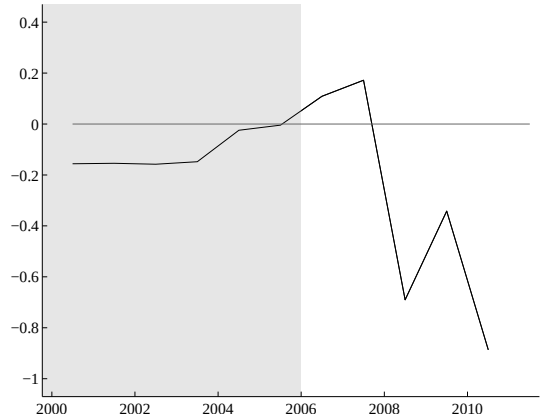
(b) Investment of Mongolia (in 2005 Int$, in logarithms)



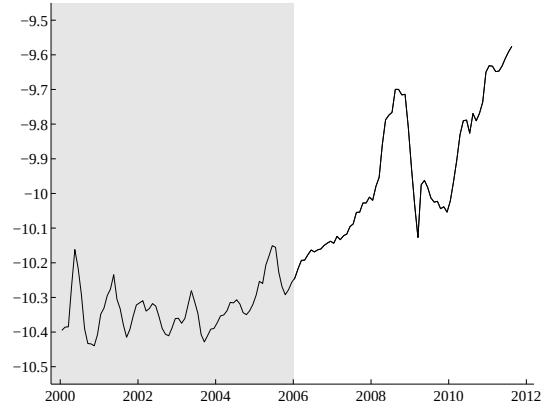
(c) GDP of Mongolia (in 2005 Int$, in logarithms)



(d) Net direct and portfolio investment inflows of Mongolia (in billions of US dollars)



(e) Current account of Mongolia (in billions of US dollars)

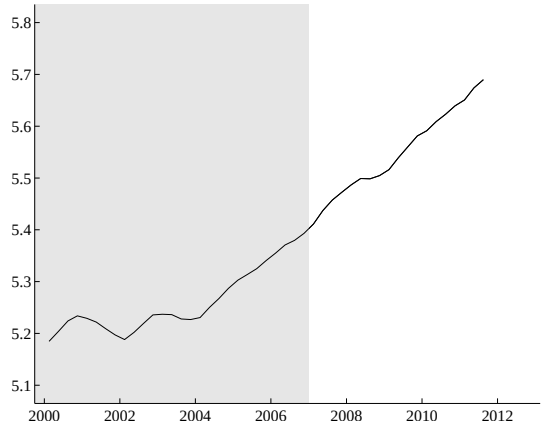


(f) Bilateral real exchange rate between Mongolia and the United States (CPI-based, in logarithms)

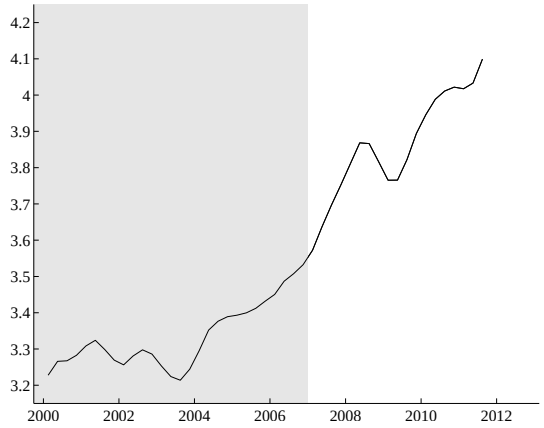
Figure 13: **Case study: Mongolia - since 2006.**

Brazil - since 2007

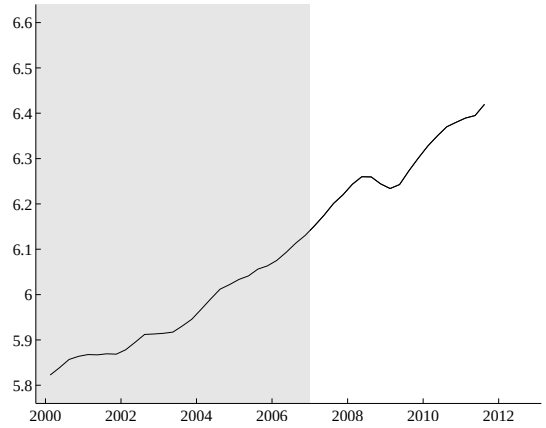
- **2007: discovery of vast oil reserves** in the so-called pre-salt (”below the salt”) layer off the coast of Brazil
- Country expected to be **one of the world’s top five oil producers by 2020**
- **Development** of the pre-salt oil fields forecast **to cost** a trillion dollars over the first ten years, **around half Brazil’s 2010 GDP**
- **Soaring domestic investment and foreign lending** since the oil finds
- **Current account:**
  - Surplus between 2003 and 2007, **deficit since 2008**
  - **2010: deficit** the **ninth-largest in the world** (2.1% of GDP)
- **Exchange rate:**
  - **2006–2010: real appreciation of 31.0%,** despite a 230% increase in official reserves
  - **Future:** further appreciation possible, yet eventually **even greater depreciation likely** according to the model



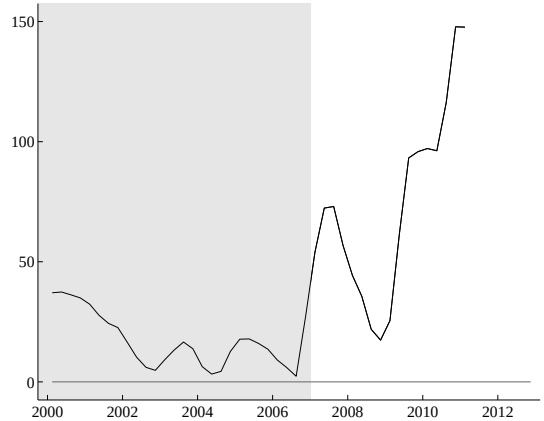
(a) Private consumption volume of the Brazil (in logarithms, annual moving average)



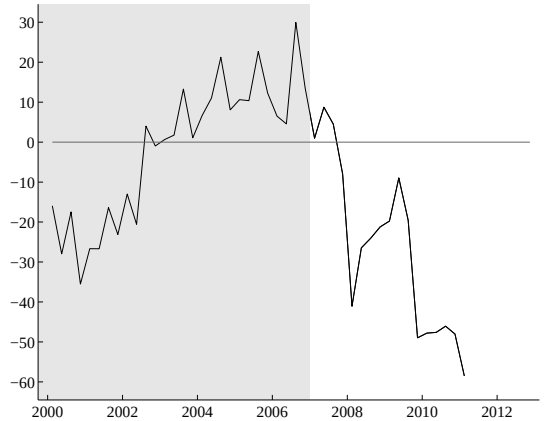
(b) Investment volume of Brazil (in logarithms, annual moving average)



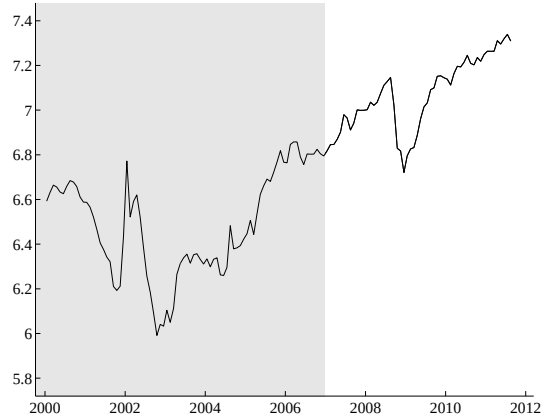
(c) GDP volume of Brazil (GDP 2005 = 100, in logarithms, annual moving average)



(d) Net direct and portfolio investment inflows of Brazil (in billions of US dollars, annual moving average)



(e) Current account of Brazil (in billions of US dollars)



(f) Real effective exchange rate of Brazil (CPI-based, in logarithms)

Figure 14: **Case study: Brazil - since 2007.**

Conclusions

- **Model explains simultaneously** the movements of **national income and spending, the balance of payments and the real exchange rate.**
  - **Boom-and-bust cycles** modelled as a temporary rise in the return on domestic capital.
  - Contrary to conventional wisdom (Obstfeld & Rogoff 1995, 1996), a **rise in return on capital (positive income shock)** leads to a **current account deficit,** not a surplus - a result that is confirmed in all ten case studies.
  - **Exchange market pressure** implied by the dynamics of the balance of payments provides a simple and consistent explanation of the **rise and fall of the real exchange rate** - no need to explain the real exchange rate through differences in non-traded and traded goods inflation.
- Applicability to **very different countries and contexts:**
  - **International debt crisis** of the 1980s
  - **Currency crises** of the 1990s
  - **US dollar** since 1973
  - **Natural resource discoveries**

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