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International Financial Markets - Advanced

Background check

- High yield currencies tend to
  - Appreciate - Depreciate
- Because of the expansionary monetary policy the FED has been implementing for same time now, we shall expect
  - a further US $ depreciation - a US $ appreciation
- Hedging exchange rate risk is more important for FIAT than for Parmalat.
  - True / false / uncertain

What we do & *why we do it*

- Understanding the fx rate dynamics
  - *forecasting*

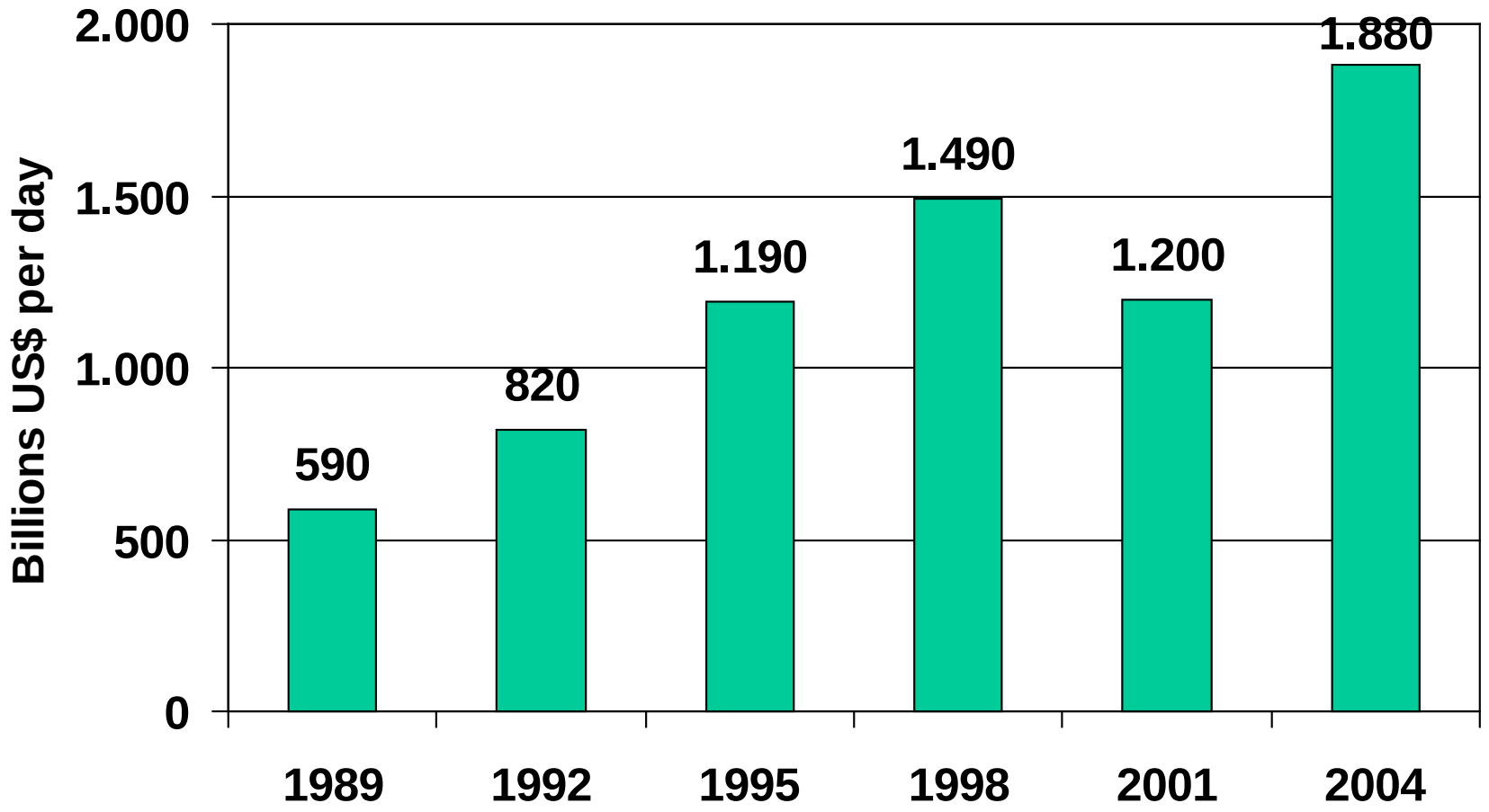
- Understanding the fx risk and exposure
  - *measuring & managing fx risk & exposure*

- Understanding international investments

Understanding Fx Rates

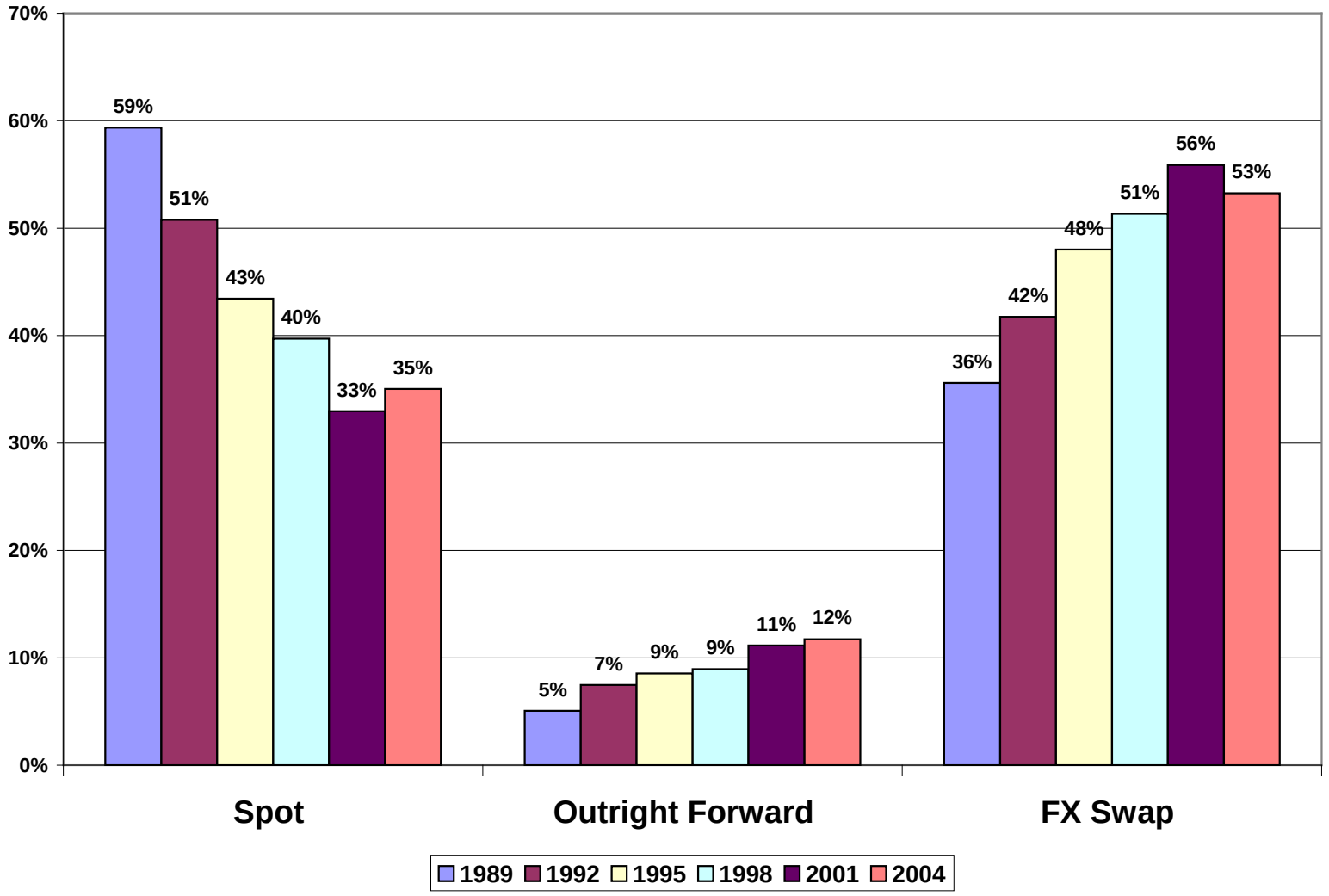
- Facts and figures
- Demand and supply of fx
- Exchange rate regimes
- Fx rate parities

Fx Market Size



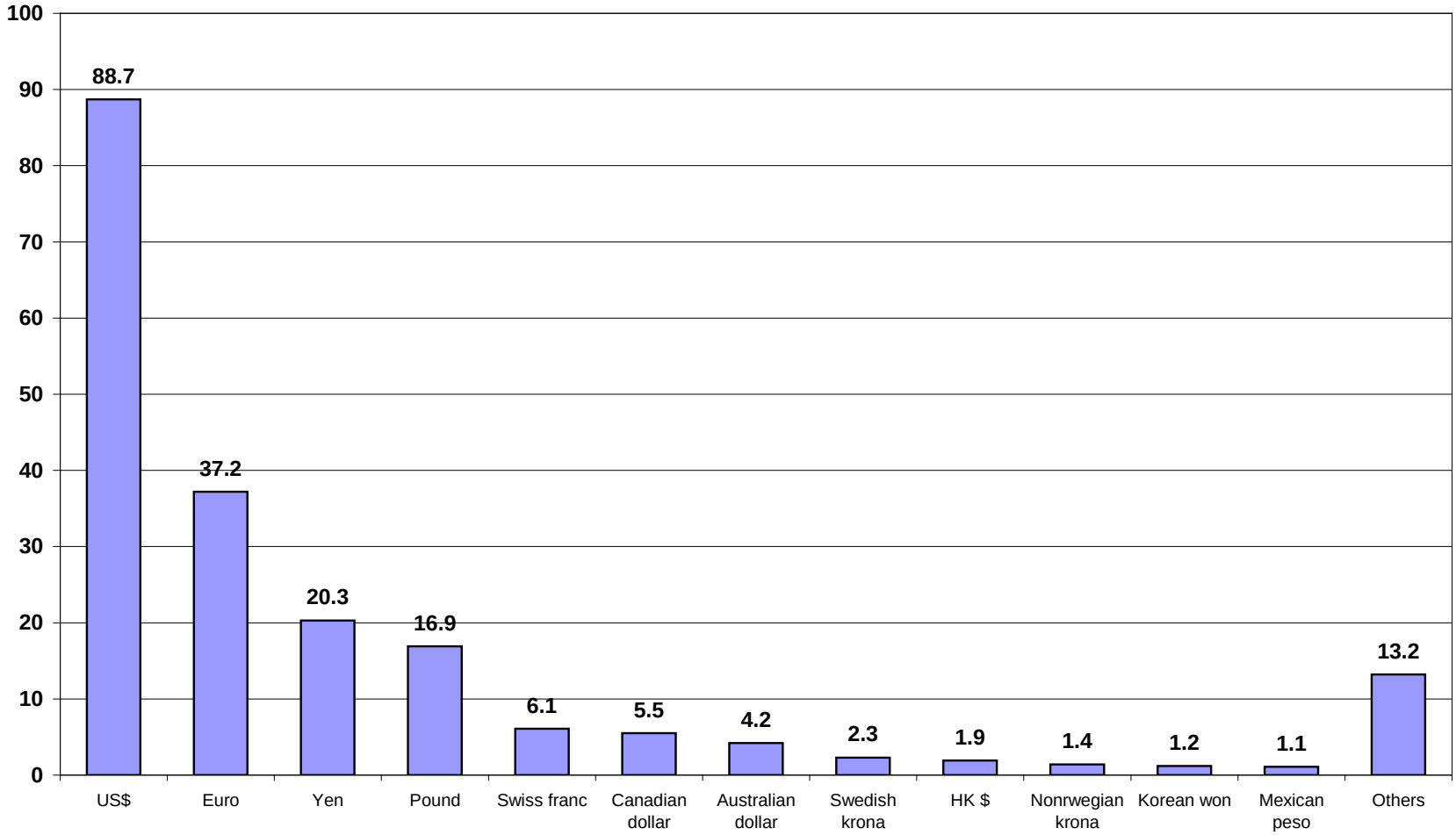
All survey data based on Bank for International Settlements, “Triennial Central Bank Survey Foreign Exchange and Derivatives Market Activity in 2004,” Basle Switzerland, September 2004.

Share of Trading by Contract Type



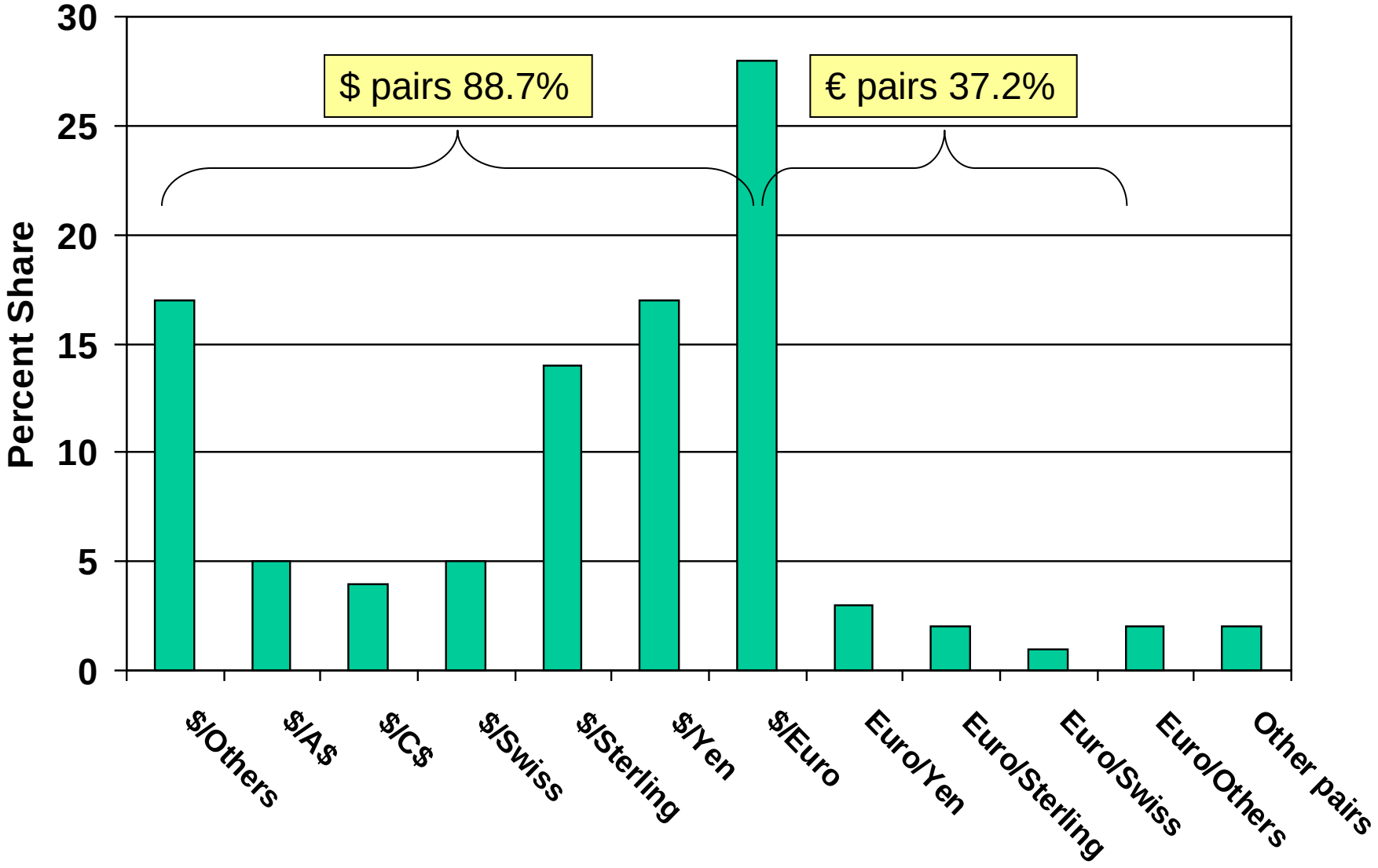
Trading by Currency (BIS Survey 2004)

2004



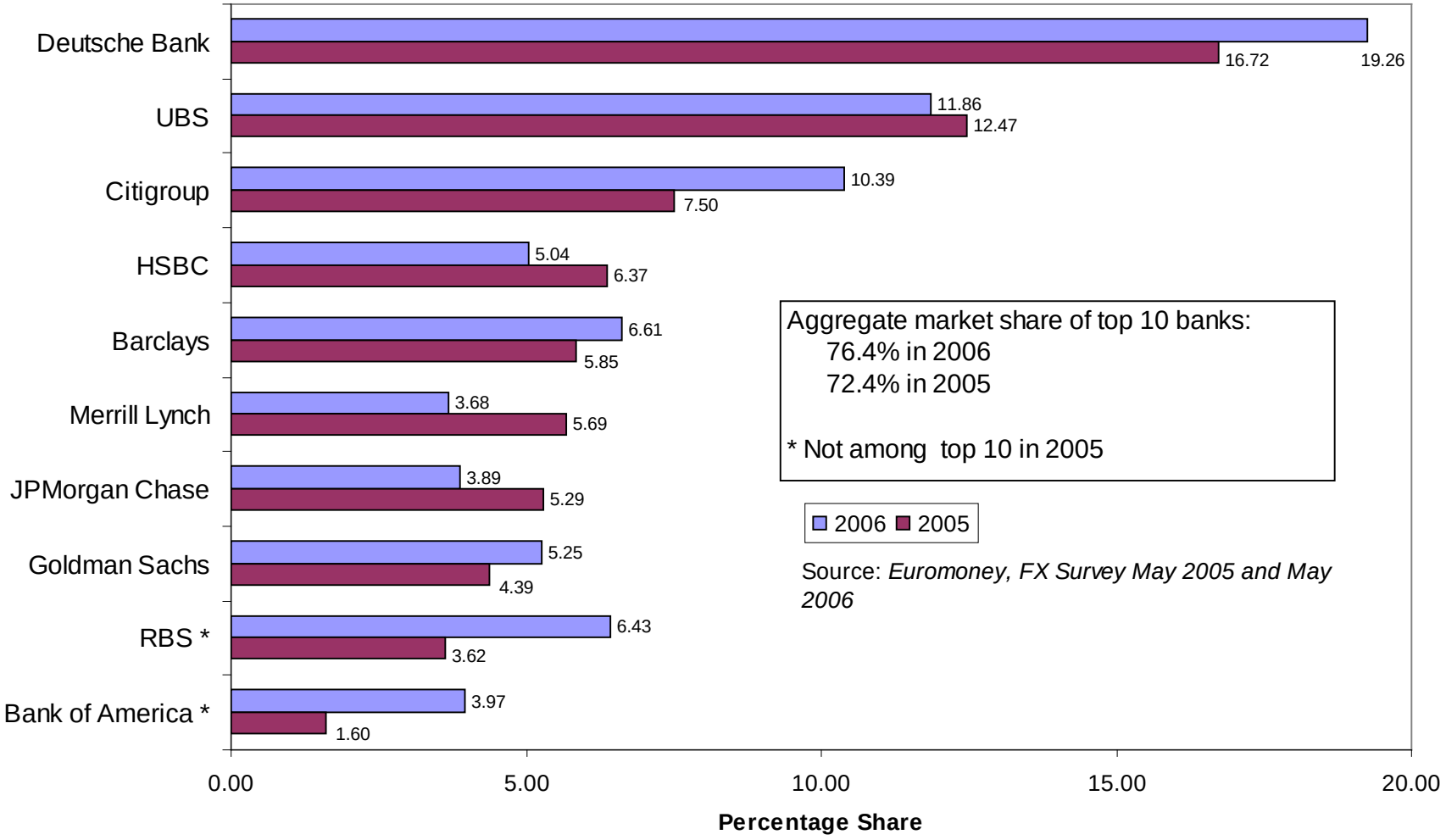
Note: Percentage shares sum to 200% because two currencies are involved in eash transaction

Market Turnover by Currency Pair



Concentration in the FX Market

Market Share of Top 10 Dealers, 2006 and 2005



Fx Demand (domestic currency supply)

- From the private sector
  - purchase of goods and services (imports)
  - Income payments on domestic non residents' investments
  - Unilateral (outgoing) transfers
  - Net purchase of foreign assets by residents (capital outflow)
  - Foreign debt restitution (cash outflow)

- From the public sector (central bank)
  - Fx purchases by the central bank (increase in official reserves)
  - decrease in official foreign assets

Fx Supply (domestic currency demand)

- From private sector (non residents)
  - Purchase of domestic goods & services (export)
  - Unilateral (incoming) transfers
  - Income receipts on residents' investments abroad
  - Net purchase of domestic assets by non residents
  - Settlement of foreign credit (cash inflow)

- From public sector
  - Fx sales by the central bank (decrease in official reserves)
  - Increase in official foreign asset

Table 1. U.S. International Transactions

[Millions of dollars]

Line	(Credits +; debits -) [1]	2006	2007 [p]
	Current account		
1	**Exports of goods and services and income receipts**		
2	Exports of goods and services	1,445,703	1,628,358
12	Income receipts	650,462	782,229
18	**Imports of goods and services and income payments**		
19	Imports of goods and services	-2,204,225	-2,336,873
29	Income payments	-613,823	-707,913
35	**Unilateral current transfers, net**	**-89,595**	**-104,438**
	Capital account		
39	**Capital account transactions, net**	**-3,913**	**-2,317**
	Financial account		
40	**U.S.-owned assets abroad, excluding financial derivatives (increase/financial outflow (-))**		
41	U.S. official reserve assets	2,374	-122
46	U.S. Government assets, other than official reserve assets	5,346	-22,931
50	U.S. private assets	-1,062,896	-1,183,278
55	**Foreign-owned assets in the United States, excluding financial derivatives (increase/financial inflow (+))**		
56	Foreign official assets in the United States	440,264	412,698
63	Other foreign assets in the United States	1,419,333	1,450,999
70	**Financial derivatives, net**	**28,762**	**n.a.**
71	**Statistical discrepancy (sum of above items with sign reversed)**	**-17,794**	**83,590**
	Memoranda:		
72	Balance on goods (lines 3 and 20)	-838,271	-815,370
73	Balance on services (lines 4 and 21)	79,749	106,854
74	Balance on goods and services (lines 2 and 19)	-758,522	-708,515
75	Balance on income (lines 12 and 29)	36,640	74,316
76	Unilateral current transfers, net (line 35)	-89,595	-104,438
77	Balance on current account (lines 1, 18, and 35 or lines 74, 75, and 76)[13]	-811,477	-738,638

Balance of Payments (BOP)

- Current Account Balance (CAB)
- Capital Account Balance (KAB)
- Official Reserve Settlement (ORB)
- Statistical Discrepancies (SD)

- Balance of Payment Identity

$$CAB + KAB + ORS + SD = 0$$

- Official settlement balance (OSB)

$$[CAB + KAB + SD] = OSB$$

BOP Accounting

- Items are recorded with:
  - a "+" sign if they imply a demand of domestic currency / supply of fx
    - export of goods & service; proceeds from investment income
    - increase of financial claims towards domestic entities held by foreigners (from now on "foreign assets")
    - decrease of financial claims towards foreign entities held by domestic residents (from now on "domestic asset abroad)
    - decrease of domestic official reserve; increase of official foreign asset
  - a "-" sign if they imply a demand of fx / supply of domestic currency
    - import of goods & service; payment of investment income
    - decrease of financial claims towards domestic entities held by foreigners (from now on "foreign assets")
    - increase of financial claims towards foreign entities held by domestic residents (from now on "domestic asset abroad)
    - increase of domestic official reserve; decrease of foreign official asset
- Double entry bookkeeping
  - Example: sales of goods to foreigners (+ export; - foreign asset)

Statistical Discrepancies

- Unrecorded credits or debits in the BOP accounting
- If positive
  - Unrecorded export (mainly services)
  - Unrecorded capital inflows
- If negative
  - Unrecorded import (mainly services)
  - Unrecorded *capital flights*
- From now on, assume SD = 0

Current Account Balance (CAB)

(+) Export of goods (-) Import of goods

= Trade Balance

(+) Export of services (-) Import of services

= **Balance of goods & services**

(+) Investment income receipts

(-) Investment income payment

= **Balance of G&S and Investment Income**

(+) Unilateral transfers received

(-) Unilateral transfer sent

= (+/-) Current Account Balance

Kapital Account Balance (KAB)

(+)	Increase in foreign owned assets
(-)	Decrease in foreign owned assets
(+)	Decrease in domestic owned asset abroad
(-)	Increase in domestic owned asset abroad
=	**Kapital Account Balance**

- Capital Flows
  - FDI – foreign direct investments
    - Acquisition of control of a foreign firm (at least x% of the equity capital)
  - Portfolio investments
    - Acquisition of bonds, notes and of a minority equity stake (< x%)
  - Other investments
    - Bank deposits, trade credit, currency,….

Common Wisdom?

- The story
  - High domestic interest rates attract capital inflows
  - KAB > 0 raises the demand of domestic currency
  - In turn the domestic currency appreciates

- Objection
  - a strong domestic currency spoils international competitiveness
  - CAB turns negative (CAB < 0)
  - what about the net supply of domestic currency (KAB + CAB)?

- Besides interest rate, capital flows are affected by:
  - country risk
  - portfolio allocation decisions
  - expectation of fx rate changes
  - legal barrier to capital movements

Official Reserve Settlement (ORS)

(+)	Sale of domestic official reserves	
(-)	Increase of domestic official reserve	
(-)	Decrease of foreign official assets	(*)
(+)	Increase of foreign official assets	(*)
=	**Official reserve settlement**	

(*) Significant only if domestic currency is an international reserve currency

- Meaning of the sign of ORS
- Official settlement balance (OSB)

[CAB + KAB + SD] = OSB = [- ORS]

Fx Regime

- Floating fx rate
- Fixed fx rate
  - unilateral
    - currency board
  - International agreement
    - Monetary Union
- Managed floating
  - Informal
  - Unilateral peg
  - Currency area / target zone

Managed FX rate

- If ORS ≠ 0 policy makers are managing fx rate
  - Fixed or pegged exchange rate

- Can a fixed / pegged fx regime survive?
    - Risk of shortage of official reserve
    - Risk of domestic monetary growth with inflation
    - Paradise for speculators; hell for policy makers

- Trilemma (Impossibility Theorem)
  - fx rate target
  - independent monetary policy
  - international capital mobility

Fx Regime: free float

- If ORS=0, policy makers have no fx rate target
  - Purely flexible exchange rate regime
    - Fx rate determined solely by private fx demand/supply
    - Fx rate changes to make sure CAB +KAB = 0 always, i.e. official settlement balance = 0
    - Exchange of goods against “pieces of paper”

- Shocks & policy effects *(**)*
  - Expansionary monetary policy
    - i ↓; net capital outflow; weaker domestic currency, CAB ↑
  - Expansionary fiscal policy or similar shock
    - i ↑; net capital inflow; stronger domestic currency; CAB ↓
  - *(**): Domestic price levels are assumed to be sticky*

Other fx regimes

- Multiple fx rate regime
  - Dual unofficial regime (black markets)
  - Dual official fx regime
    - fx rate for trade transactions (usually fixed or pegged)
    - fx rate for all other transaction (floating)
    - can they be segmented?
  - Multiple exchange rate regimes
    - different rate for different items in the current account
      - more precise fine tuning of economic incentives across sector
- Dollarization

Competing to be a reserve currency

- How to gain prominence
  - Be a store of value
  - Be the unit of account use to invoice merchandise and denominate financial transaction
  - Be a global medium of exchange (vehicle currency)

- Why to gain prominence
  - ✓ seignorage
  - ✓ [(M^{SS}) – (M^{DD} domestically)] generate wealth for the country

Balance of Payments

(+) Export of goods (-) Import of goods

= Trade Balance

(+) Export of services (-) Import of services

(+) Investment income receipts (-) Investment income payment

(+) Unilateral transfers in (-) Unilateral transfer out

= Current Account Balance

(+) Net Δ in foreign owned assets (-) Net Δ in domestic owned asset abroad

= Capital Account Balance

Current Account Balance

Capital Account Balance

(+) Net Δ in foreign owned official assets

(-) Net Δ in official reserves

= Zero

National Accounting

- Three agents in a closed economy
  - Households (Sector)
    - Income (DI) – Consumption (C) = Savings > 0
  - Firms (Sector)
    - Earnings (E) – Dividend (D) = Savings ???
  - Government (Sector)
    - Taxes (T) – Public Spending (G) = Savings < 0

- Allocation of saving:
  - *Savings (S) - (real) investment (I) = financial flow* (FF)

Financial Flows Across Sectors

- Households: $FF_H = DI - C$
- Firms: $FF_F = RE - I$
- Government: $FF_G = (T-G)$

- In a closed economy $FF_H + FF_F + FF_G = 0$

$$(DI - C) + (RE - I) + (T - G) = 0$$

National Savings = National Investments

Open Economy

- Transactions with non residents (recorded in BOP)
- A new sector appears: “Rest of the World” (ROW)
- ROW Saving = - Current Account Balance = (M – X)

$$(DY - C) + (RE - I) + (T - G) + (M - X) = 0$$

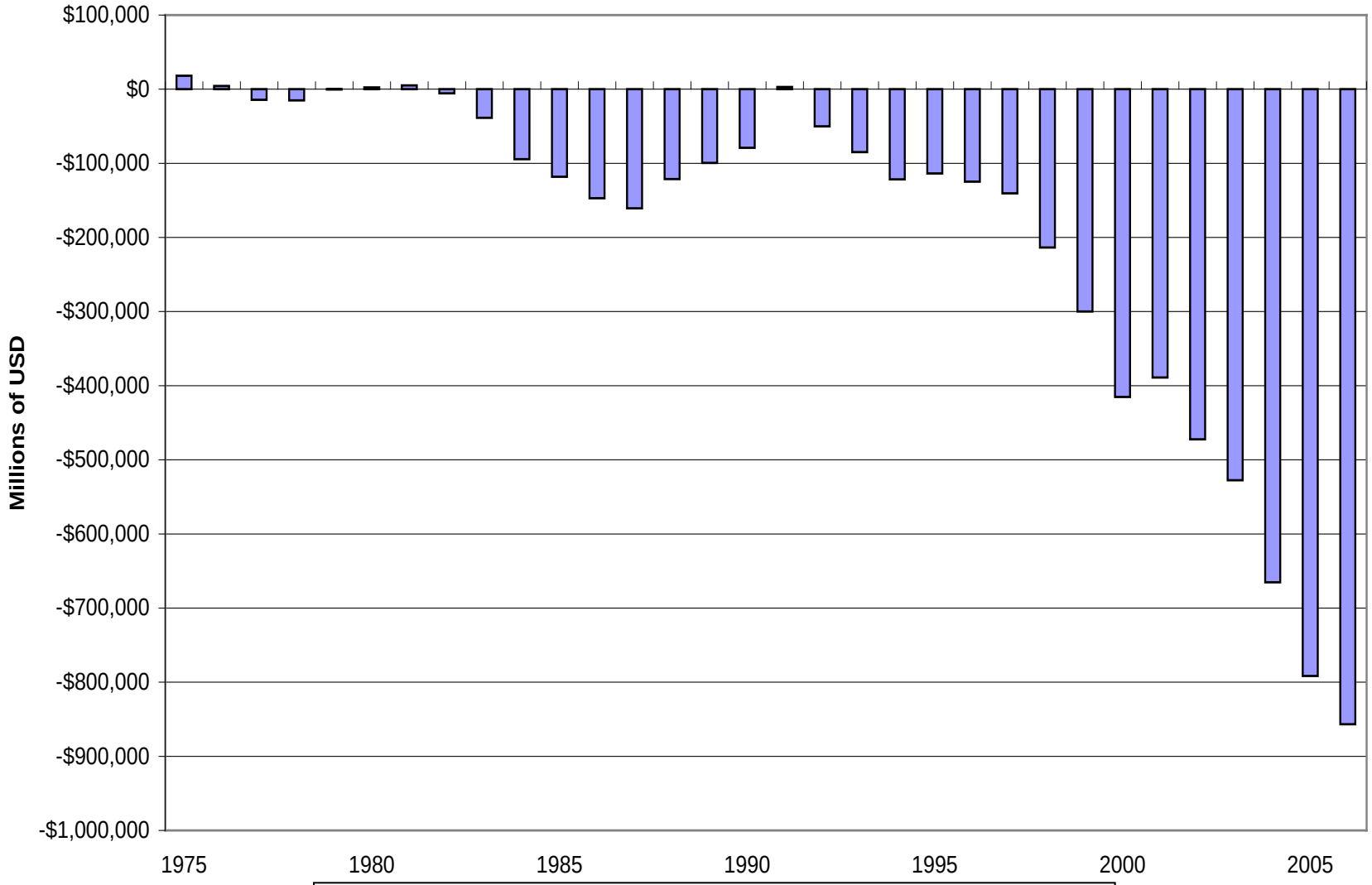
$$(NS - NI) = CAB$$

$$(NS - NI) = -(KAB + ORS)$$

CAB < 0 usually goes with strong domestic currency. Why ?

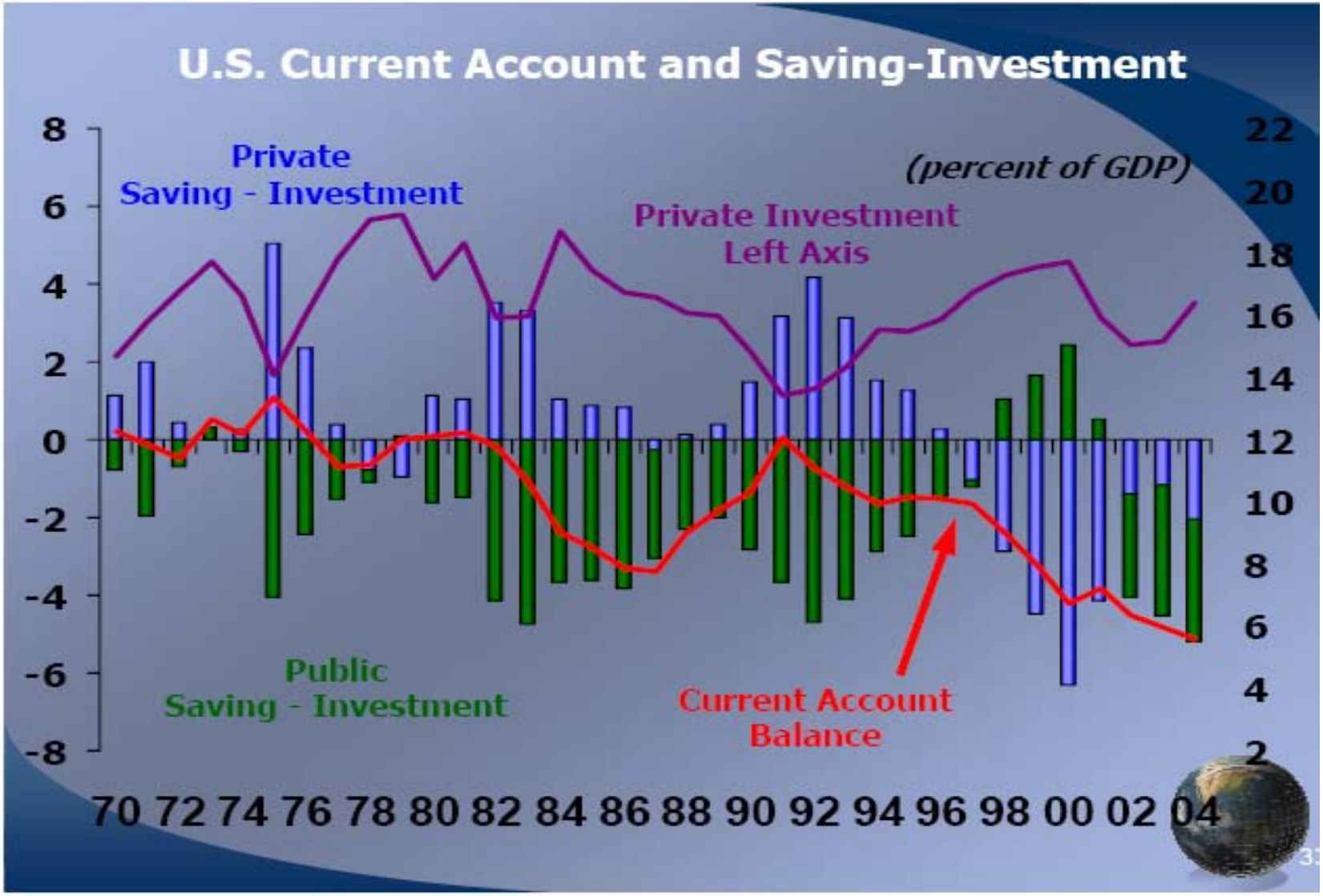
U.S. Balance on Current Account - Annually, 1975-2006

Source: U.S. Bureau of Economic Analysis, U.S. International Transactions Accounts Data, Table 1



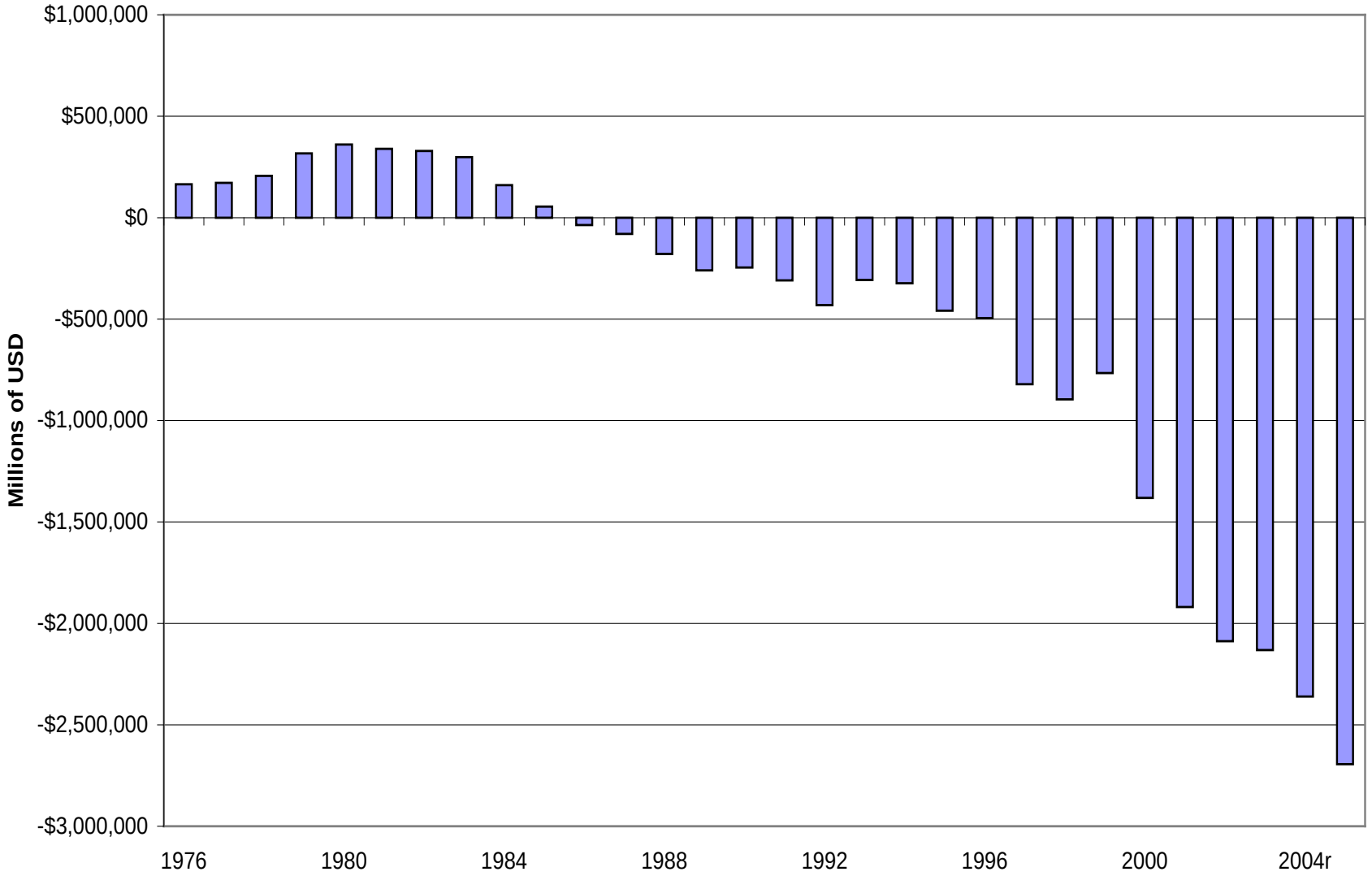
Is it sustainable?

Where does US CAB come from?



International Investment Position of United States at Yearend, 1976-2005

Source: U.S. Bureau of Economic Analysis, Survey of Current Business, July 2006, Table 2



How far can it go?

More in detail

Capital Flows Over Time (% of GDP)

	Last	3 Years	5 Years	10 Years	Trend Better / Worse
Current Account	-6.0	-5.4	-4.2	Worse
Net FDI	-0.2	-0.4	0.1	Mixed / Worse
Narrow Basic Balance	-6.2	-5.8	-4.1	Worse
Net Equity	-0.2	-0.2	-0.1	Worse
Net US Treasuries	0.8	0.9	0.6	Mixed / Better
US Overseas Bonds	-0.6	-0.3	-0.3	Worse
Foreign US Corporates	2.4	2.1	1.8	Better
Foreign US Agencies	0.6	0.5	0.4	Better
Net Portfolio	3.0	3.0	2.4	Mixed / Better
Broad Basic Balance	-3.2	2.8	-1.6	Worse

Source: Goldman Sachs

Does the CAB still matter?

- Global imbalances
  - U.S. 2006 CAB: - $ 811 bl. (- 6.2% GDP)
  - Euro zone: - $ 17 bl. (- 0.2% GDP)
  - Japan: +$ 163 bl. (+ 3.5% GDP)
  - Newly industr. Asia: +$ 80 bl. (+ 4.9% GDP)
  - Other developing: +$ 639 bl.

- CAB is a meaningless concept (former Treasury Secr. O'Neill)
- CAB irrelevant: integrated asset markets make adjustment easier (Greenspan)
- U.S. is the best place for the world to invest (Laffer)
- It's all fault of excessive global saving
- Adjustment through asset pricing rather than through flows

The Other Side

World Top 10 FX Reserves

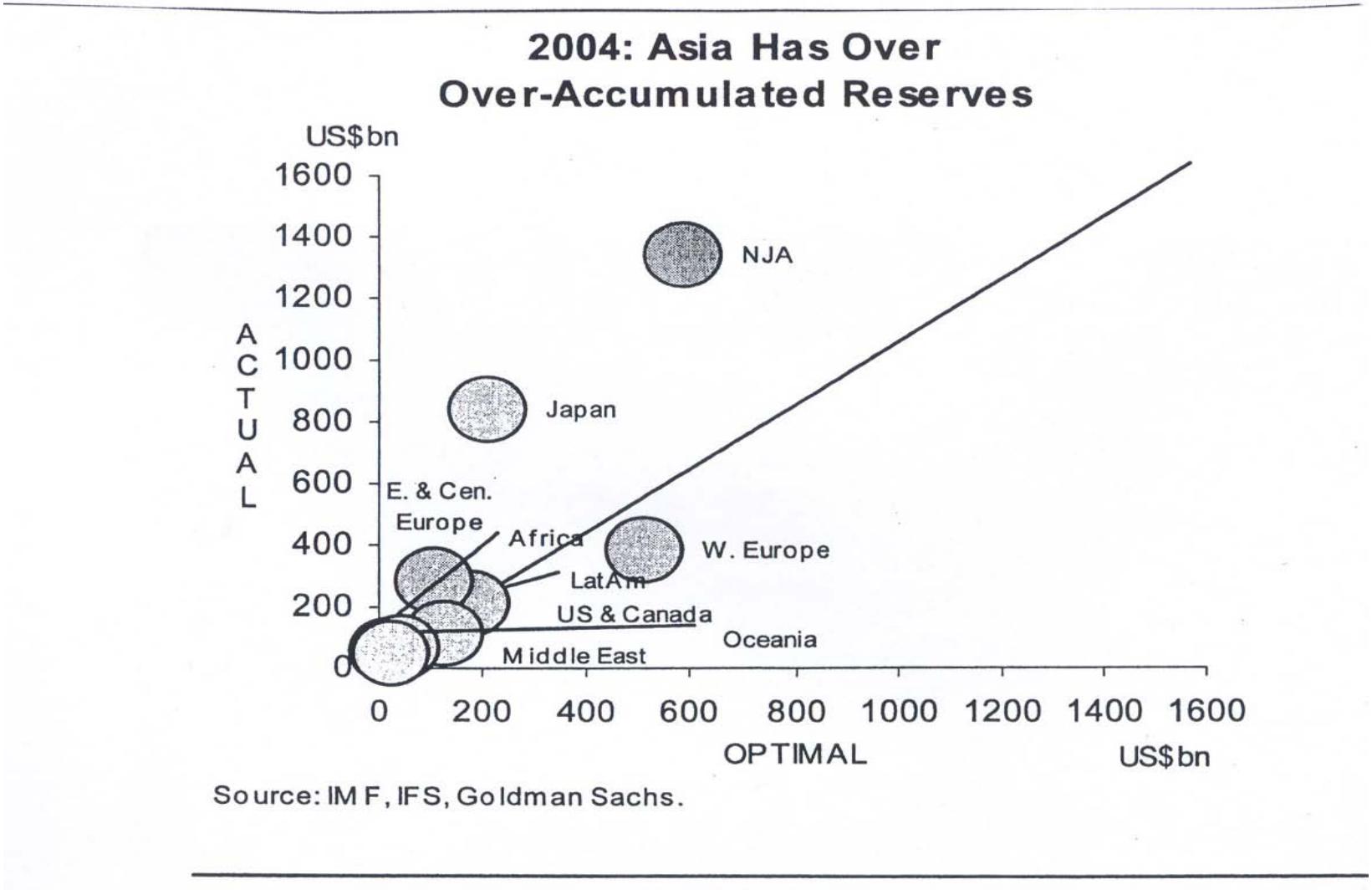
Country	Total FX Reserves* (US$bn)	Current Account** (% of GDP)
China	1,434	9.4
Japan	911	3.9
Russia	407	9.7
Taiwan	263	6.8
Korea	257	0.7
India	222	-1.1
Eurosystem	201	0.0
Brazil	161	1.6
Singapore	147	27.5
Hong Kong	141	10.8

*As of September 2007

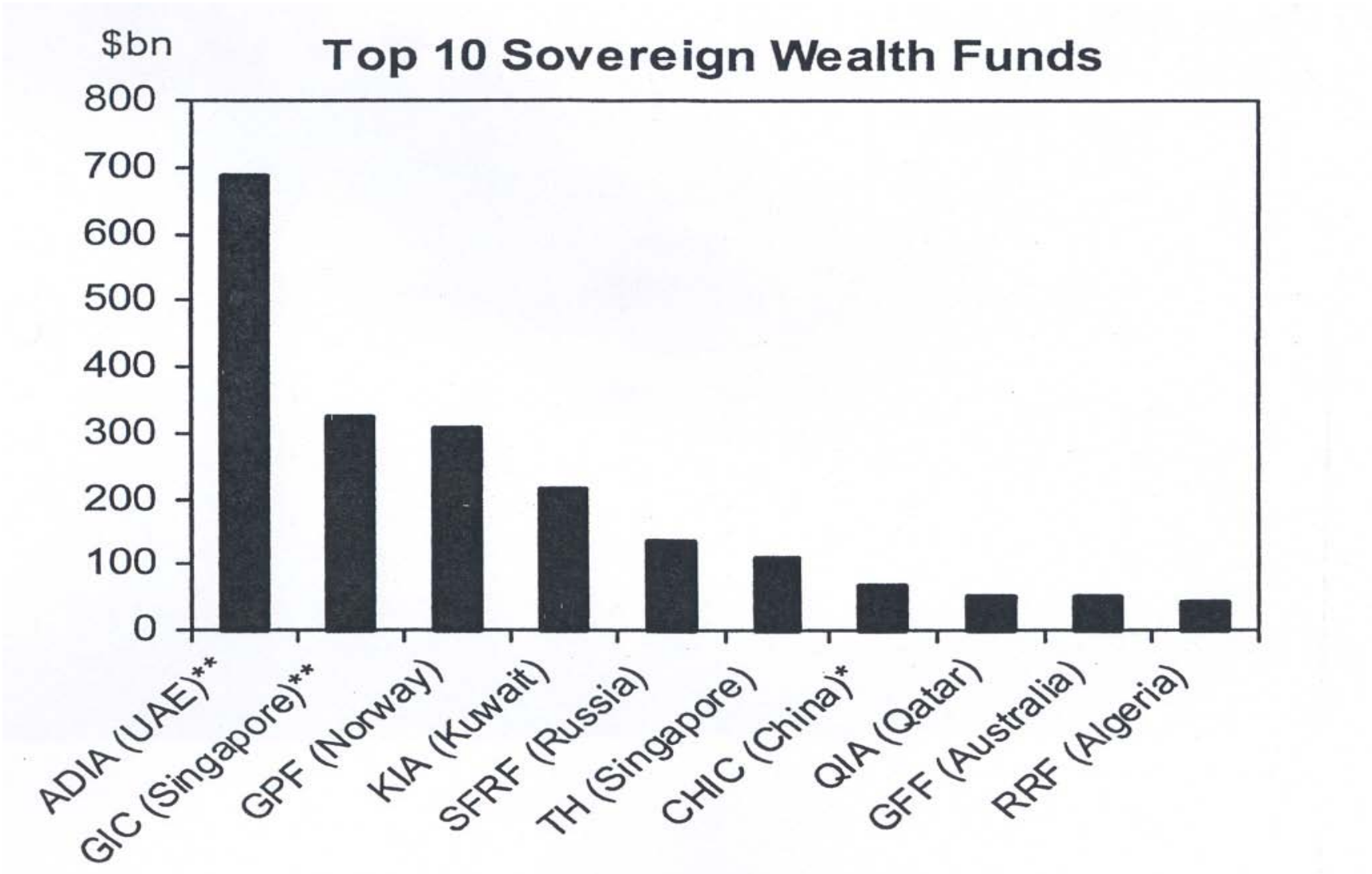
**As of December 2006

Source: IMF, National Sources

Unbalances…


2004: Asia Has Over
Over-Accumulated Reserves
US$bn
1600
1400
1200
1000
800
600
400
200
0
ACTUAL
NJA
Japan
E. & Cen.
Europe
Africa
W. Europe
LatAm
US & Canada
Oceania
Middle East
0
200
400
600
800
1000
1200
1400
1600
OPTIMAL
US$bn
Source: IMF, IFS, Goldman Sachs.

SWF


$bn
Top 10 Sovereign Wealth Funds
800
700
600
500
400
300
200
100
0
ADIA (UAE)**
GIC (Singapore)**
GPF (Norway)
KIA (Kuwait)
SFRF (Russia)
TH (Singapore)
CHIC (China)*
QIA (Qatar)
GFF (Australia)
RRF (Algeria)

US CAB due to foreign asset demand?

- Foreign asset demand could raise US *CA* deficit by:
  - appreciating the US$;
  - lowering US interest rate.

- To grow and attain full employement Asian countries need:
    - a dollar peg
    - inward FDI
  - Export surplus driving their growth (and the peg) causes reserve build up
  - Interest rates on $ are kept low and $ value high (not vs. €)
  - Chinese controls can support this situation for a long time
  - What about more open economies such as Japan and Korea?

- US assets can be added to world portfolios even if US *CAB* = 0
  - Mid of this decade the world ex USA added to their portfolio much more US$ asset than the net US CA deficit

Net Foreign Assets (NFA)

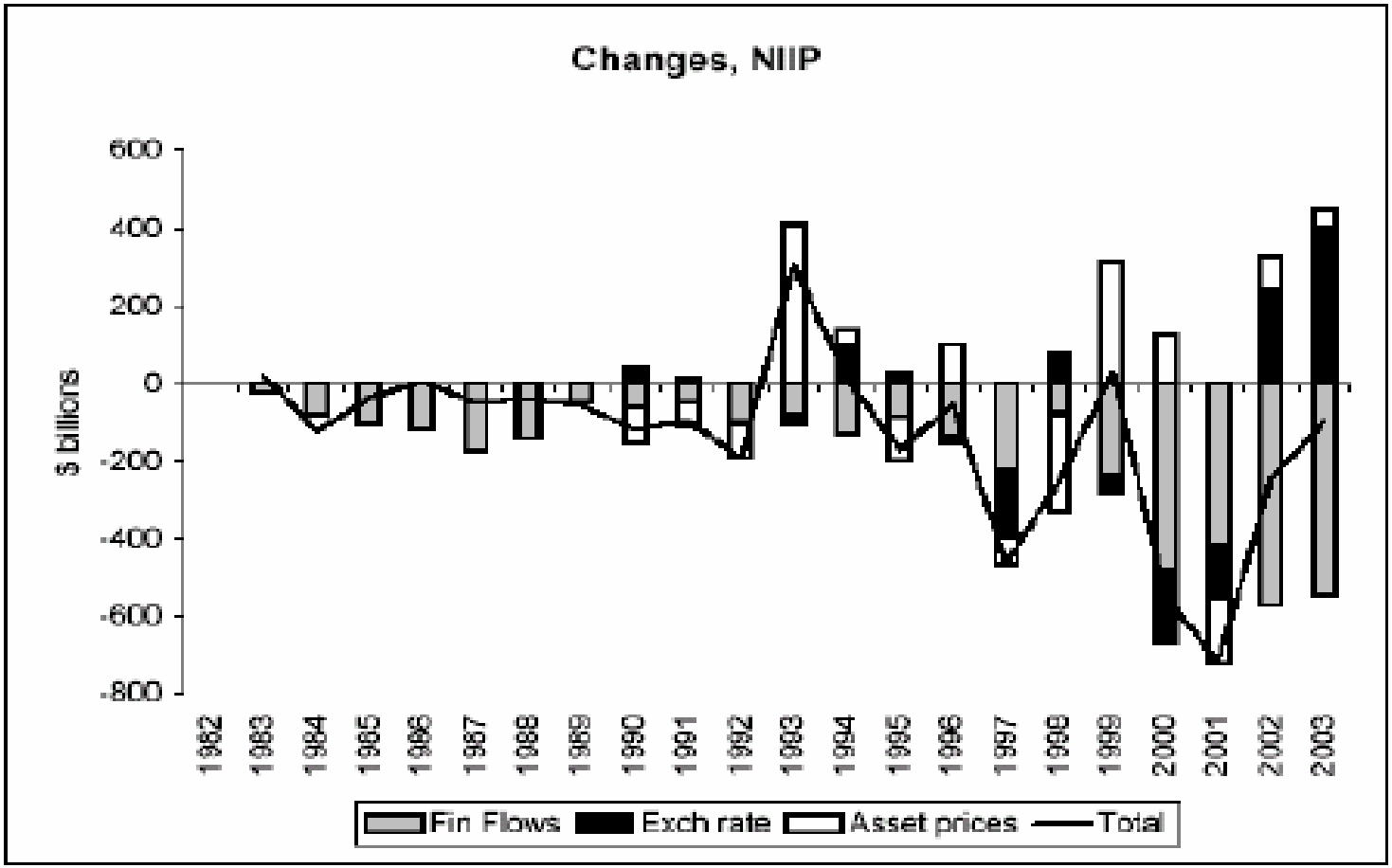
- $\sum CAB_{past} = NFA_{current}$ *at historical cost*
- *CAB* excludes capital gains/losses on net foreign assets (NFA).
- $\Delta\ NFA = CA$ + net capital gains on NFA_{lagged}
- Capital gains/losses due to:
  - asset price changes
  - exchange rate changes.

- Application:
  - U.S. net external debt = 20% U.S. GDP.
    - Gross foreign assets = 105% GDP vs. Gross foreign liabilities = 125% GDP.
  - 65% of U.S. assets in foreign currencies.
  - 95% of U.S. liabilities in dollars.

  - Effect of a 1% balanced dollar depreciation:

(.01)(.35)(1.05) - (.01)(.95)(1.25) = .82% GDP = $ 106 bl. transfer to U.S.

Δ NFA



- In the ‘90s U.S. CA deficit reflected high corporate investment
- Now *CA* reflects high government deficit
  - -To offset it consumers must *raise* saving massively
  - - now U.S. household saving rate is lowest in industrial world

Stabilizing role of depreciation?

- A country's budget constraint links the increase in net foreign debt to:
  - increase in present value (PV) of future trade surpluses
  - increase in PV of future CG on leveraged international portfolios

- Stabilizing role for the US
  - Assets are mainly in fx, Liabilities in domestic currency
  - As US$ depreciates, foreigners lose and demand more US goods while US residents gain and demand less US goods

- Non stabilizing role for emerging markets
  - As their currencies depreciate in the face of a deficit, negative flow effect on their *NFA* is *reinforced*, not offset.
  - Since the hit to wealth is all in net dollar holdings, domestic currency must depreciate more sharply, not less

Dominant Role of Asset Stocks

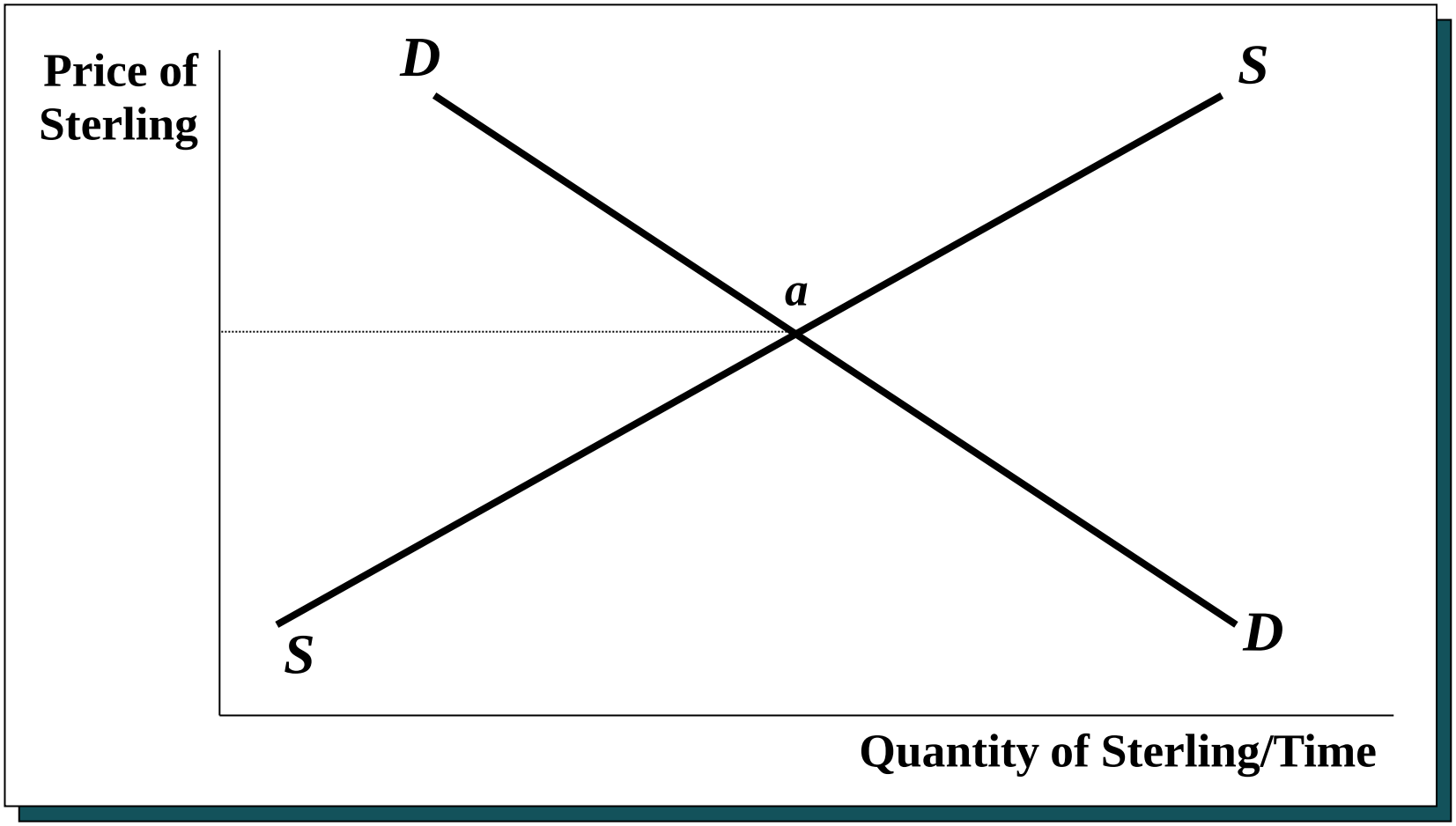
World Foreign Assets and Liabilities, 1970–2003 (percent of world GDP)

Source: Philip Lane and Gian Maria Milesi-Ferretti, unpublished data.

FX Rate: from flow to stock models

- Flow models
  - Fx seen as medium of exchange for international trade
  - Fx rate determined by demand/supply of fx currency
  - Fx rates clear the fx market
  - Dynamics of fx rate are sluggish
- Stock (Asset) models (approach)
  - Fx seen as store of value
  - Fx rates set to convince people to hold the current stock of assets
  - Fx rates set to equilibrate the (risk-adjusted) expected rate of return on assets denominated in different currencies.
- The asset approach
    - is “forward looking”
    - predicts quick movements in the fx rate to reflect news
    - links fx rates to other market prices (parities, general equilibrium)

The Flow Approach (- 1980)



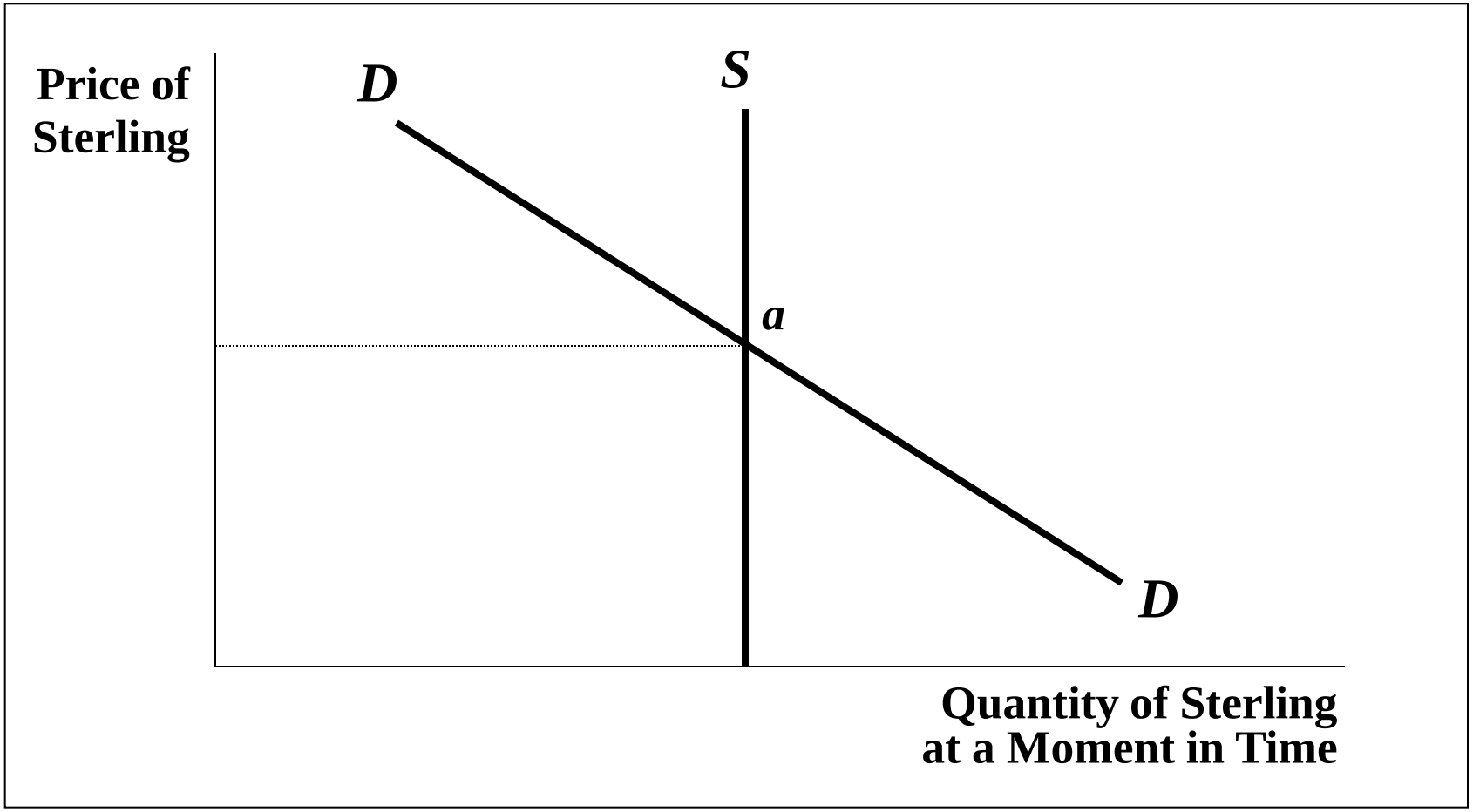
Why? A) Mostly international trade

B) International capital flows not so important

F) Finance disconnected from international economics

The Stock Approach (1980 -)

Why? A) Removal of international capital flow restriction
B) Better understanding of investors' portfolio decisions
C) High volatility of FX rate over short period of time



Parity Conditions

- They state the relation between fx rates and:
  - domestic/foreign goods prices (purchasing power parity)
  - domestic/foreign interest rates (covered interest rate parity)
  - [“open interest rate parity” (“international Fisher effect”)]

- They are based on an “arbitrage condition”
  - ideally if a parity is violated, there are opportunity for:
    - Profit with no risk → no free lunch principle
    - market dislocation → law of one price

- Caveat
  - They do not explain fx rates
  - They do not hold exactly
  - They provide a reference point for fx value conditional to commodity prices or financial prices

Retail Prices Around the World

iPod Shuffle 1GB

Prices, including taxes, as provided by retailers in each city, averaged and converted into US$

Source: *Wall Street Journal*, Jan. 31, 2007

City	Currency	US$
New York		$ 85.00
Tokyo	9,800 yen	80.00
Hong Kong	HK$4,695	83.00
Rome	€79	102.00
Frankfurt	€79	102.00
Brussels	€89	115.00
Paris	€89	115.00
London	£55	115.00

Terminology

- Direct quotation
  - $S_{h/f}$ = unit of domestic (home) currency (dx - h) per unit of foreign currency (fx – f)
  - Taking the $ as domestic currency:
    - $S_{\$/£}$ = 1.97 (units of $ per one £)

- Indirect (reciprocal) quotation
  - $S_{f/h}$ = unit of foreign currency (fx - f) per unit of domestic currency (dx – h)
  - Taking the $ as domestic currency:
    - $S_{\$/Y}$ = 99.75 (units of Y per one $)

Purchasing Power Parity (PPP)

- **Absolute version: $P = P^* S_{h/f}$**
  - P = price index; S = spot rate (* = foreign)
  - goods are priced equally everywhere, but:
    - different basket of goods underlying the price index
    - non tradable goods
    - transaction cost (transport, tax and tarif)
    - different preferences
    - oligopolistic markets

- **Relative version: $\Delta\%P \approx \Delta\%P^* + \Delta\%S_{h/f}$**
  - same % change in goods price everywhere
  - goods can maintain a different price around the world
  - the fx rate changes to offset the relative inflation between a pair of countries

L.O.P. and McDonalds

A feast of burgernomics

The Big Mac index

	Big Mac prices		Implied PPP* of the dollar	Actual dollar exchange rate Jan 31st	Under (-)/over (+) valuation against the dollar, %
	In local currency	in dollars			
United States†	$3.22	3.22			
Argentina	Peso 8.25	2.65	2.56	3.11	-18
Australia	A$3.45	2.67	1.07	1.29	-17
Brazil	Real 6.4	3.01	1.99	2.13	-6
Britain	£1.99	3.90	1.62‡	1.96‡	+21
Canada	C$3.63	3.08	1.13	1.18	-4
Chile	Peso 1,670	3.07	519	544	-5
China	Yuan 11.0	1.41	3.42	7.77	-56
Colombia	Peso 6,900	3.06	2,143	2,254	-5
Costa Rica	Colones 1,130	2.18	351	519	-32
Czech Republic	Koruna 52.1	2.41	16.2	21.6	-25
Denmark	DKr27.75	4.84	8.62	5.74	+50
Egypt	Pound 9.09	1.60	2.82	5.70	-50
Estonia	Kroon 30	2.49	9.32	12.0	-23
Euro area§	€2.94	3.82	1.10**	1.30**	+19
Hong Kong	HK$12.0	1.54	3.73	7.81	-52
Hungary	Forint 590	3.00	183	197	-7
Iceland	Kronur 509	7.44	158	68.4	+131
Indonesia	Rupiah 15,900	1.75	4,938	9,100	-46
Japan	¥280	2.31	87.0	121	-28
Latvia	Lats 1.35	2.52	0.42	0.54	-22
Lithuania	Litas 6.50	2.45	2.02	2.66	-24
Malaysia	Ringgit 5.50	1.57	1.71	3.50	-51
Mexico	Peso 29.0	2.66	9.01	10.9	-17
New Zealand	NZ$4.60	3.16	1.43	1.45	-2
Norway	Kroner 41.5	6.63	12.9	6.26	+106
Pakistan	Rupee 140	2.31	43.5	60.7	-28
Paraguay	Guarani 10,000	1.90	3,106	5,250	-41
Peru	New Sol 9.50	2.97	2.95	3.20	-8
Philippines	Peso 85.0	1.74	26.4	48.9	-46
Poland	Zloty 6.90	2.29	2.14	3.01	-29
Russia	Rouble 49.0	1.85	15.2	26.5	-43
Saudi Arabia	Riyal 9.00	2.40	2.80	3.75	-25
Singapore	S$ 3.60	2.34	1.12	1.54	-27
Slovakia	Crown 57.98	2.13	18.0	27.2	-34
South Africa	Rand 15.5	2.14	4.81	7.25	-34
South Korea	Won 2,900	3.08	901	942	-4
Sri Lanka	Rupee 190	1.75	59.0	109	-46
Sweden	SKr32.0	4.59	9.94	6.97	+43
Switzerland	SFr6.30	5.05	1.96	1.25	+57
Taiwan	NT$75.0	2.28	23.3	32.9	-29
Thailand	Baht 62.0	1.78	19.3	34.7	-45
Turkey	Lire 4.55	3.22	1.41	1.41	nil
UAE	Dirhams 10.0	2.72	3.11	3.67	-15
Ukraine	Hryvnia 9.00	1.71	2.80	5.27	-47
Uruguay	Peso 55.0	2.17	17.1	25.3	-33
Venezuela	Bolivar 6,800	1.58	2,112	4,307	-51

Sources: McDonald's; *The Economist*

*Purchasing-power parity: local price divided by price in United States
†Average of New York, Atlanta, Chicago and San Francisco ‡Dollars per pound
§Weighted average of prices in euro area **Dollars per euro

• *The Economist*'s Big Mac index is based on the theory of purchasing-power parity, under which exchange rates should adjust to equalize the cost of a basket of goods and services, wherever it is bought around the world. Our basket is the Big Mac. At end-January 2007, the most overvalued currency is the [redacted]: the exchange rate that would equalise the price of an [redacted] Big Mac with an American one is [redacted] the actual rate is [redacted], making the [redacted] too dear. The most undervalued currency is the [redacted], at [redacted] below its PPP rate; several other [redacted] currencies also appear to be 40-50% undervalued.

PPP Spot Rate

- Absolute version: $S_{PPP} = P / P^*$
  - $S > S_{ppp}$ then fx overvalued / dx undervalued;
  - $S < S_{ppp}$ then fx undervalued / dx undervalued

- Relative version: $S_{ppp\text{-}bp} = (P / P^*)_{base\ period}$
  - $S > S_{ppp\text{-}bp}$ then fx overvalued / dx undervalued;
  - $S < S_{ppp\text{-}bp}$ then fx undervalued / dx overvalued

- Real Exchange rate: $e_{h/f} = (P^* S_{h/f}) / P$
  - If absolute PPP holds, e = 1
  - If e > 1 then ; if e < 1 then

PPP: the Evidence

- Test the regression model

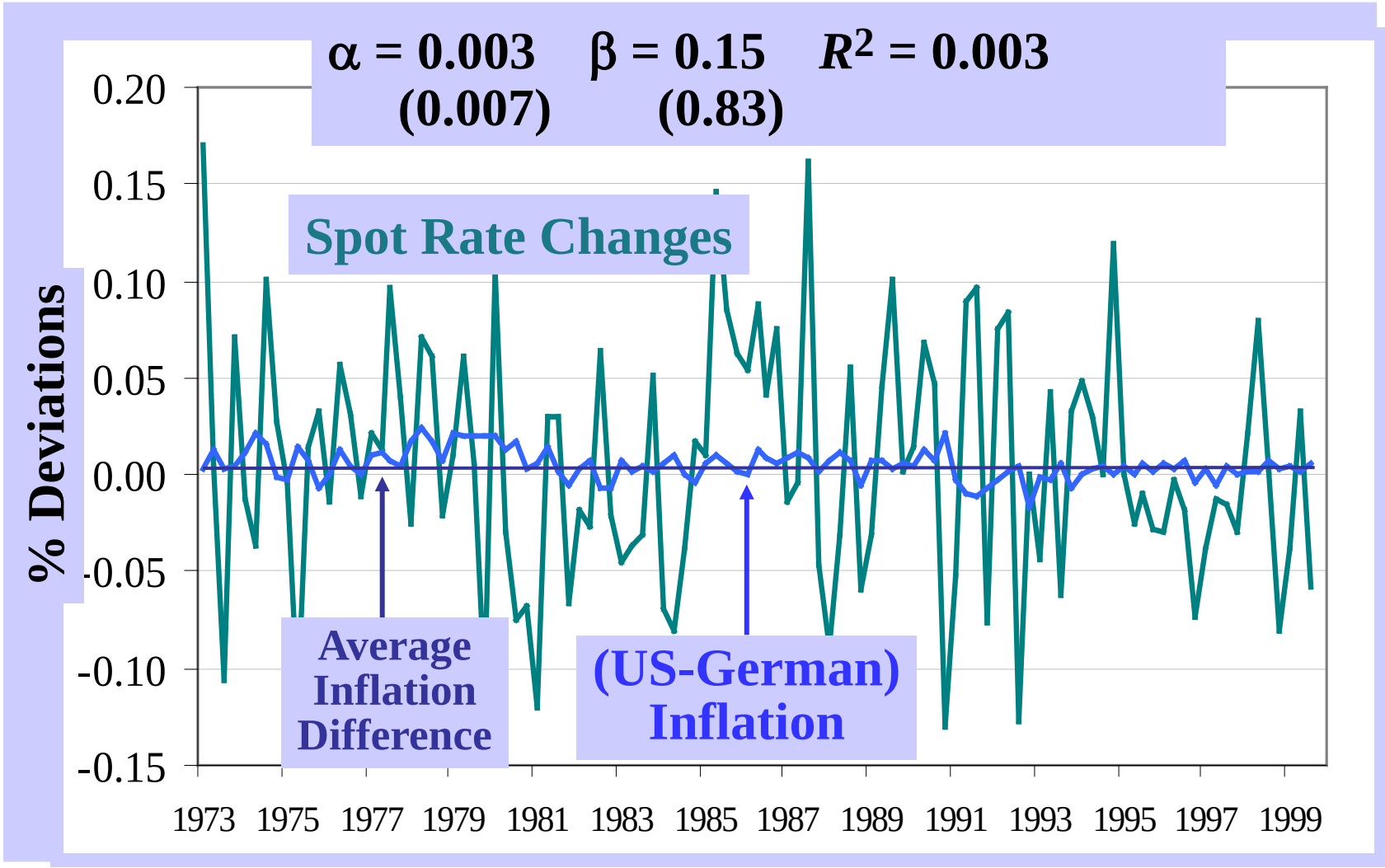
$$\Delta\%S_t = \alpha + \beta\,(\Delta\%P_t - \Delta\%P^*_t) + \varepsilon_t$$

for $\boldsymbol{\alpha = 0}$ and $\boldsymbol{\beta = 1}$ $\qquad$ **R^2 high**

- Results
  - PPP poorly explains fx rate dynamics in the short term
  - over the long term fx rates revert to their PPP value *(reversion)*
  - Speed of adjustment towards the PPP level is a positive function of the size of the deviation
    - Among OECD nation the half life of the deviation is on average 4.5 years (deviations dampen approx. by 15% a year)
  - PPP deviation may be permanent if a permanent real shock affects one country but not the other

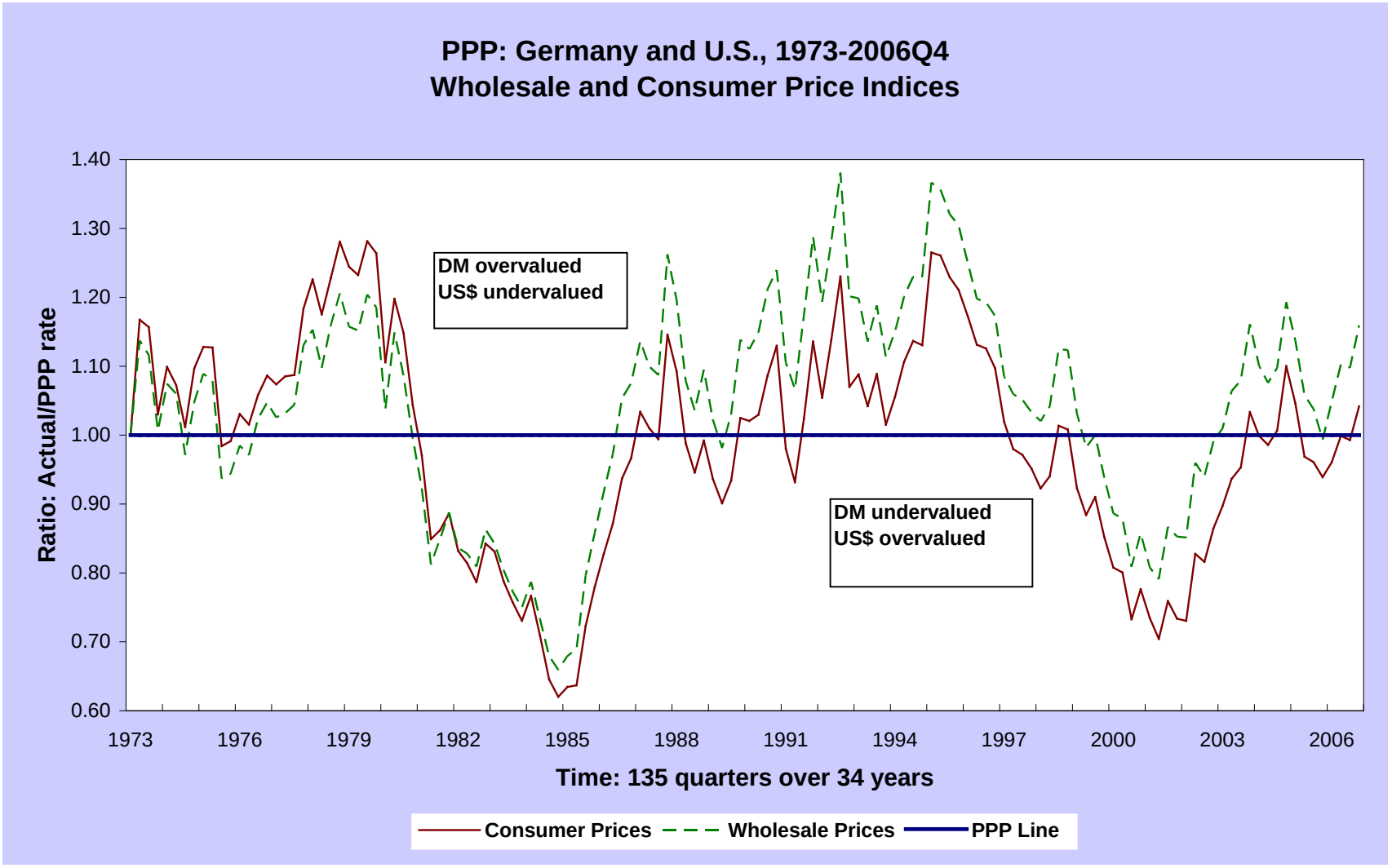
Quarterly Deviations from Relative PPP

CPI: Germany and the United States, 1973-1999



Cumulative Deviations from Relative PPP

Germany and the United States, 1973-2006



Real & Nominal Fx Rates in the Long Run

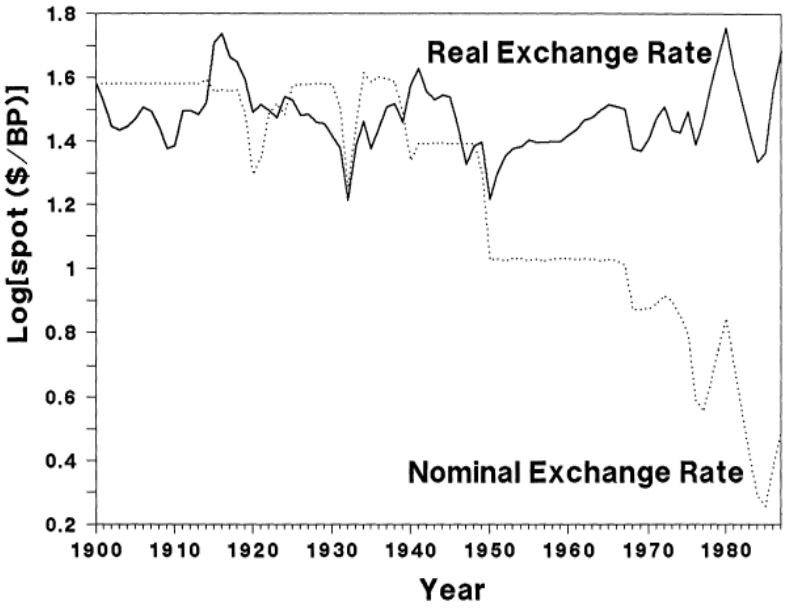


Figure 3. Dollar/pound exchange rate. Time-series plot of the real and nomimal exchange rate of the British pound versus the US dollar ($/BP), based on annual averages. The real exchange rate is obtained by deflating the nominal exchange rate by the ratio of wholesale price indices. The vertical scale is measured as the logarithm of the exchange rate. The real exchange rate is translated so that the 1900 value is equal to that of the nominal exchange rate.

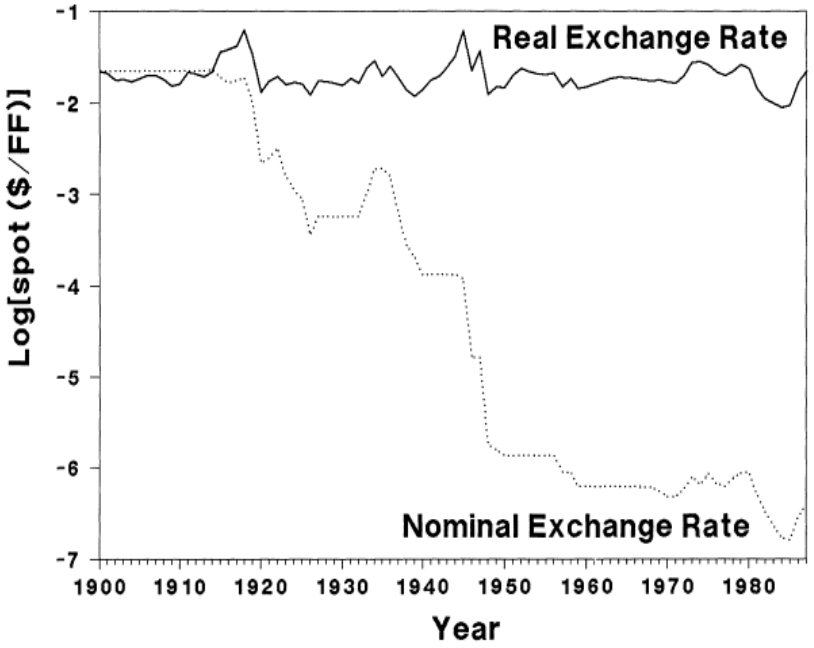


Figure 4. Dollar/French franc exchange rate. Time-series plot of the real and nominal exchange rate of the French franc versus the US dollar ($/FF), based on annual averages.

The empirical results above cast doubt on the hypothesis that the real exchange rate follows a random walk. A 50% over-appreciation of a currency with respect to PPP would take 3-5 years to be cut in half. Similarly, analyzing annual data over the period 1900-1972 reveals that a period of 3 years is needed for such a reversal.

- Source: Abuaf and Jorion, “PPP in the Long Run,” *Journal of Finance*, 1990.

Effective Exchange Rate Index (EERI)

- Aim is to convey in a single number the average change of all fx rates for a given currency (average currency value)

- Weights
  - bilateral trade (import; export; import + export)
  - bilateral trade adjusted for price sensitivity;
  - Multilateral trade of each foreign country

- Index type
  - Nominal EERI
    - informative on the average demand of domestic currency vs. fx
  - Real EERI
    - informative on price competitiveness of domestic vs. foreign goods

- Methodology
  - average currency value vs. fx in a base year set at 100 (I_0=100)
  - I_1 = 100 * average change in fx rates (quoted in indirect term)
  - Increase in the index means domestic currency appreciation

Deviation from PPP or PPP change?

Czech Republic's Real Effective Exchange Rate

Source: Institute of International Finance

Poland's Real Effective Exchange Rate

Source: Institute of International Finance

Hungary's Real Effective Exchange Rate

Source: Institute of International Finance

Russia's Real Effective Exchange Rate

Source: Institute of International Finance

Covered Interest Rate parity (CIRP)

- Strategy 1:
  - Invest 1 $ in a dollar denominated deposit @ $i_{\$}$ with maturity T
  - Payoff at T (in $): **$(1+i_{\$}*T)$**

- Strategy 2:
  - sell 1$ to purchase $(1/S_{\$/£})$ British pounds
  - invest $(1/S_{\$/£})$ £ in a deposit @ $i_{£}$ with maturity T
  - sell forward @ F_T the compounded value of the deposit in £ to receive $ at maturity T
  - Payoff at T (in $): **$(1/S_{\$/£})*(1+i_{£}*T)*F_T$**

CIRP - II

- Strategy 1 = Strategy 2
- Lend $ =

  = sell $ spot for £ + lend £ + buy $ forward for £

- Play with it

$$\frac{1}{S_0}(1+i_{£}T)F_T = (1+i_{\$}T)$$

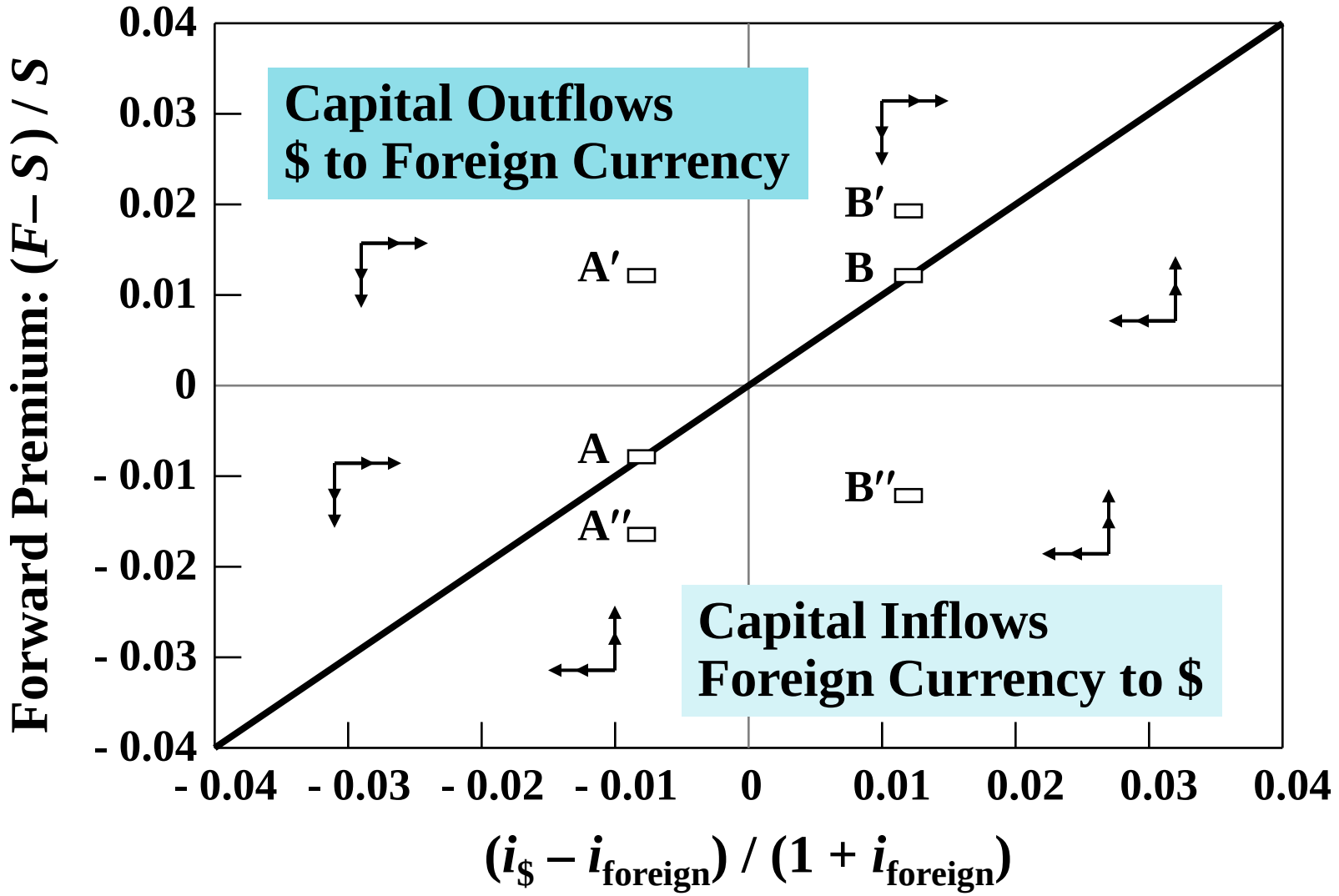
$$F_T = S_T \frac{(1+i_{\$}T)}{(1+i_{£}T)}$$

CIRP- III

$$\frac{F_T - S_0}{S_0} = \frac{(i_\$ - i_£)T}{(1 + i_£ T)} \cong (i_\$ - i_£)T$$

- Forward premium (%) on fx = interest rate differential
  - If $F_T > S_0$ → forex is at a premium
  - If $F_T < S_0$ → forex is at a discount
- Can the same fx be both at premium and at discount at the same time?
- Interest parity line

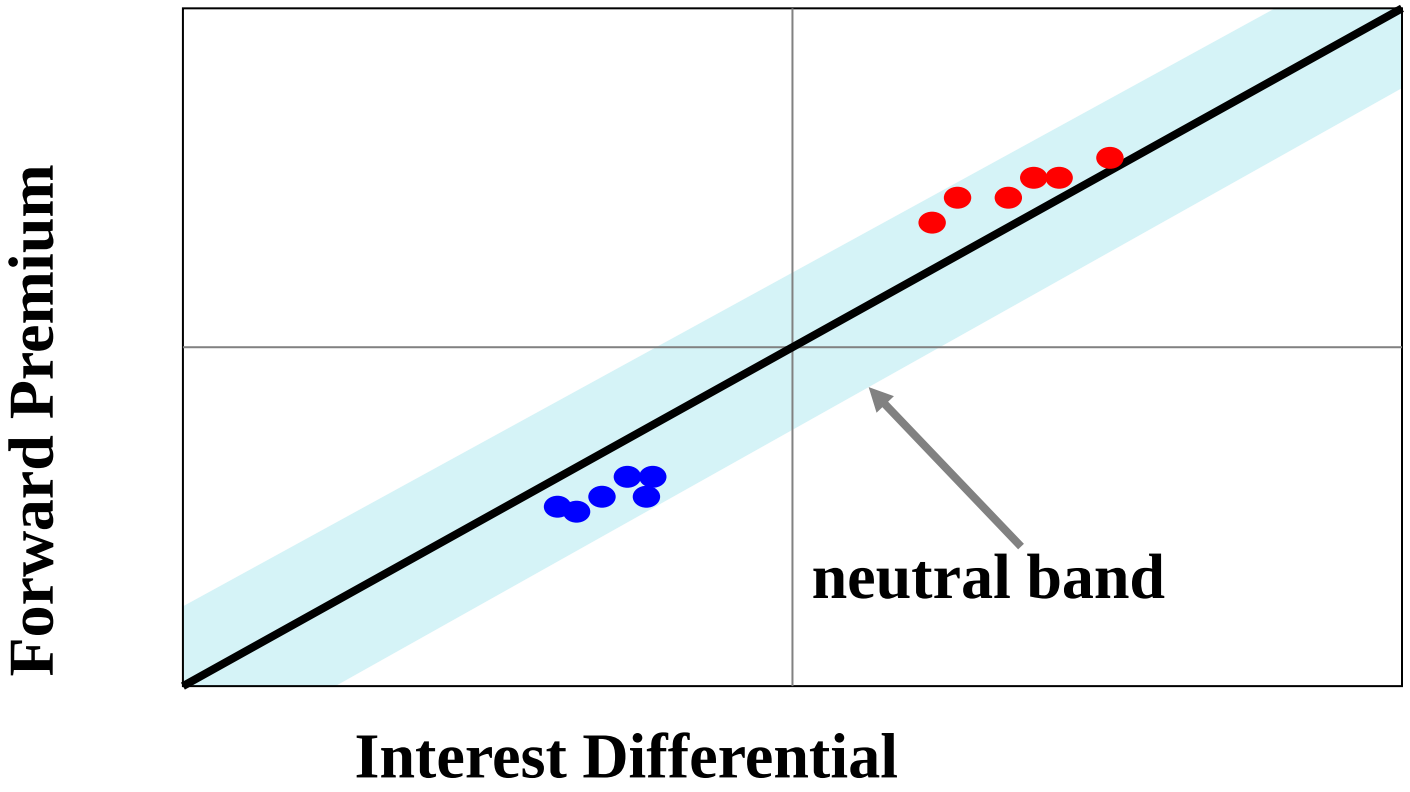
The Interest Rate Parity Line
Equilibrium and Disequilibrium Points



Deviations from CIRP

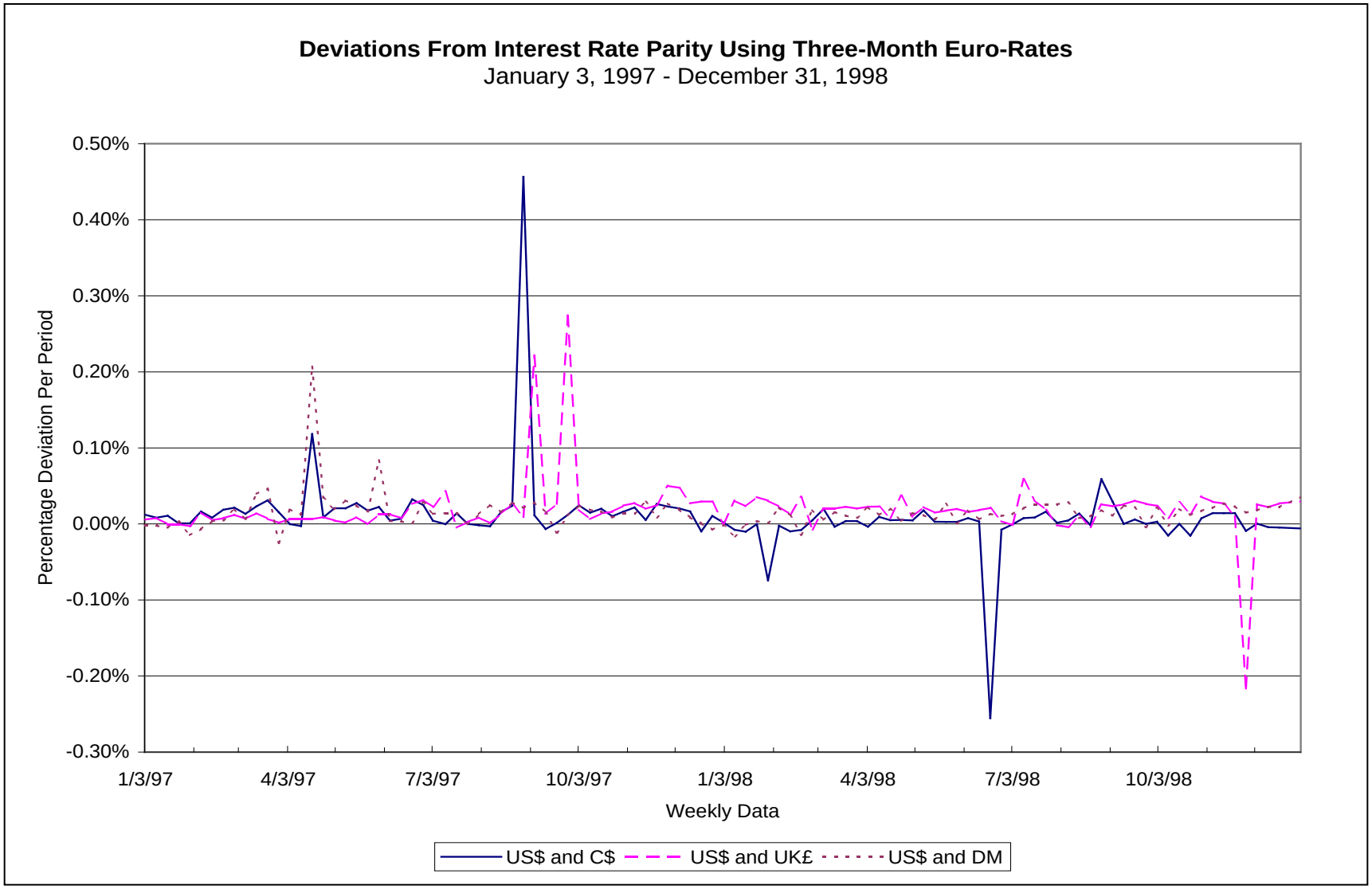
- Risk
  - execution risk (time lag)
  - credit risk
  - transfer risk
- Transaction cost
  - Bid/ask spread
  - Fees and commission
- Taxation
  - (F-S) is a capital gain/loss; (i-i*) is interest income
  - Interest paid may not be entirely tax deductible
- Empirically
  - CIRP holds well in the eurocurrency market
  - CIRP holds well for short term lending / borrowing

CIRP in the real world

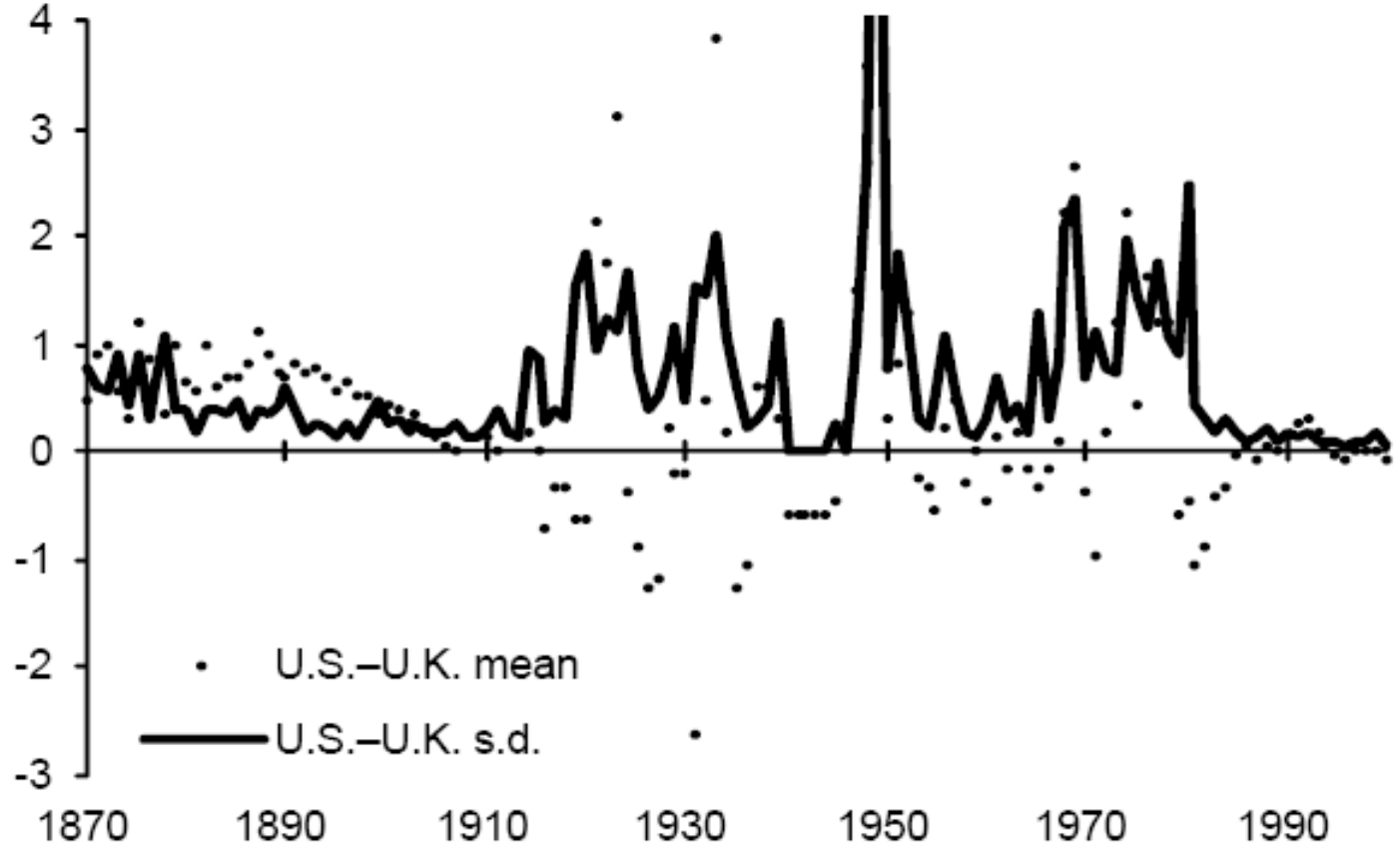


- Transaction costs create a “neutral band” within which covered interest arbitrage transactions will not occur.

CIRP: the evidence



Deviation from CIRP



Expectation in a Risk Neutral World

- Unbiased forward rate: $F_T = E_0[S_T]$
  - F is the market estimate of future spot rate
  - *fp* is the market estimates of the future change in spot rate
  - if risk neutral investors will take a bet entering a naked forward position

$$fp = E_0[\Delta\%S]$$

- Open interest rate parity:

  lend $ = buy £ + lend £ + sell £ spot at maturity

$$\frac{1}{S_0}(1+i_{£}T)E_0(S_t) = (1+i_{\$}T)$$

Investing either in an uncovered foreign asset or in a domestic asset delivers the same expected payoff

Open Interest Rate Parity (OIRP) - I

$$E_0[S_T] = S_0 \frac{(1+i_{\$}T)}{(1+i_{£}T)}$$

$$\frac{E_0(S_T) - S_0}{S_0} = E_0[\Delta\%S] = \frac{(i_{\$} - i_{£})T}{(1+i_{£}T)} \cong (i_{\$} - i_{£})T$$

- *Markets expect currency with higher interest rate to depreciate*
- **Combine OIRP with relative PPP:**

$$E_0[\Delta\%P_{US} - \Delta\%P_{UK}] \cong E_0[\Delta\%S] = \cong (i_{\$} - i_{£})T$$

- Interest rate differential due to difference in expected inflation
  - Real interest rate in the two countries remain the same
- High yielding currencies carry more inflation risk and depreciate over time

Open Interest Rate Parity (OIRP) - II

$$S_0 = \frac{(1+i_{£})T}{(1+i_{\$}T)} \mathrm{E}_0[\mathrm{S}_\mathrm{T}] \approx \frac{\mathrm{E}_0(\mathrm{S}_\mathrm{T})}{1+(i_{\$}-i_{£})}$$

- Over shorter period of time, PPP does not hold and nominal interest rate differential may reflect real interest rate differential

- The current spot rate is the net present value of the expected future spot rate using $(i_{\$}-i_{£})$ as discount rate

- *Holding expectation on future spot rate constant, what happens if interest rates change?*

Evidence on OIRP

- Test the regression model

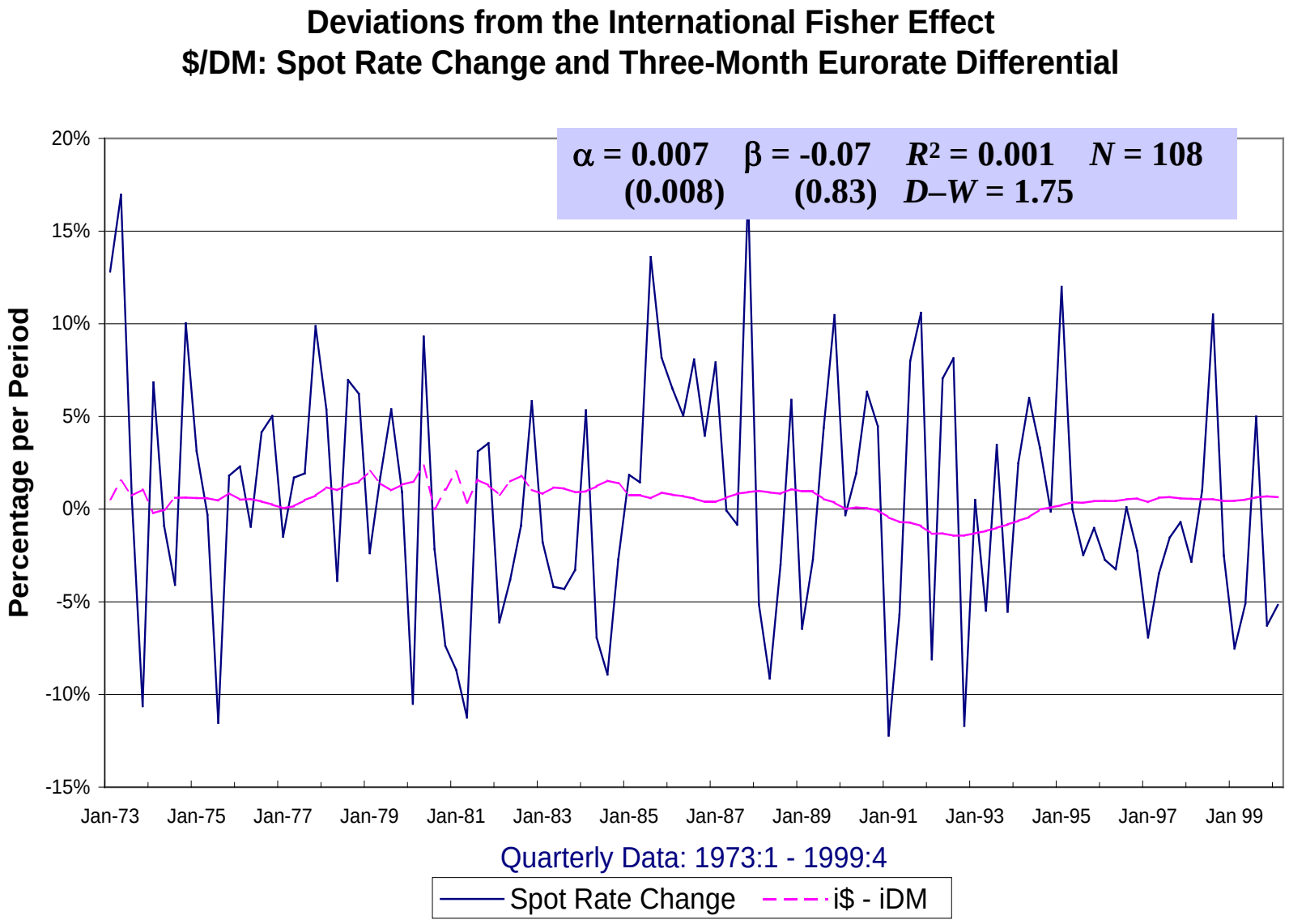
$$\Delta\%S_t = \alpha + \beta\,(\Delta\%\, i_{\$} - \Delta\%\, i_{£})_t + \varepsilon_t$$

for $\alpha = 0$ and $\beta = 1$ with R^2 high

- Poor performance over short periods (< 12 months)
  - on average $\beta = -0{,}88$
  - if high short term interest rate, currencies tend to appreciate
  - “carry trade” strategy are profitable (< 12 months)
  - Basket carry trades are even better

- Over longer periods (5 – 10 years)
  - performance improves ($\beta = 0{,}6$; $R^2 = 0.53$)
  - High yielding currency tend to depreciate

OIRP: the Evidence



Basket Carry Trade: Excess Returns

- DB carry strategy ranks G10 currencies by their 3-month interest rates
- Buy the top-3 yielding currencies and sell short the bottom-3.
- Annual excess returns since 1980 have been 5% with a Sharpe ratio of 0.6.

Source: Deutsche Bank, “Currencies: Carry Investing, March 29, 2007.

Forward Rate Unbiased: Evidence

	Levels			Percentage Changes		
	$S_{t+n} = \alpha + \beta F_{t,n} + e_t$			$\ln (S_{t+n}/S_t) = \alpha + \beta \ln (F_{t,n}/S_t) + e_t$		
Country	α	β	R^2	α	β	R^2
Belgium	0.002 (0.001)	0.933 (0.036)	0.89	-0.216 (0.721)	-0.025 (1.119)	0.00
Canada	-0.004 (0.028)	1.005 (0.035)	0.91	-0.532 (0.289)	-0.788 (0.597)	0.02
France	0.014 (0.006)	0.917 (0.035)	0.90	-0.144 (0.758)	0.506 (0.814)	0.00
Germany	0.018 (0.021)	0.963 (0.037)	0.90	0.394 (0.806)	-0.540 (0.823)	0.01
Italy	0.000 (0.000)	0.949 (0.028)	0.94	0.994 (1.094)	1.497 (0.714)	0.05
Japan	0.000 (0.000)	0.969 (0.026)	0.95	3.491 (1.111)	-3.212 (0.984)	0.12
Netherlands	0.018 (0.018)	0.960 (0.037)	0.89	0.463 (0.778)	-0.969 (0.892)	0.01
Switzerland	0.030 (0.027)	0.948 (0.041)	0.88	1.132 (1.018)	-1.024 (0.770)	0.02
United Kingdom	0.140 (0.070)	0.918 (0.041)	0.86	-1.180 (0.727)	-1.935 (0.893)	0.06

Sample period Jan. 1979 – Dec. 1998, 3-mo. forwards, N=80 observations, standard errors in parenthesis.

Why OIRP does not hold?

- Risk premium
  - default risk - expropriation risk - transfer risk
  - inflation risk

- People care about real interest
  - $r_{\$} = i_{\$} - E_0[\Delta\%P_{US}]$
  - $r^f_{\$} = i_{£} + E_0[\Delta\%S_{\$/£}] - E_0[\Delta\%P_{US}]$
  - risk is not additive
  - If relative PPP holds then $r^f_{\$} = i_{£} - \Delta\%P_{UK}$
  - you can choose the inflation risk to be exposed to

- Risk premium can go either way

  $F = E_0[S_T] + RP$ either $RP > 0$ or $RP < 0$

Part 2: Preview

- Exchange rate determination
  - fx rate models
  - News and fx movements
  - The forecasting debate
- Exchange rate risk
  - Risk vs. exposure
  - The hedging debate
  - Types of fx risk

Asset approach

- Forward looking
  - Fx rate determined by expectations
  - Fx rate move quickly to reflect any new info
  - No common pattern of fx rate reaction to news
    - Permanent vs. transitory changes
    - Expected vs. unexpected changes
    - Nominal vs. real changes
- Fx rate are set to equilibrate the risk adjusted expected return on assets denominated in different currencies
- All “asset models” are based on the assumption of perfect capital mobility

Asset Models of FX Rates

- Monetary approach
  - 2 asset classes: domestic money (M); foreign money (M*)
  - perfect capital substitutability (M vs. M*)
  - OIRP holds (no currency risk premium)
  - immediate adjustment in asset prices
  - commodity prices are assumed to be:
    - perfectly flexible in the monetary model
    - sticky in the overshooting model.

- Portfolio balance approach
  - 2 additional asset classes: domestic and foreign bond
  - Currency risk premium
  - Imperfect capital substitutability

The Monetary Approach

- Fx rate is the relative price of two currencies
- M, M* are perfect substitutes
- Immediate price adjustment for goods and services
- Equilibrium in money markets
  - $M / P = L (Y^{+}, i^{-})$ $\qquad\qquad$ $M^* / P^* = L^* (Y^{*+}, i^{*-})$
- LOP (PPP): goods must cost the same everywhere

  $S_{H/F} = P / P^* = [M / M^*] \times [L^*(Y^*, i^*) / L(Y, i)]$
- Predictions
  - Monetary policy
  - Income shocks
  - Interest rate shocks

Overshooting (Dornbusch) model

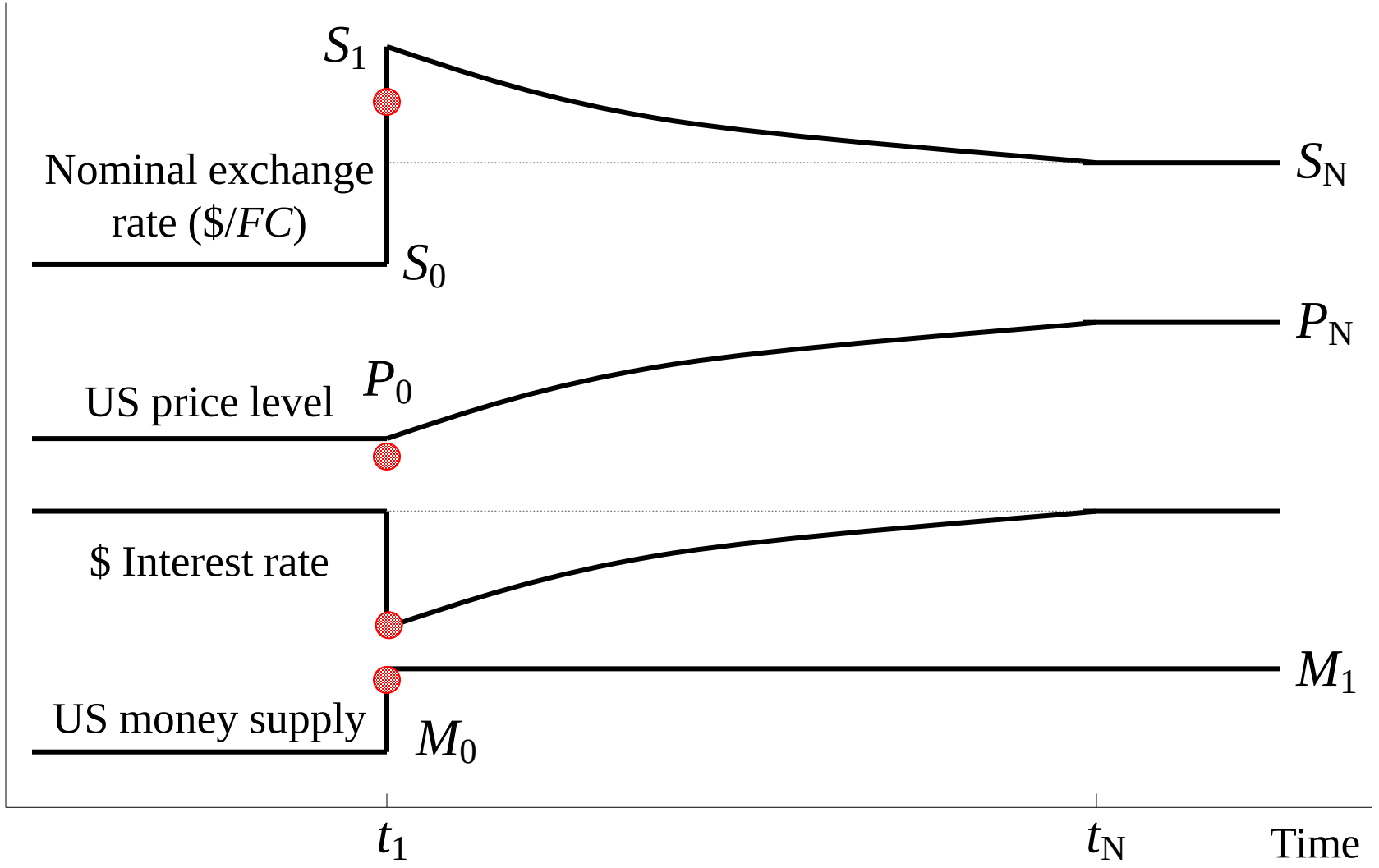
- Goods prices are sticky compared to asset prices
  - But in the long run PPP holds (monetary model OK)

- No currency risk premium: OIRP always valid

- If M^S increases ("i" falls to clear money market):
  - investors are enticed to hold domestic currency through
    - a low yield
    - a high inflation (long run PPP)
  - Due to OIRP, the Fx rate (both nominal and real) jumps immediately overshooting its final equilibrium value

Overshooting Model

When a monetary shock occurs at time t_1 ...



Portfolio balance approach (PBA)

$$(NS - NI) = CAB = NFA_{end} - NFA_{start}$$

with NFA = net foreign asset position

- Net foreign asset available
  - fixed in the short run
  - domestic resident can increase them in the long run (CAB>0)
- Imperfect asset substitutability (no OIRP)
  - The ratio domestic/foreign bonds in a portfolio is positively related to the expected excess return on domestic over foreign bonds, ϕ *:*

$$\phi = i - (i^* + E(s)) \neq 0$$

    - $\phi > 0$ means market requires a risk premium on ….
    - The domestic demand for domestic bonds is positively related to *i*.
    - The domestic demand for foreign bonds is positively related to *i** augmented by the expected exchange rate change *E*(*s*).

The Portfolio-Balance Models

Effects of Macroeconomic Shocks on the Fx Rate

Model	Increase in		Impact on home currency
all	*B*	supply of home country bonds	+ depreciates
	F	foreign country bond supply	- appreciates
	i	domestic interest rates	- appreciates
	*i**	foreign interest rate	+ depreciates
	E[s	expected rate of home currency depreciation	+ depreciates
preferred local habitat	*W*	home country wealth	- appreciates
	CA	home country current account surplus	- appreciates

Supply Shocks and the PBA

- A supply shock affects the relative supply of Gover. bonds
  - Initial conditions: U.S. gov't debt (B) = \$5 trillion
    Japanese gov't debt (F) = \$1 trillion
  - Assume: U.S. fiscal budget deficit = \$200 billion/year
    Japanese run balanced budget
  - After 5 years:

$$\frac{Supply\ of\ US\ Debt}{Supply\ of\ Japanese\ Debt} = \frac{\$6\ Trillion}{\$1\ Trillion} = \frac{6}{1} > \frac{5}{1} = \frac{Demand\ for\ US\ Debt}{Demand\ for\ Japanese\ Debt}$$

$$\frac{Supply\ of\ US\ Debt}{Supply\ of\ Japanese\ Debt} = \frac{6}{1} = \frac{B\ (US\$)}{S\ (\$/Yen) \times F\ (Yen)}$$

  - Assume: Relative demand for US vs. JPY bonds is still 5:1
  - US gov't bonds are in "oversupply" vs. demand. To adjust:
    - B↓ US bond prices fall, and US interest rates rise
    - S↑ US\$ depreciates
    - F↑ Japanese bond prices rise, Japanese interest rates fall

Demand Shocks and PBA

- A “demand shock" affects the relative demand for T-bonds outstanding. A change in national wealth (resulting from a current account imbalance) is an example of a demand shock.
  - Assume initial portfolio allocations in the U.S. and Japan are:

Portfolio Weights:	US$ Assets	¥ Assets
United States	90%	10%
Japan	30%	70%

- Investors from US & Japan hold assets denominated in both US$ and ¥;
- All investors prefer assets denominated in their home currency.

Demand Shocks and PBM

- Now assume that the USA runs a current account deficit of $1 billion, while Japan has a corresponding current account surplus of $1 billion.

$$\frac{\textit{Japanese Demand for Yen Assets}}{\textit{Japanese Demand for US\$ Assets}} = \frac{0.70}{0.30} > \frac{0.10}{0.90} = \frac{\textit{US Supply of Yen Assets}}{\textit{US Supply of US\$ Assets}}$$

- As a result of the US CA deficit (Japan CA surplus), yen and yen assets in excess demand.
- To restore portfolio balance, either:
  - B↓ US bond prices fall, and US interest rates rise
  - S↑ US$ depreciates
  - F↑ Japanese bond prices rise, JPY interest rates fall

Fx dynamics suggested by PBA

- Jump in demand for foreign assets
  - Due to an increase in M^{SS} or decrease in domestic income
  - cannot be accommodated by a change in quantity of foreign asset available
  - should be accommodated by a change in foreign asset value
    - if P, P* constant, than S must change
    - Risk premium to hold domestic asset (insurance premium to hold foreign asset)

- Higher S (devaluations) allows CAB > 0
  - As net foreign asset available increase, premium disappears
  - CAB goes with currency appreciation
    - even more so under the preferred local habitat assumptions

Are fx models useful?

- Some economists (Rogoff) claim that fx rates are not systematically related to macro variables.
  - *"One of the most remarkable facts about G-3 fx rates is that they are so seemingly immune to systematic empirical explanation."*

- Financial markets are preoccupied with news & spend considerable time & resources tracking macro variables
  - Economic Calendars
    - economic meetings release time
    - market expectations, "consensus" forecasts of macro variables

- Could fx rates move without regard to economic fundamentals?

Spot trader reaction to macro news

- Difficult to find a systematic connection between news announcements and fx rate reactions?

- The market is *forward-looking*
  - Expected vs. unexpected changes that often have differing impacts on the spot rate.

- The market distinguishes between:
  - *Permanent* versus *transitory* changes
  - Real versus nominal changes

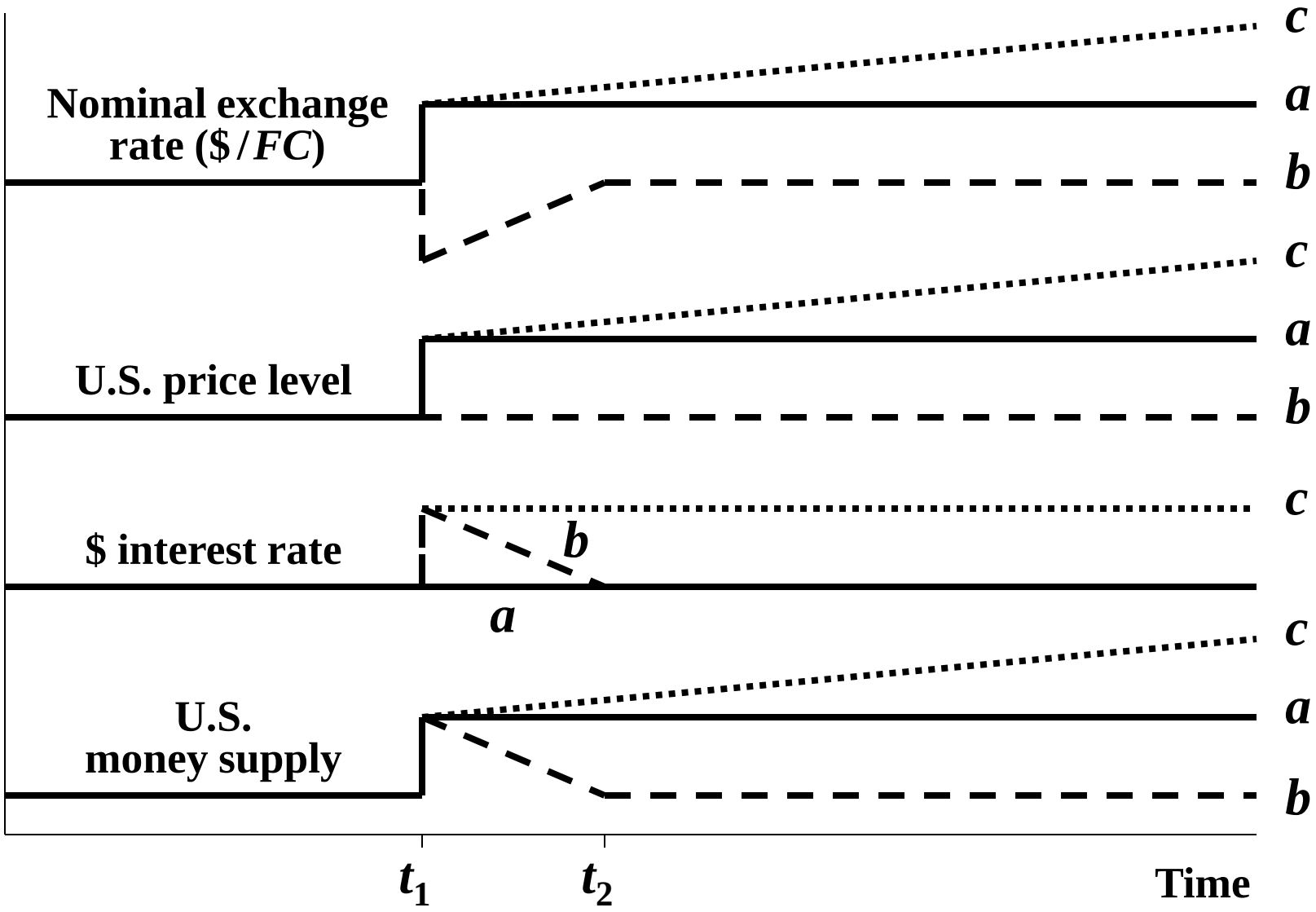
- While two news announcements may seem similar, their underlying aspects may, in fact, be different.

Reaction to macro news- I

- At time t_1, it is announced that the U.S. money supply grew by $5 billion in the most recent week.
- (The consensus market forecast was $3 billion.)

- Q: How will $/FC rate respond?
  - ***Case a:*** The US$ weakens as the market feels that the higher money supply will be maintained.
  - ***Case b:*** The US$ strengthens as the market believes that the Federal Reserve will take corrective actions (contract the money supply).
  - ***Case c:*** The US$ weakens and then steadily depreciates as the market feels that the change in the growth rate is permanent.

U.S. Money Supply Increase



Reaction to macro news 2

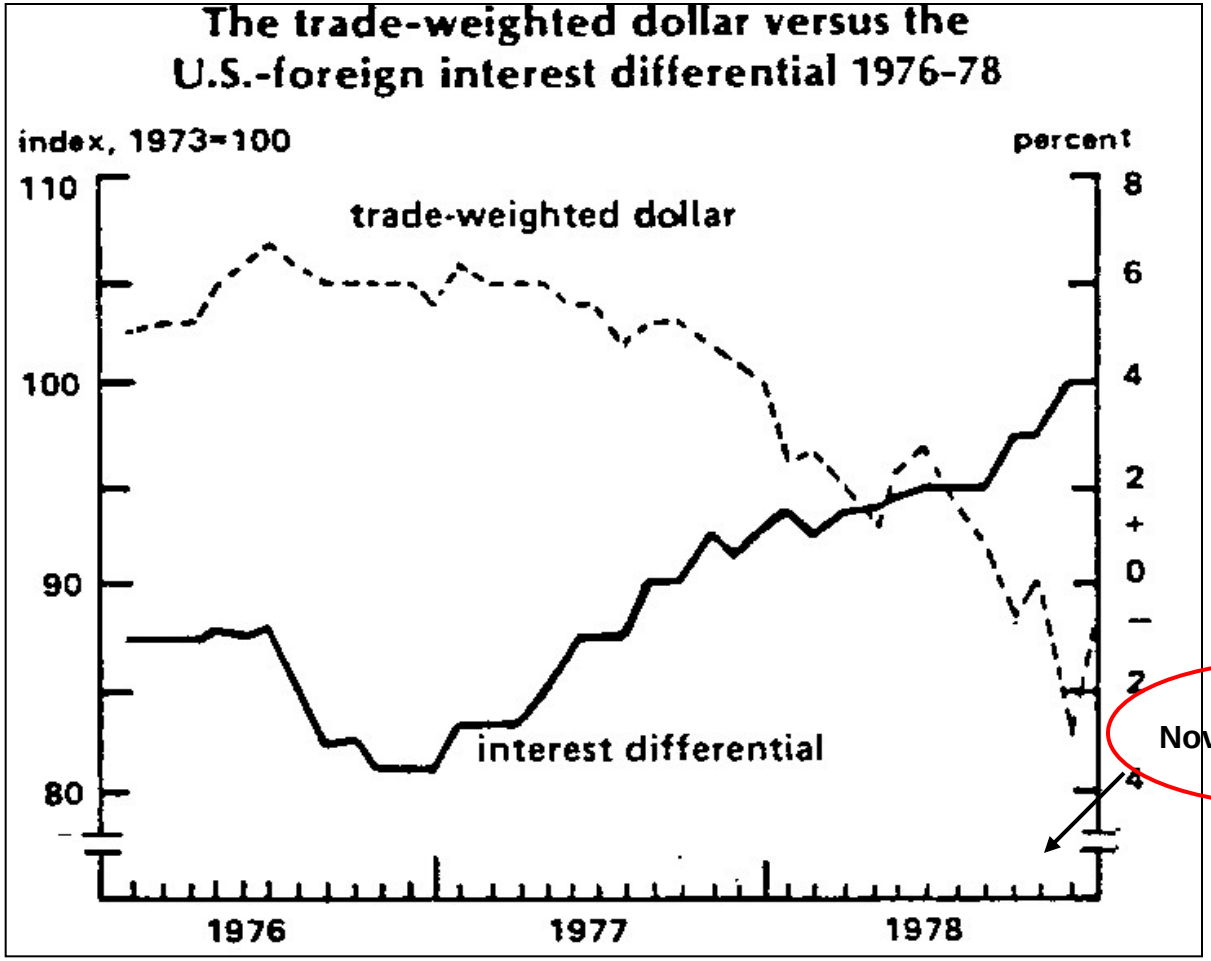
- U.S. interest rates at all maturities rise by 0.10%.
- The market consensus was for no change in rates.

Q: How will $/FC rate respond?

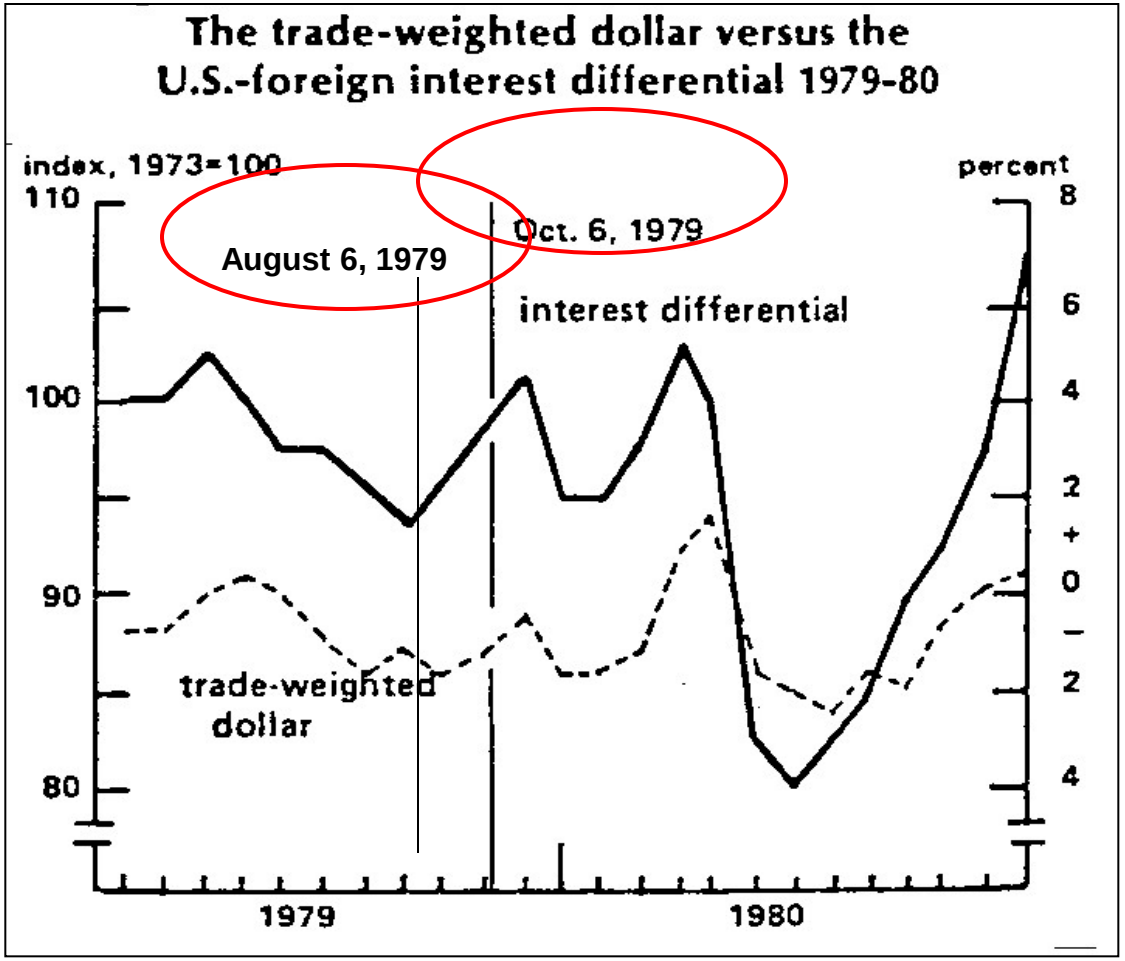
  - ***Case d:*** The US$ weakens as the market feels that the rise stems from inflationary concerns, and is therefore a rise in the *nominal* interest rate.

  - ***Case e:*** The US$ strengthens as the market believes that inflation is under control, such that the higher rate corresponds to an increase in the *real* interest rate.

Increase in US Interest Rates: Case d



Increase in US Interest Rates: Case e



Reaction to macro news 3

- It is announced that the U.S. current account deficit will reach an annual rate of $700 billion.
- The consensus was $600 billion.

- Q: How will $/FC rate respond?
  - ***Case f:*** The shortfall in exports or increase in imports is viewed as permanent and the US$ weakens.
  - **Case g:** The change is due to greater private sector investments, and the US$ strengthens as foreign capital flows in to finance the investments.

News and Fx Rates: A Summary

- Only unanticipated events cause fx rates to deviate from their expected path of movement.

- Factors increasing the demand for a currency tend to raise the price of that currency.

- The “character” and the “context” of the economic news item greatly influence the “nature” of the fx rate response that follows.

Exchange Rate Forecasting

- Controversies in Exchange Rate Forecasting
- The Cases For & Against FX Forecasting
- Performance Evaluation: Accurate vs. Useful
- A Framework for Currency Forecasting
- Empirical Evidence Favorable to Forecasting

Debates on Fx Rate Forecasting

- The 'random walk' school
  - Fx markets are not predictable
    - fx rate vs. fx return
    - fx return volatility
- The 'technical' school
  - Rates have patterns in the short run
- The 'fundamentals' school
  - Rates have patterns in the long run

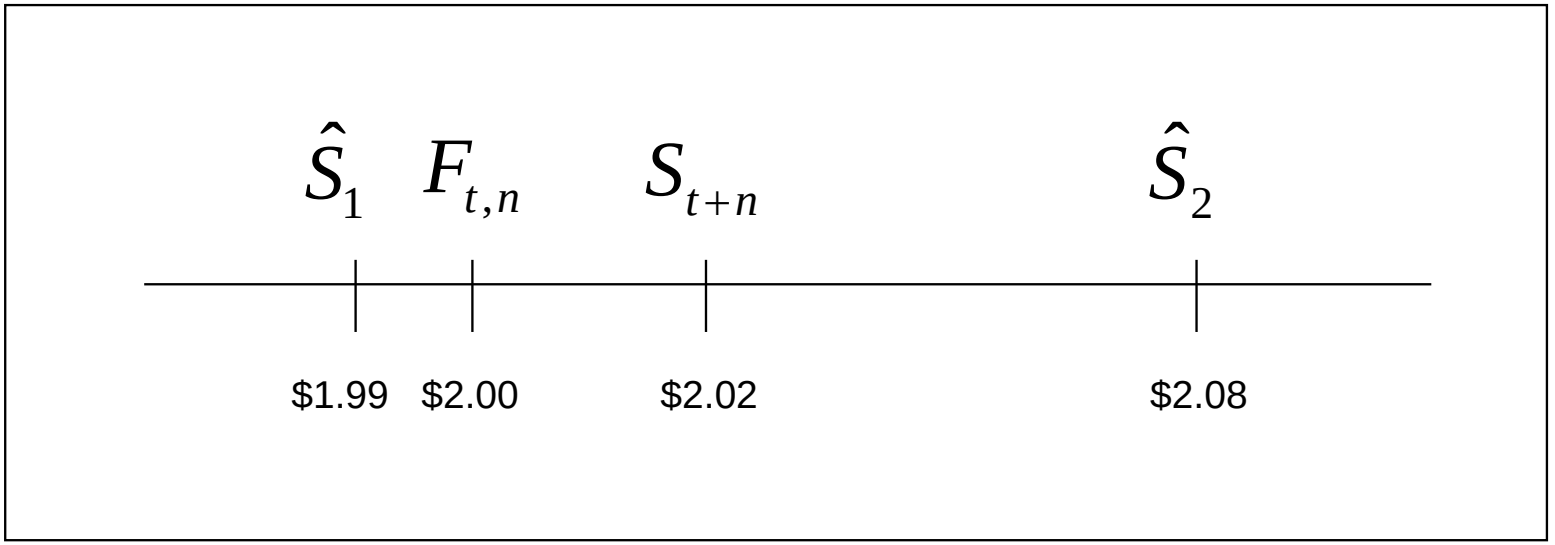
The Case Against Fx Forecasting

- It's very hard to forecast currencies
  - The structural macroeconomic approach
    - Which model? Which variables?
    - Where to get future the explanatory variables?
  - The non-structural approaches
    - Which approach? Which specification?
    - How much past data?
- Market Efficiency
  - "Prices fully reflect available information"
    - Currency markets are competitive, liquid, few barriers to entry
    - Surprising if obvious (low risk) currency profit opportunities exist
  - Forecasting is a competitive industry
    - Use of a good forecast undermines its value

In Favor of Fx Forecasting

- It's *not* so hard to forecast currencies
  - Accuracy is not essential
  - Getting direction right adds value
- Shortage of speculators who act on forecasts
  - Corporate treasurers hedge
  - FX traders close positions at day's end
  - Many asset managers cannot take open Fx positions
- FX markets may violate efficiency
  - Government intervention

Forecast Performance Evaluation: Accurate vs. Useful Forecasts



Consider two forecasters ($\hat{S}_1$ *and* $\hat{S}_2$) as above.

$\hat{S}$ is more accurate, but $\hat{S}$ is correct.

Which one would you prefer to follow?

Measuring Forecast Usefulness

- The “right side of the market” implies the “right side of the forward rate”.
- Measure of “usefulness” = % of correct forecast.

		Actual Exchange Rate Change	
		$S_{t+j} > F_{t,j}$	$S_{t+j} < F_{t,j}$
Predicted Exchange Rate Change	$\hat{S}_{t,j} > F_{t,j}$	**Correct**	**Incorrect**
	$\hat{S}_{t,j} < F_{t,j}$	**Incorrect**	**Correct**

Fx Forecasting: Fx Regime Matters

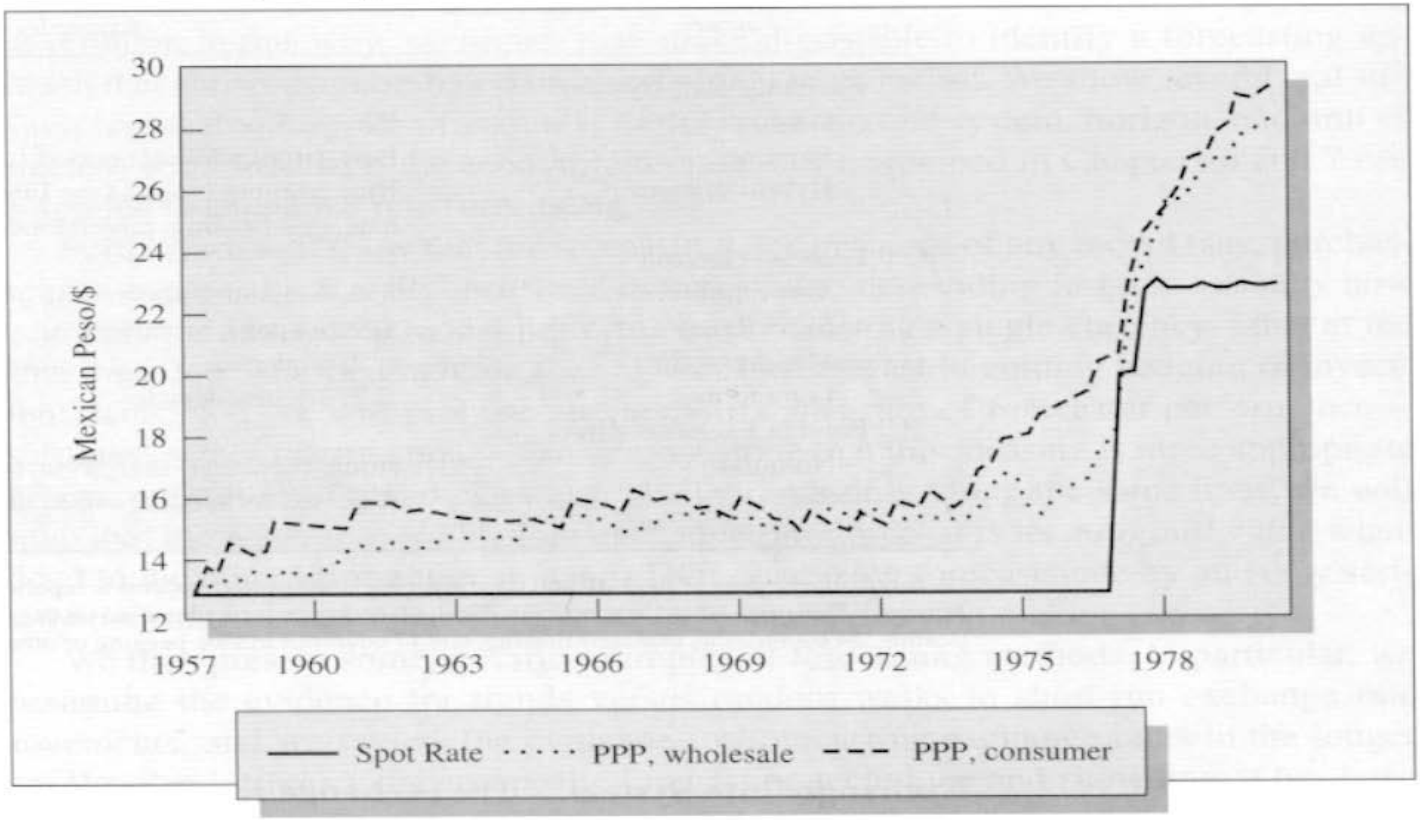
- Under a *pegged rate* regime
  - Once the FX rates become *misaligned*, models may assist regarding direction & magnitude of change
  - Timing is political decision, but economics matters

- Under a *floating rate* regime
  - Continuous small changes
  - Profitable forecasting depends on the lack of efficiency

- Under a *hybrid* regime
  - Elements of both pegged and floating process

The Mexican Peso: 1954-76

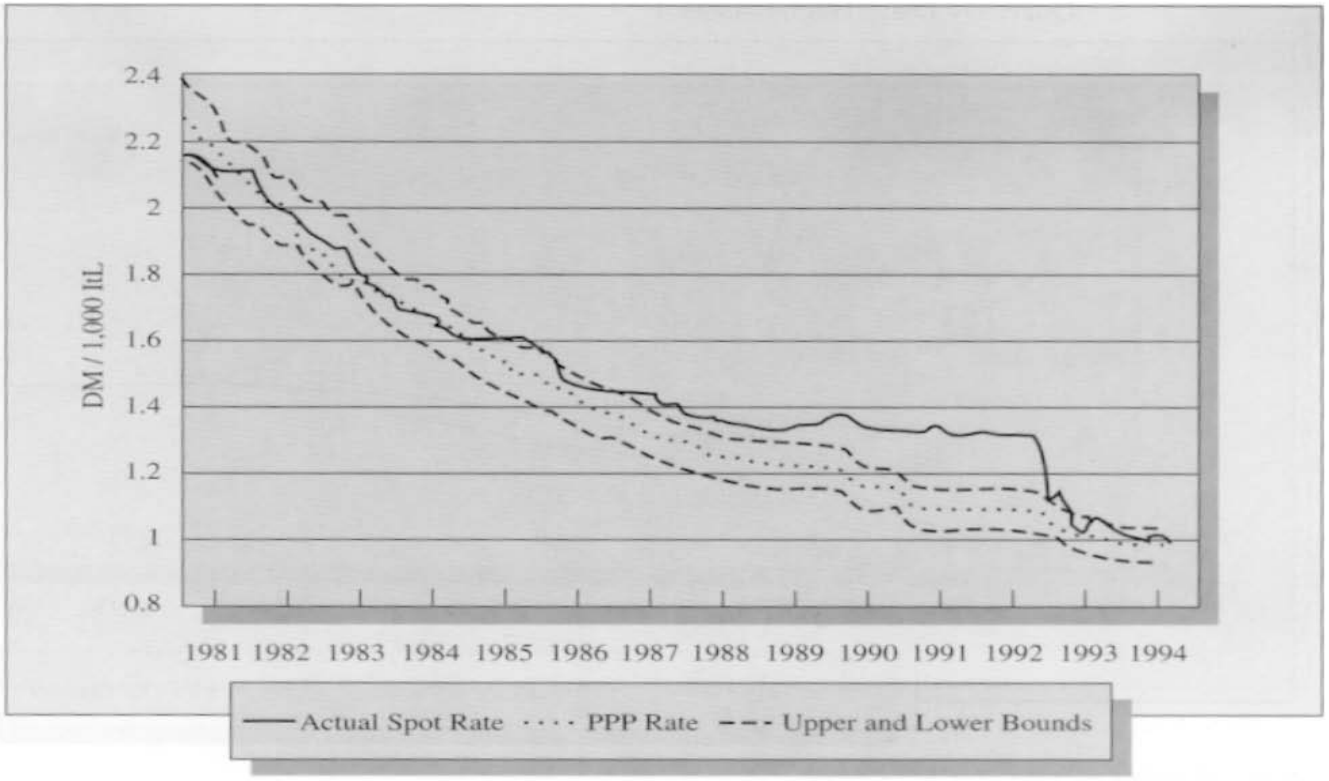
FIGURE 8.2 **Actual and PPP Spot Rates: Mexico**
Quarterly Data, 1957–1979



Note: Calculation uses 1957:1 as a base period.
Source: Author's calculations; data from *International Financial Statistics*.

The Italian Lire: 1981-94

FIGURE 8.4 Actual and PPP Spot Rate—DM/Italian Lira



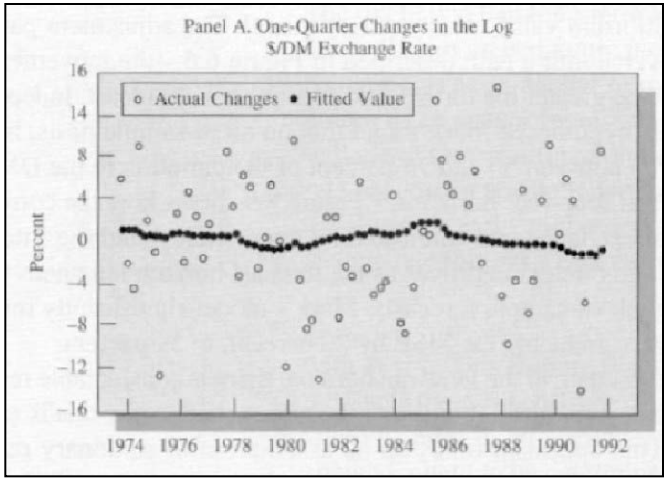
Note: The three lines moving together in the graph represent the estimated PPP rate and its upper and lower bound. During the late 1980s and early 1990s, the lira became progressively overvalued against the DM on a PPP basis, until the lira was devalued in September 1992.

Source: Swiss Bank Corporation, *PPP Chart Book*, Aug. 1994.

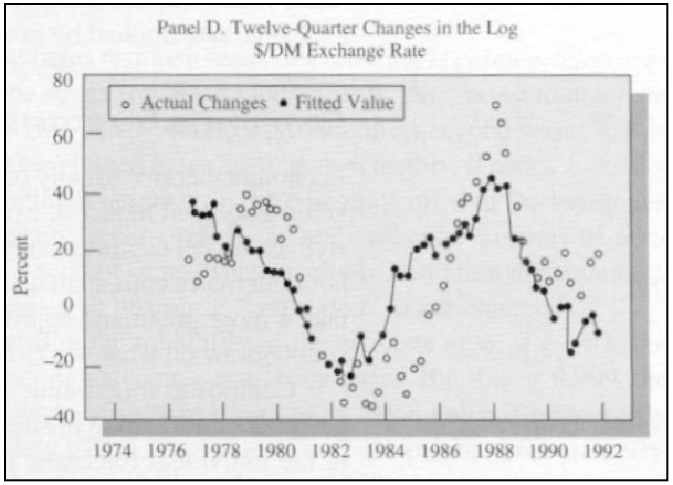
Fx Forecasting: Time Matters

- At short horizons, market participants place greater reliance on technical models
- At longer horizons, there is more reliance on economic fundamentals
- In the middle range of horizons, special approaches, like *out-of-the-money options*, may be useful
  - OTM options used as signal of when fx parity is “too” either expensive or cheap

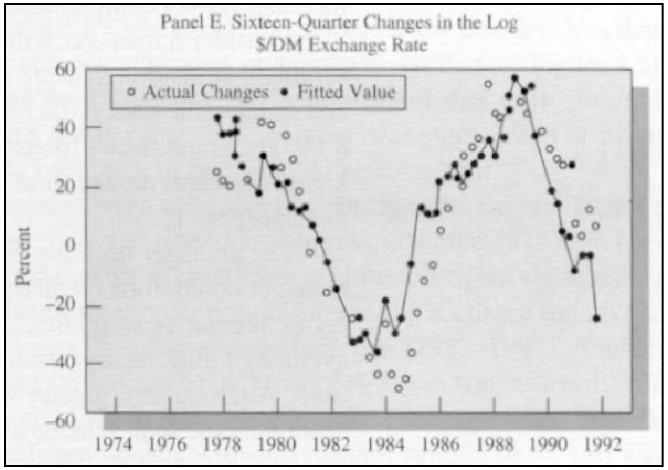
Long-Horizon Predictability



1 Qtr



12 Qtr



16 Qtr

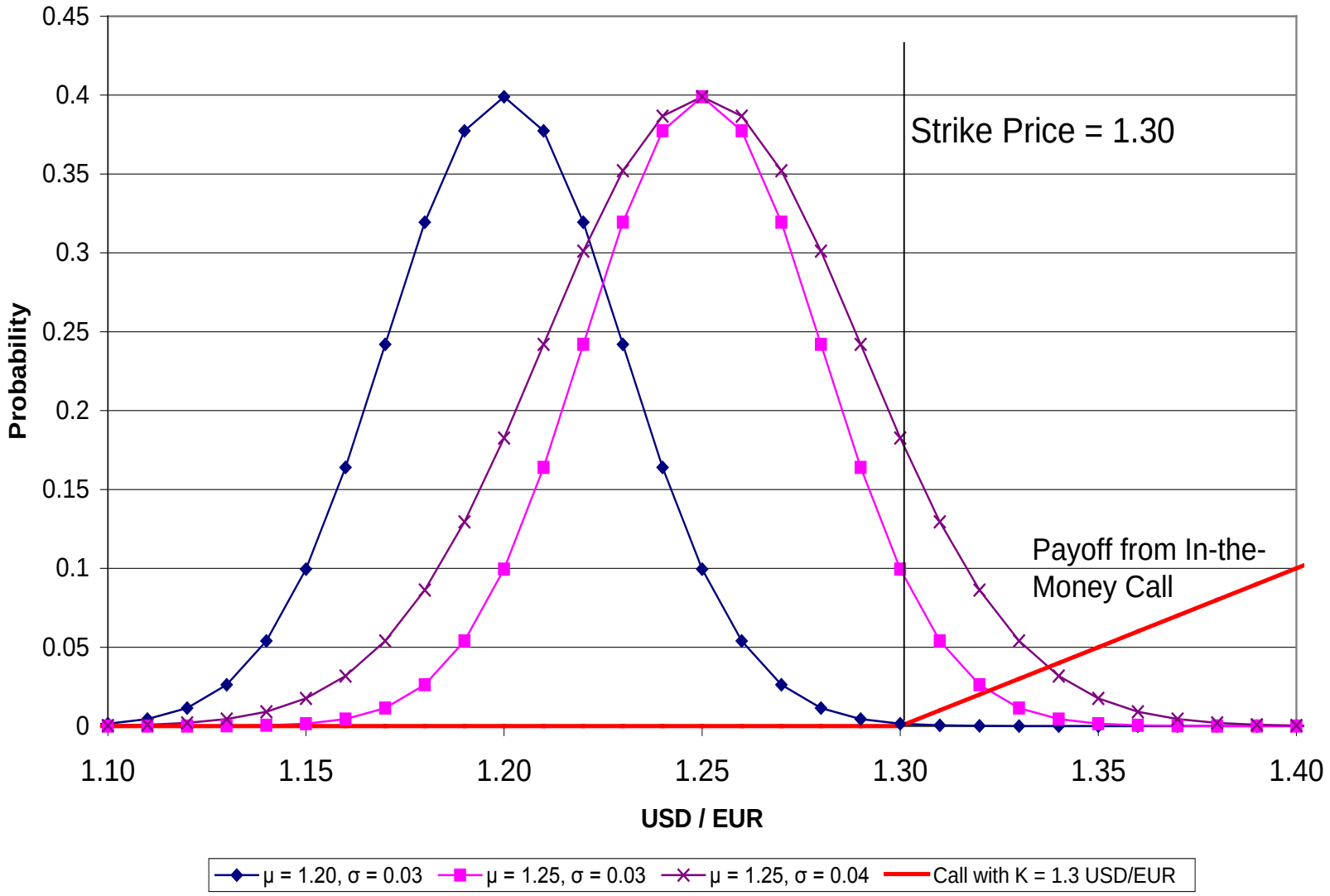
Source: Nelson Mark, “Exchange Rates and Fundamentals …,” *Amer. Econ. Rev.,* March 1995.

Option Prices and Forecasting

- Option prices and the credibility of a target zone
  - If a target zone with limits $\underline{S}$ and $\overline{S}$ is fully credible, then there are limits
    - on the strike prices of options that are sensible to write
    - and on the prices of options with strikes: $\underline{S} < K < \overline{S}$

- The basic intuition is
  - If the target zone is fully credible, realizations of $S > \overline{S}$, or $S < \underline{S}$ are ruled out. So options to buy at $K > \overline{S}$, and options to sell at $K < \underline{S}$ should be worthless.
  - Option prices (both puts and calls) more expensive if buyers think that extreme occurrences outside the target zone are possible.
  - Option prices are sensitive to variance
  - The amount by which an option price exceeds a theoretical price conditional on "no break" in a target zone measure market expectation of a break in the zone.

Option Valuation Under Several Exchange Rate Distributions



Evidence Favoring Forecasting

- Very Short-Run
  - Technical trading rules have been profitable
    - Could reflect either greater risk or true inefficiency
  - Exchange rate responses to macro news

- Short- to Medium-Run
  - Out of the money options

- Long-Run
  - Mean reversion in the real exchange rate
  - Reversion to long-run equilibrium in nominal rate
  - No universal model, but many useful empirical findings

Fx Forecasting: Units of Forecast Matter

- Forecasters must distinguish between the “real” and “nominal” exchange rate
  - Why? Real vs. nominal assets and liabilities
- Real and nominal FX may be similar in the short run, but very different in the long run.
- The nominal exchange rate may be non-stationary, but tend toward an equilibrium.
- The real exchange rate could be a stationary series, implying mean reversion in the long run.

What did we learn about fx rates?

- Fx rates
  - jointly move with macro variables (interest rate, national income, CAB, expectations)
  - depend on some exogenous variables (money supply, fiscal policy, supply of bonds, portfolio preferences, …)
  - Fx rates are set in a forward looking fashion taking into account all available info

- Explanatory power of models
  - no dominant model
  - improves the longer the time horizon considered
  - improves with stable monetary and fiscal policy
  - good even over short horizon if under extreme condition (hyperinflation)
  - in the short run asset models are to be preferred
  - in the long run the flow models become crucial

- Forecasting power of models
  - much of the same said above, but not as good as explanatory power
  - Role of unexpected structural break, fads,…

Basics about risk

- What is risk ?
- Where does the risk come from ?
- Measuring risk or measuring exposure to risk ?
- Multidimensional risk
  - A more common perspective
  - A less common perspective
- Why do firms need to hedge risk?
  - Shareholders' interest ? (base, risk concept)
  - Bondholders' interest? (attitude vs. risk)
  - Managers' interest? (ec matters)
  - Stakeholders' interest? (asset specificity)

Reasons to Hedge

- Information asymmetry
  - Management knows better the firm's net exposure to hedge
- Cost savings
  - Firms can acquire lower cost hedges
- Cost of bankruptcy risk
  - suppliers refusing to supply
  - customers refusing to buy
  - employees leaving the company / recruiting problems
- Liquidity constraints
  - Lost investment opportunities
- Taxes
  - Progressive corporate tax rate
  - Limited carry forward of losses
- Agency problem
  - measuring manager ability

Operating and economic exposure

- Operating risk
  - Uncertainty regarding the overall operating cash flow over the relevant time horizon (annual report, strategic plan) due to changes in business conditions caused by FX dynamics
    - Existing competitors' policies
    - Entrance of new competitors
    - Regulation changes
    - Aggregate demand shifts

- Economic risk
  - As above but related to the market value of the firm

$$MV = f\,(\text{current and future cash flows})$$

Operating / economic exposure

- CF (profit) = revenues – costs
- Fx rate affects
  - Revenue = Output Price * Quantity Sold
    - capacity utilization,
    - competitors' behavior,
    - customers' income, demand elasticity, product differentiation,...
- Costs
  - Cost = Fixed + Variable * Quantity produced
    - Input prices
    - Sourcing flexibility
    - Production flexibilit
    - R&D

Is there operating Fx risk?

- *No fx risk if*
  - neither revenues nor costs are sensitive to fx rate
  - both revenues and cost are sensitive to fx rate thanks to a high level of exchange rate pass-through
    - Degree of pricing power
      - » market leader or follower
      - » competitive industry vs oligopolistic industry
    - Competitors cost structure
      - » Sourcing (fx/dx) / production (operating leverage)
      - » PPP
    - Customer base
      - » Sensitivity of customer's income to fx changes
- *Yes fx risk if*
  - either revenues or costs are sensitive to fx rates

(Fx) Pass Through

Industry Code (SIC)	Industry	Pass-Through Coefficient
20	Food and kindred products	0.2485
22	Textile mill products	0.3124
23	Apparels	0.1068
24	Lumber and wood products	0.0812
25	Furniture and fixtures	0.3576
28	Chemicals and allied products	0.5312
30	Rubber and plastic products	0.5318
31	Leather products	0.3144
32	Stone, glass, concrete products	0.8843
33	Primary metal industries	0.2123
34	Fabricated metal products	0.3138
35	Machinery, except electrical	0.7559
36	Electrical and electronic machinery	0.3914
37	Transportation equipment	0.3583
38	Measurement instruments	0.7256
39	Miscellaneous manufacturing	0.2765
Average		0.4205

Source: Jiawen Yang. "Exchange Rate Pass-Through in U.S. Manufacturing Industries," *Review of Economics and Statistics* 79 (1997), pp. 95–104.

Economic exposure: long/short run

- Economic exposure is different in the long/short run
- Market provides some natural hedge in the long run
  - PPP, OIRP, Overshooting
  - Economic policies may help to offset the damages caused by unexpected fx rate changes
- In the short run:
  - the firm has less flexibility in changing prices, adjusting production processes and innovating the product range
  - the firm is exposed to large violation of PPP, UIRP
- <u>You need to survive the short run</u>

Investing Abroad

$$(1+R_{hc}) = (1+R_a)\,(1+R_{fx}) = 1 + (R_a + R_{fx} + R_a\,R_{fx})$$

$$E[R_{hc}] \approx E[R_a] + E[R_{fx}]$$

$$Var\,(R_{hc}) = Var\,(R_a) + Var\,(R_{fx}) + 2\,Cov\,(R_a, R_{fx})$$

- Are foreign markets more volatile than home markets?
- Fx risk or fx insurance?
  - Does it really matter ?

Fx risk or insurance?

EXHIBIT 15.8 Decomposition of the Variance of International Security Returns in U.S. Dollars[a] (Monthly Data: 1978.1–1989.12)

	$Var(R_{is})$	Components of Var (R_{is})[b]			
		$Var(R_i)$	$Var(e_i)$	$2Cov(R_i, e_i)$	ΔVar
Bonds					
Canada	15.29	10.82 (70.76%)	1.72 (11.25%)	2.67 (17.46%)	0.08 (0.52%)
France	16.48	2.82 (17.11%)	12.74 (77.31%)	0.60 (3.64%)	0.32 (1.94%)
Germany	21.53	2.59 (12.03%)	13.84 (64.28%)	4.91 (22.81%)	0.19 (0.88%)
Japan	24.70	3.03 (12.27%)	15.13 (61.26%)	6.09 (24.66%)	0.45 (1.82%)
Switzerland	21.16	1.14 (5.39%)	17.64 (83.36%)	2.34 (11.06%)	0.04 (0.19%)
U.K.	27.67	8.88 (32.09%)	12.39 (44.78%)	6.08 (21.97%)	0.32 (1.16%)
U.S.	10.24	10.24 (100.00%)	0.00 (n.a.)	0.00 (n.a.)	0.00 (n.a.)
Stocks					
Canada	37.70	30.58 (81.11%)	1.72 (4.56%)	5.37 (14.24%)	0.03 (0.08%)
France	59.75	43.03 (72.02%)	12.74 (21.32%)	3.75 (6.28%)	0.23 (0.38%)
Germany	43.82	29.27 (66.80%)	13.84 (31.58%)	0.00 (0.00%)	0.71 (1.62%)
Japan	41.47	19.45 (47.24%)	15.13 (36.48%)	5.83 (14.06%)	1.06 (2.56%)
Switzerland	34.81	20.07 (57.66%)	17.64 (50.68%)	−3.76 (−10.80%)	0.86 (2.47%)
U.K.	40.96	29.27 (71.46%)	12.39 (30.25%)	−1.52 (−3.71%)	0.82 (2.00%)
U.S.	21.16	21.16 (100.00%)	0.00 (n.a.)	0.00 (n.a.)	0.00 (n.a.)

[a]The portfolio variances are computed using the monthly percentage returns.

[b]The relative contributions of individual components to the total portfolio risk appear in parentheses.

Source: Reprinted by permission, C. Eun and B. Resnick, "International Diversification of Investment Portfolios: U.S. and Japanese Perspectives," *Management Science*, Vol. 40, No. 1, January 1994. © 1994, The Institute of Management Sciences (currently INFORMS), 290 Westminster Street, Providence, RI 02903 USA.

Stock markets around the world

EXHIBIT 15.4 Summary Statistics of the Monthly Returns for 12 Major Stock Markets: 1980.1–2001.12
(All Statistics in U.S. Dollars)

Stock Market	Correlation Coefficients											Mean (%)	SD (%)	β[a]	SHP[b]	(Rank)
	AU	CN	FR	GM	HK	IT	JP	NL	SD	SW	UK					
Australia (AU)												1.05	7.07	0.94	0.071	(10)
Canada (CN)	0.60											0.88	5.78	0.99	0.057	(11)
France (FR)	0.37	0.46										1.19	6.29	1.00	0.102	(6)
Germany (GM)	0.34	0.42	0.69									1.09	6.26	0.91	0.086	(9)
Hong Kong (HK)	0.46	0.47	0.31	0.36								1.53	9.58	1.10	0.102	(6)
Italy (IT)	0.25	0.35	0.50	0.43	0.29							1.26	7.62	0.89	0.093	(8)
Japan (JP)	0.33	0.33	0.41	0.33	0.26	0.37						0.91	6.99	1.20	0.052	(12)
Netherlands (NL)	0.44	0.58	0.66	0.71	0.47	0.44	0.42					1.38	5.15	0.92	0.161	(1)
Sweden (SD)	0.44	0.49	0.49	0.54	0.39	0.44	0.39	0.54				1.71	7.28	1.08	0.159	(3)
Switzerland (SW)	0.38	0.46	0.61	0.67	0.34	0.35	0.41	0.70	0.49			1.13	5.40	0.85	0.107	(5)
United Kingdom (UK)	0.54	0.57	0.57	0.50	0.48	0.38	0.42	0.70	0.51	0.59		1.23	5.55	0.98	0.123	(4)
United States (US)	0.47	0.74	0.50	0.45	0.41	0.29	0.31	0.62	0.49	0.51	0.58	1.26	4.43	0.86	0.160	(2)

[a]β denotes the systematic risk (beta) of a country's stock market index measured against the world stock market index.

[b]SHP denotes the Sharpe performance measure, which is $(\bar{R}_i - R_f)/\sigma_i$ where R_i and σ_i are, respectively, the mean and standard deviation of returns to the ith market. Ranking of each market in terms of the Sharpe performance measure is provided in parentheses. The monthly risk-free interest rate, R_f, is 0.55%, which is the average monthly U.S. Treasury bill rate during the sample period 1980–2001.

Source: Returns on MSCI stock market indexes are from Datastream.

Questions

- Why different risk levels across countries?
- What happens if you add a riskier market to your domestic portfolio?
- What about the equity risk premium ?

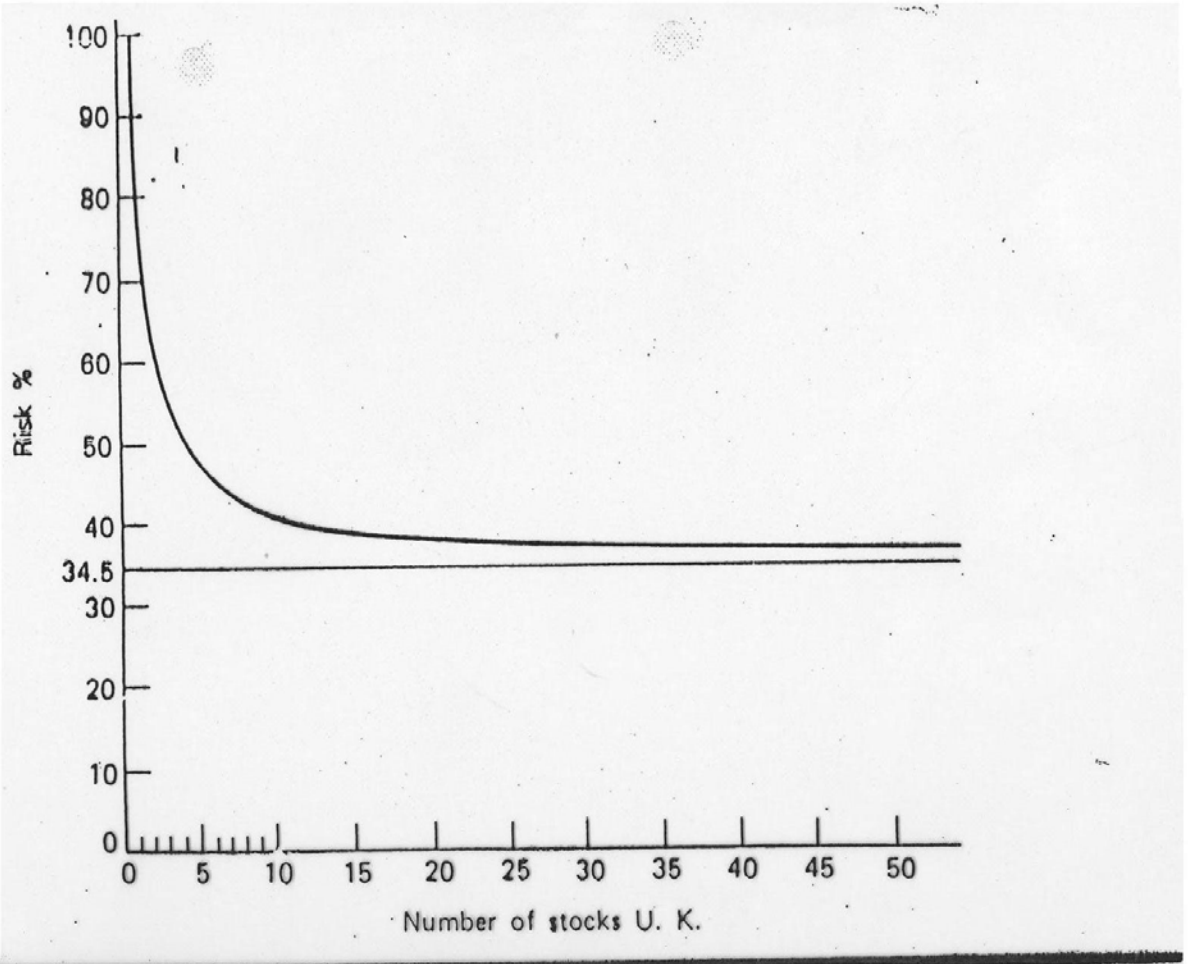


Figure 4.3 The effect of securities on risk in the U.K. [12].

Elton - Gruber

Table 4.9 Percentage of the Risk on an Individual Security that Can Be Eliminated by Holding a Random Portfolio of Stocks within Selected National Markets and among National Markets [12]

U.S.A.	73
U.K.	65.5
France	67.3
Germany	56.2
Italy	60.0
Belgium	80.0
Switzerland	56.0
Netherlands	76.1
International stocks	89.3

Elton- Gruber

ERP I

Table I

Long-Term Performance of Global Equity Markets
(Compound Return in Percentage per Annum)

The table compares the long-term performance of global equity markets with annually compounded data. The sample period varies across country and is reported in the second column. Data for subperiods are reported within brackets. Percentage returns are measured in nominal terms in the local currency, in real terms—deflating by the Wholesale Price Index, and translated into U.S. dollars. The last column reports the inflation rate. * indicates a break in the series that has been bridged; + indicates a permanent discontinuity in the series.

Country	Period	Nominal Return	Real Return	Dollar Return	Inflation
United States	1/21–12/96	6.95	4.32	6.95	2.52
Canada	1/21–12/96	5.78	3.19	5.35	2.51
Austria*	1/25–12/96	5.64	1.62	5.00	3.95
Belgium	1/21–12/96	4.45	−0.26	3.51	4.73
Denmark	1/26–12/96	5.87	1.87	5.19	3.93
Finland	1/31–12/96	10.23	2.07	6.19	7.99
France	1/21–12/96	9.09	0.75	4.29	8.28
Germany*	21–96	4.43	1.91	5.81	2.47
Germany	1/21–7/44	[3.29]	[2.23]	[5.59]	[1.04]
Germany	1/50–12/96	[8.46]	[6.00]	[10.78]	[2.32]
Ireland	1/34–12/96	7.00	1.46	5.14	5.45
Italy	12/28–12/96	10.10	0.15	3.22	9.94
Netherlands	1/21–12/96	3.71	1.55	4.47	2.12
Norway	1/28–12/96	7.13	2.91	6.29	4.10
Portugal*	31–96	6.89	−0.58	3.78	7.51
Portugal	12/30–4/74	[5.21]	[1.16]	[4.96]	[4.00]
Portugal	3/77–12/96	[20.11]	[5.63]	[11.92]	[13.71]
Spain*	1/21–12/96	4.66	−1.82	1.53	6.61
Sweden	1/21–12/96	7.42	4.29	7.00	3.00
Switzerland	1/26–12/96	4.83	3.24	6.84	1.54
United Kingdom	1/21–12/96	6.30	2.35	5.20	3.86
Czechoslovakia	1/21–4/45	4.33	3.79	9.50	0.52
Greece	7/29–9/40	−2.12	−5.50	−8.08	3.58
Hungary	1/25–6/44	6.29	2.80	9.07	3.40
Poland	1/21–6/39	−7.00	−3.97	−4.30	−3.15
Romania	12/37–6/41	−5.36	−28.06	−14.64	31.55
Australia	1/31–12/96	7.06	1.58	6.29	5.39
New Zealand	1/31–12/96	5.69	−0.34	3.63	6.01
Japan*	21–96	7.33	−0.81	1.80	8.21
Japan	1/21–5/44	[1.23]	[−0.34]	[−1.83]	[1.58]
Japan	4/49–12/96	[8.30]	[5.52]	[10.90]	[2.63]
India	12/39–12/96	5.10	−2.33	0.80	7.60
Pakistan	7/60–12/96	7.79	−1.77	0.59	8.57
Philippines	7/54–12/96	5.95	−3.65	−0.30	9.96
Argentina+	47–65,75–96	87.48	−4.80	−1.43	96.92
Argentina	9/47–7/65	[−5.78]	[−25.09]	[−23.64]	[25.78]
Argentina	12/75–12/96	[236.29]	[16.71]	[22.43]	[188.15]
Brazil	2/61–12/96	142.34	−0.17	4.68	147.52
Mexico	12/34–12/96	20.13	2.30	6.12	17.43

ERP - II

Table I—*Continued*

Country	Period	Nominal Return	Real Return	Dollar Return	Inflation
Chile*	27–96	37.12	2.99	6.38	33.16
Chile	1/27–3/71	[12.98]	[−5.37]	[−4.23]	[19.39]
Chile	1/74–12/96	[64.19]	[15.52]	[20.94]	[42.13]
Colombia	12/36–12/96	10.15	−4.29	−0.88	15.09
Peru*	41–96	45.29	−4.85	3.45	52.68
Peru	3/41–1/53	[2.03]	[−12.36]	[2.03]	[16.41]
Peru	1/57–12/77	[1.53]	[−9.88]	[−7.40]	[12.66]
Peru	12/88–12/96	[340.95]	[30.45]	[50.92]	[232.18]
Uruguay	3/38–11/44	6.70	2.42	10.01	4.19
Venezuela	12/37–12/96	9.67	−2.04	0.78	11.95
Egypt	7/50–9/62	−1.46	−2.84	−1.63	1.42
Israel	1/57–12/96	37.05	3.03	7.21	33.02
South Africa	1/47–12/96	6.13	−1.76	1.48	8.03
All 39 countries					
Mean			−0.47	3.11	
Median			0.75	4.68	
11 countries with continuous histories into the 1920s					
Mean			1.88	5.09	
Median			2.35	5.20	

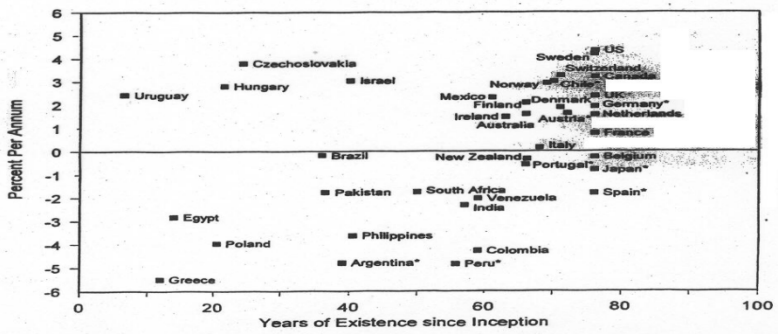
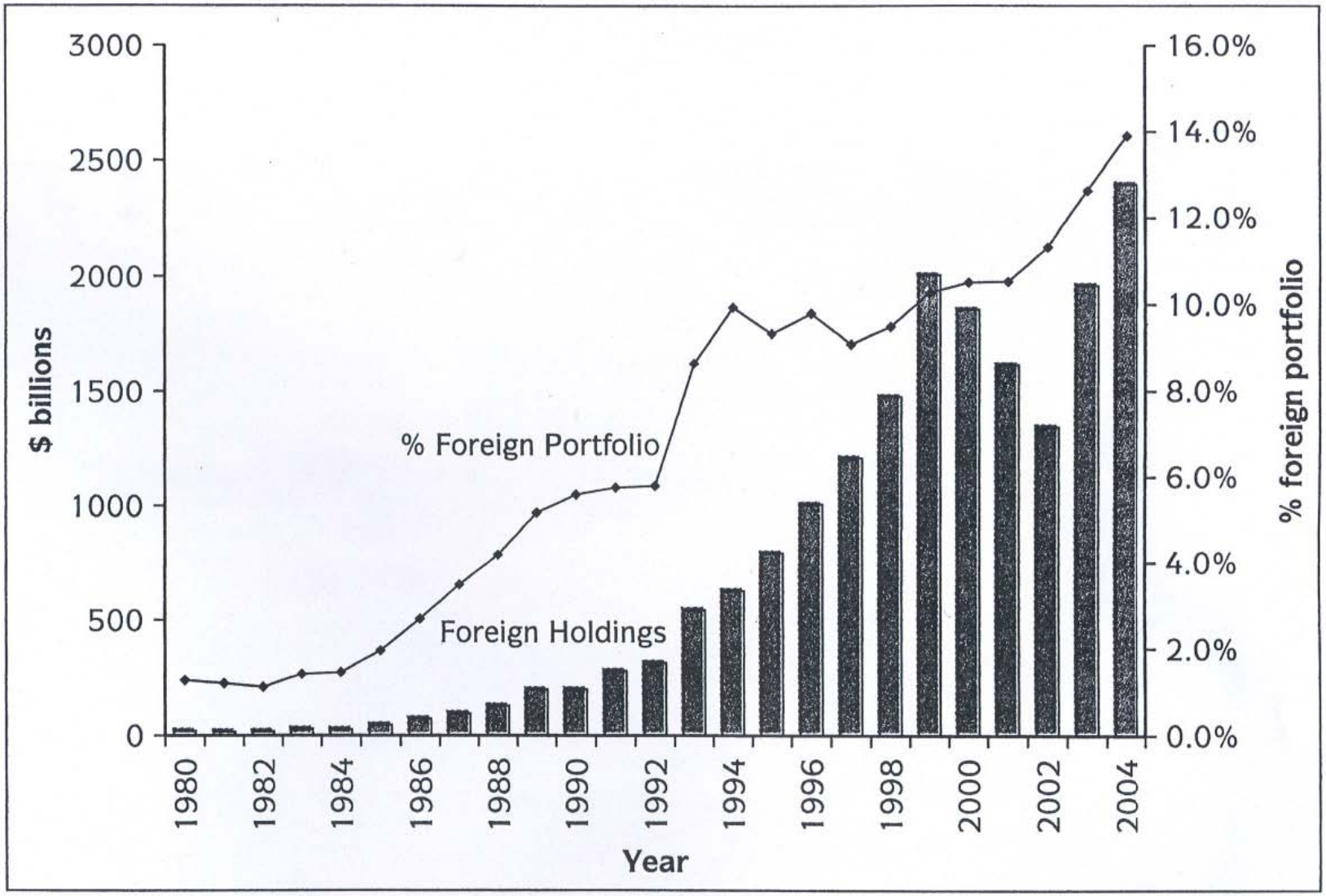


Figure 1. Real returns on global stock markets. The figure displays average real returns for 39 markets over the period 1921 to 1996. Markets are sorted by years of existence. The graph shows that markets with long histories typically have higher returns. An asterisk indicates that the market suffered a long-term break.

Still a Home Country Bias?



Source: The Federal Reserve Board, *Flow of Funds Accounts of the United States*, various issues.

Something missed ?

- Country risk
  - Sovereign risk
  - Transfer risk
  - Expropriation risk
  - Enforcement risk
- Operational risk
  - Clearing and settlement of trades
  - Custody services
  - Shareholders' rights
- Large shareholdings