

# Expanding Resources and Enhancing Incentives for Investments in Science and Innovation

## Insights from New Initiatives in Development Cooperation Financing

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\* The views expressed are those of the author and do not necessarily reflect those of the organization with which he is affiliated.

# Structure of the presentation

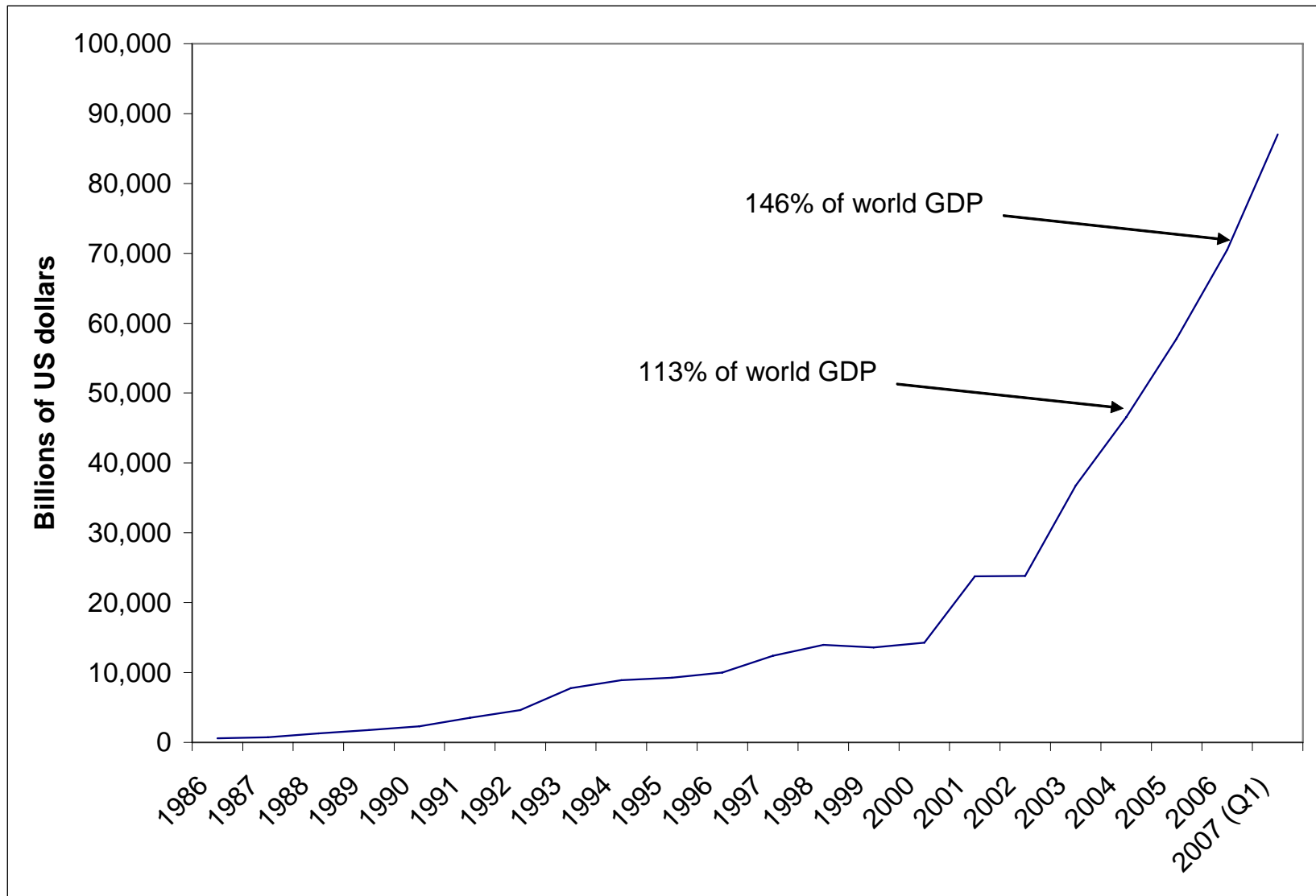
1. Opportunities and challenges for more and better financing: recent developments in financial systems
2. New and proposed initiatives in development cooperation financing
3. Implications for science and technology policy

1. Opportunities and challenges for more and better financing: recent developments in financial systems

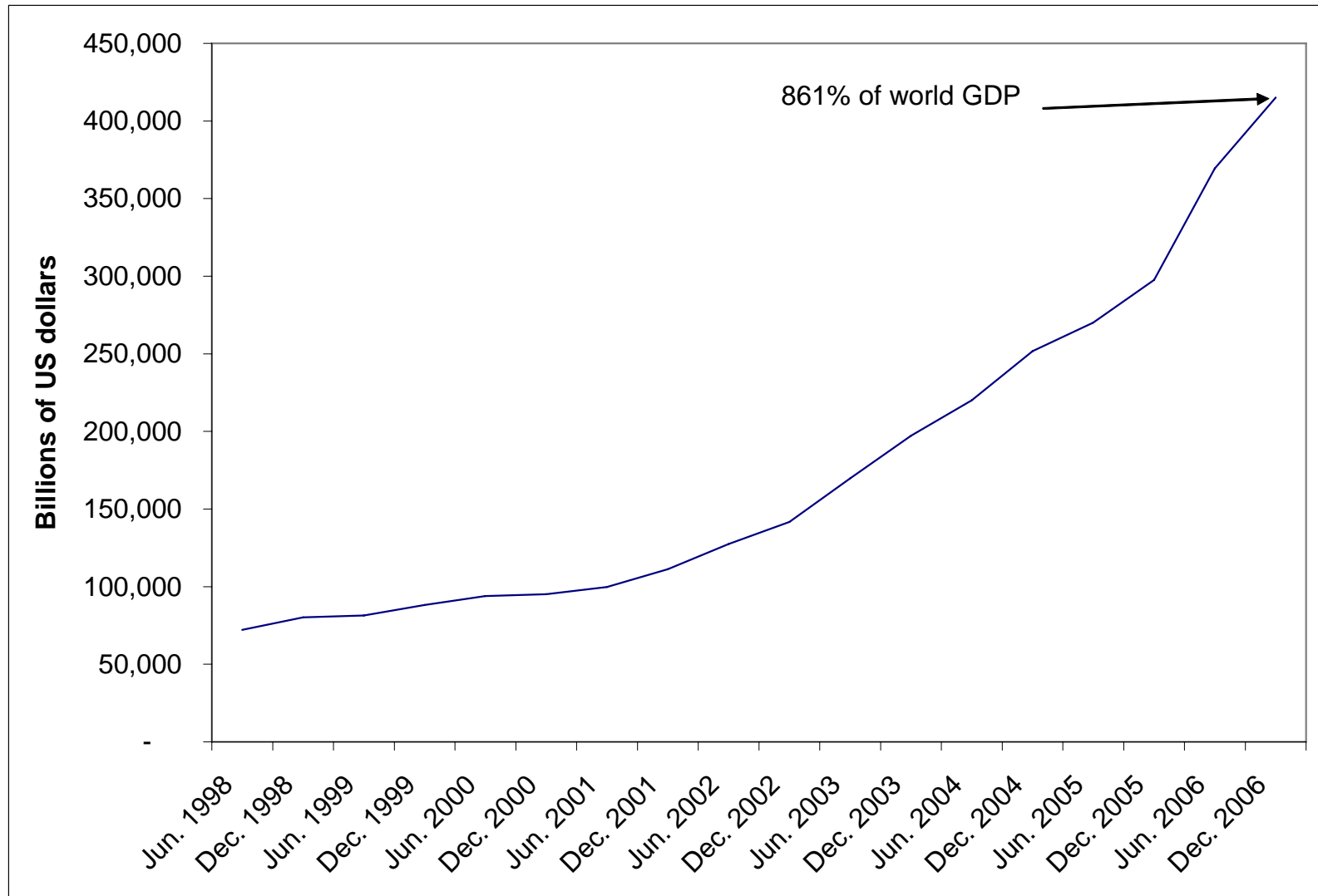
# Size of Capital Markets in 2006

	GDP (billions of US dollars)	Percent of GDP					
		Stock Market Capitalization	Debt Securities			Bank Assets	Bonds, Equities and Bank Assets
			Public	Private	Total		
European Union	13,644	96	56	114	170	269	534
Euro area	10,589	80	62	115	177	244	503
North America	14,470	147	48	146	194	84	425
Japan	4,366	110	155	45	200	147	456
Emerging market countries	14,079	83	28	15	43	80	206
<b>World</b>	<b>48,204</b>	<b>105</b>	<b>53</b>	<b>89</b>	<b>143</b>	<b>147</b>	<b>395</b>
Memo:							
World in 2004	41,255	90	56	84	140	139	369

# Exchange-Traded Derivatives (Notional principal outstanding amounts)

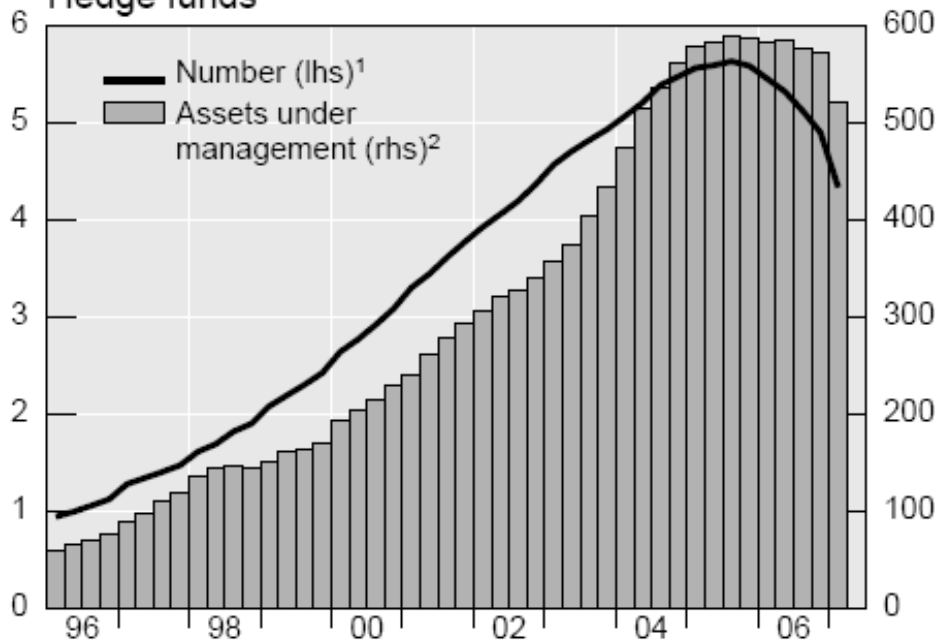


# Derivatives Traded Over-the-Counter (Notional principal outstanding amounts)



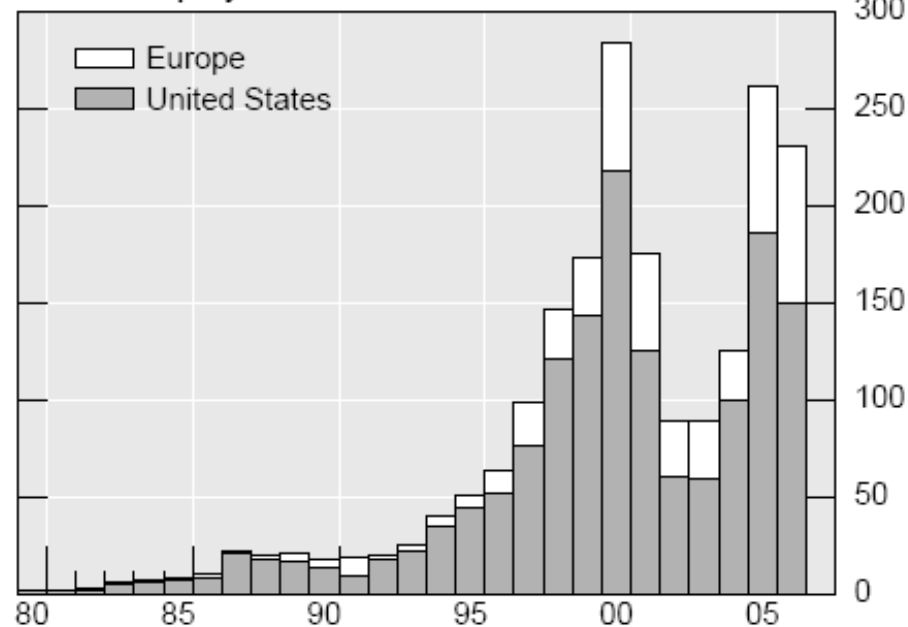
# The Rise of Hedge Funds and the Recovery in Private Equity

## Hedge funds



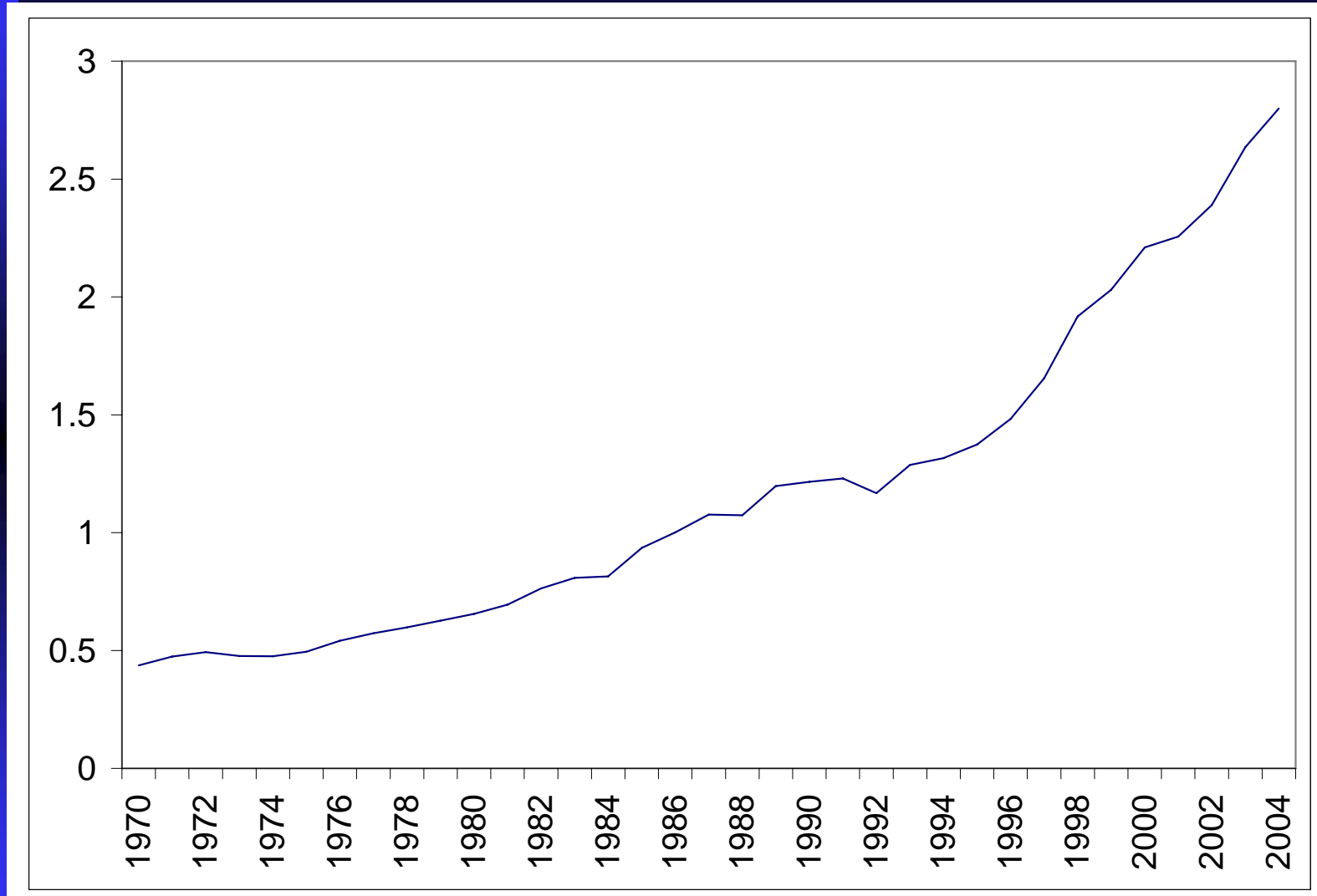
<sup>1</sup> In thousands. <sup>2</sup> In billions of US dollars.

## Private equity: cash flows<sup>2</sup>



Source: Claudio E V Borio. 2007. "Change and constancy in the financial system: implications for financial distress and policy." BIS Working Paper No. 237. October.

# Growing Integration of Global Capital Markets (global foreign assets and liabilities scaled by world GDP)



Source: Own calculations based on: Lane, Philip R. and Gian Maria Milesi-Ferretti. 2006. "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970-2004." IMF Working Paper WP/06/69. Washington, D.C.: IMF.



# Challenges

## ■ Recent developments present new challenges:

- ◆ Financial system more vulnerable to the evaporation of **liquidity** (e.g. trouble with money markets during the summer).
- ◆ Increased **complexity and opacity** of the financial system poses new problems for auditing, and for regulatory and supervisory authorities (e.g. unfolding troubles related with sub-prime crisis).
- ◆ Lack of clarity about the effect of **incentives faced by new players** (e.g. Raghuram G Rajan. 2005. “Has Financial Development Made the World Riskier?” NBER Working Paper No. 11728. Cambridge, MA: NBER).

## ■ Perennial challenges of financial systems remain:

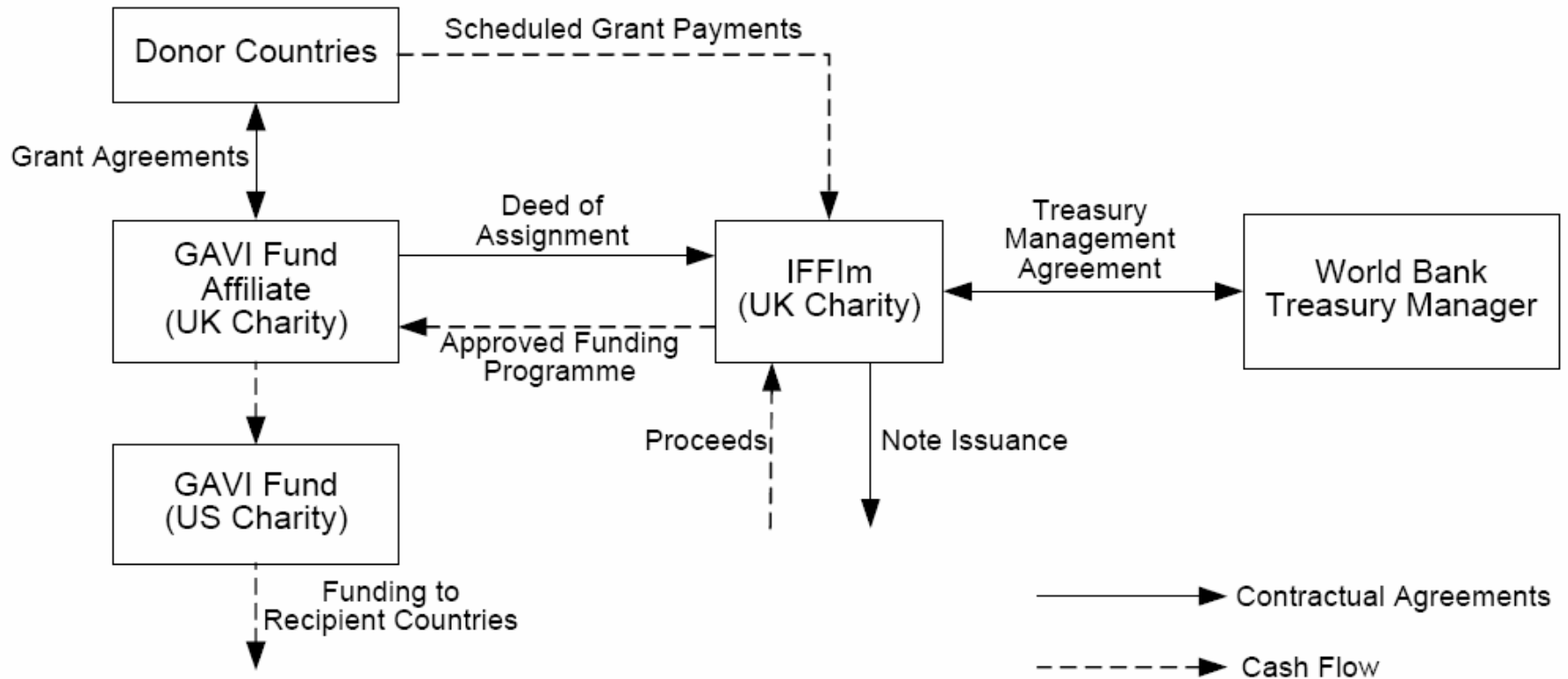
- ◆ **Asymmetric information** problems are endemic to financial transactions, since the transfer of claims on resources is made across agents that do not have access to the same information (e.g. equity rationing: Greenwald, Stiglitz, and Weiss. 1984. “Informational Imperfections in the Capital Markets and Macroeconomic Fluctuations.” *American Economic Review*. 74(2): 194–199).
- ◆ **Excessive volatility**, driven by self-reinforcing mechanisms that lead to asset price bubbles and collapses (e.g. US stock market in the late 1990s, US home prices since 2000).

2. New and proposed initiatives in development cooperation financing

# International Finance Facility

- **The challenge:** for the achievement of the Millennium Development Goals (MDGs), additional yearly investment of \$30 billion to \$70 billion until 2015 are needed.
- The IFF would raise funds based on the securitization of donor commitments – money would be available immediately by issuing debt on international capital markets backed by those donor commitments.
- A pilot project – the International Finance Facility for Immunization (IFFIm) is underway.

# Structure of IFFIm



Source: Fitch Ratings. 2006. Credit Analysis Report for the International Financial Facility for Immunisation. New York.

# Frontloaded Financing Profile (Illustrative)



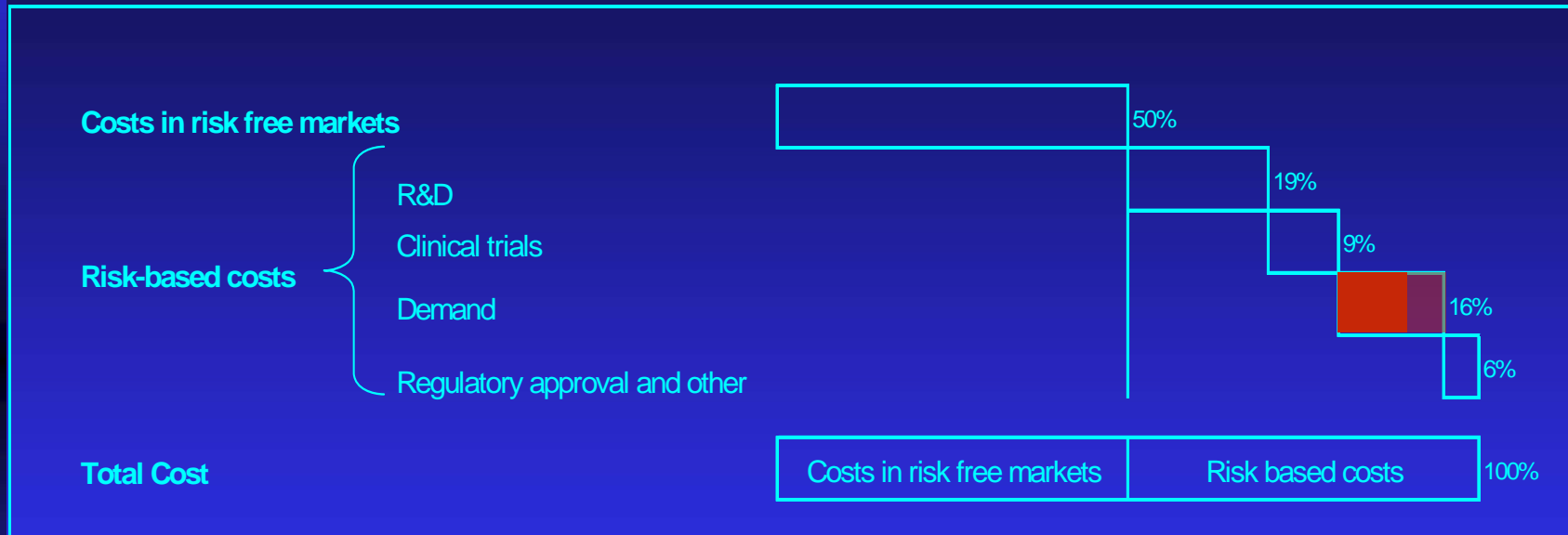
## Developments with the IFFIm

- Several countries pledged funding over 20 years: Italy, Norway, Spain, Sweden, South Africa, the UK, France, Brazil.
- First \$1 billion bond (rated AAA/Aaa/AAA) sold on November 7, 2006 (annual yield of 5.019 percent, 31 bps above five-year U.S. Treasury) - \$4 billion more over the next 10 years.
- **Advantages:**
  - ◆ Donors are able to pay over a long period of time.
  - ◆ Frontloading of spending and predictability of funding result in a **25% net increase in impact of funding** (Owen Barder and Ethan Yeh. 2006. The Costs and Benefits of Front-loading and Predictability of Immunization. CGD Working Paper No. 80. Washington, D.C.: CGD.).

# Advanced Market Commitments

- **The challenge:** missing or incomplete markets, as in the case of vaccines for developing countries diseases.
- The AMC “creates a market” similar to the one that exists for other pharmaceuticals and vaccines, with donors making a commitment to subsidize the price of the vaccine – if and only if and when one is developed to pre-specified requisites – during a period of time.
- A pilot AMC project was launched in February 2007.

# Advanced Market Commitment for Vaccines: Potential Risk-based Cost Savings



Composition of Cost per Dose for Hypothetical Vaccine .



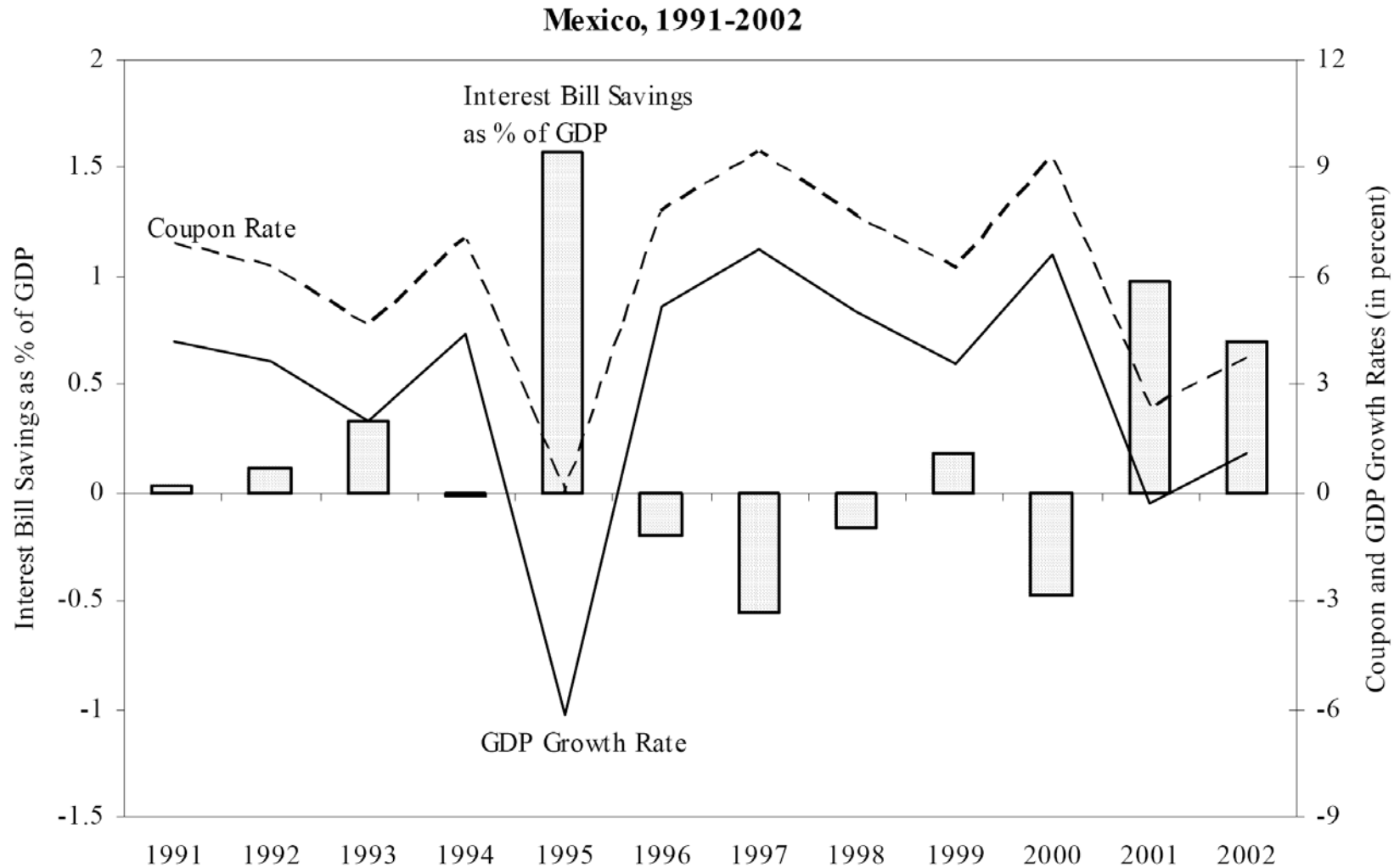
## Developments with AMCs

- The \$1.5 billion pilot AMC is financed by Italy, the UK, Canada, Norway, Russia, and the Bill & Melinda Gates Foundation.
- The pilot AMC is targeted at vaccines against pediatric pneumonia, middle ear infections, and meningitis. Vaccines expected to be licensed by 2010; estimated price per dose of \$5–7; payments continuing up to 10 years. A second AMC has been recommended for a malaria vaccine ( \$4.5–\$5.0 billion) but additional push financing for R&D still needed.
- **Advantages:**
  - ◆ Bring the availability of vaccines addressing specifically developing countries forward by 10 to 15 years.
  - ◆ In the case of malaria, this would represent a net annual gain of as much as \$1.4 billion dollars (ODS estimates).

# GDP Indexed Bonds

- **The challenge:** direct equity finance not available to sovereigns, exclusive reliance on debt finance problematic during financial distress.
- With GDP (or commodity) indexed bonds, debt servicing would be linked to economic performance (or important determinants), taking the form of a built-in stabilizer that would also induce counter-cyclical fiscal policies.
- Not implemented yet, except in an incipient way (Argentine debt warrants, value recovery rights in some Brady bonds; also relevant the story with inflation-indexed bonds)

# Interest Savings from GDP-indexed Bonds (Illustrative)



Source: Borensztein, E. and Mauro, P. 2004. "The Case for GDP-indexed Bonds." *Economic Policy*, 19 (38): 166-216.

### 3. Implications for science and technology policy

# Insights from Development Cooperation Financing

- Not so much about more money (although it may be: PPPs and project finance) but *better* money. Some characteristics of better money:
  - ◆ Enhanced risk allocation (AMCs reduce demand risk faced by private agents; GDP indexed bonds: some risks are placed in capital markets).
  - ◆ More value for money (including by changing the time profile of spending and making commitments more credible, as in IFF).
  - ◆ Better alignment of incentives (AMCs: money is only spent with results).
  - ◆ Improved liquidity conditions (GDP indexed bonds: money is there when most needed, instead of drying out).
- **Public finance remains critical:** collaboration between public and private finance, governments and markets, finding the “comparative advantages” of each (e.g. Kremer and Miguel. 2007. “The Illusion of Sustainability.” *Quarterly Journal of Economics*. 122 (3): 1007-1065.)
- Innovative finance *should not be* about subverting public budget processes and obfuscating the public.

# Similarities between R&D/Innovation and Development Cooperation Financing

- Risk and uncertainty are pervasive, but rarely analyzed systematically (equity financing, with superior risk-sharing properties and project selection frameworks is not available or is small).
- Returns are potentially very high, but appropriability challenging (large spillovers, even global). Very hard to measure results and to prove to skeptics the effectiveness of the *total* envelope of financial allocations (always possible to find *individual* examples of success).
- Both types of investment have been financed rather traditionally by both the public and the private sectors.

# What Can be Done in Science and Technology Policy?

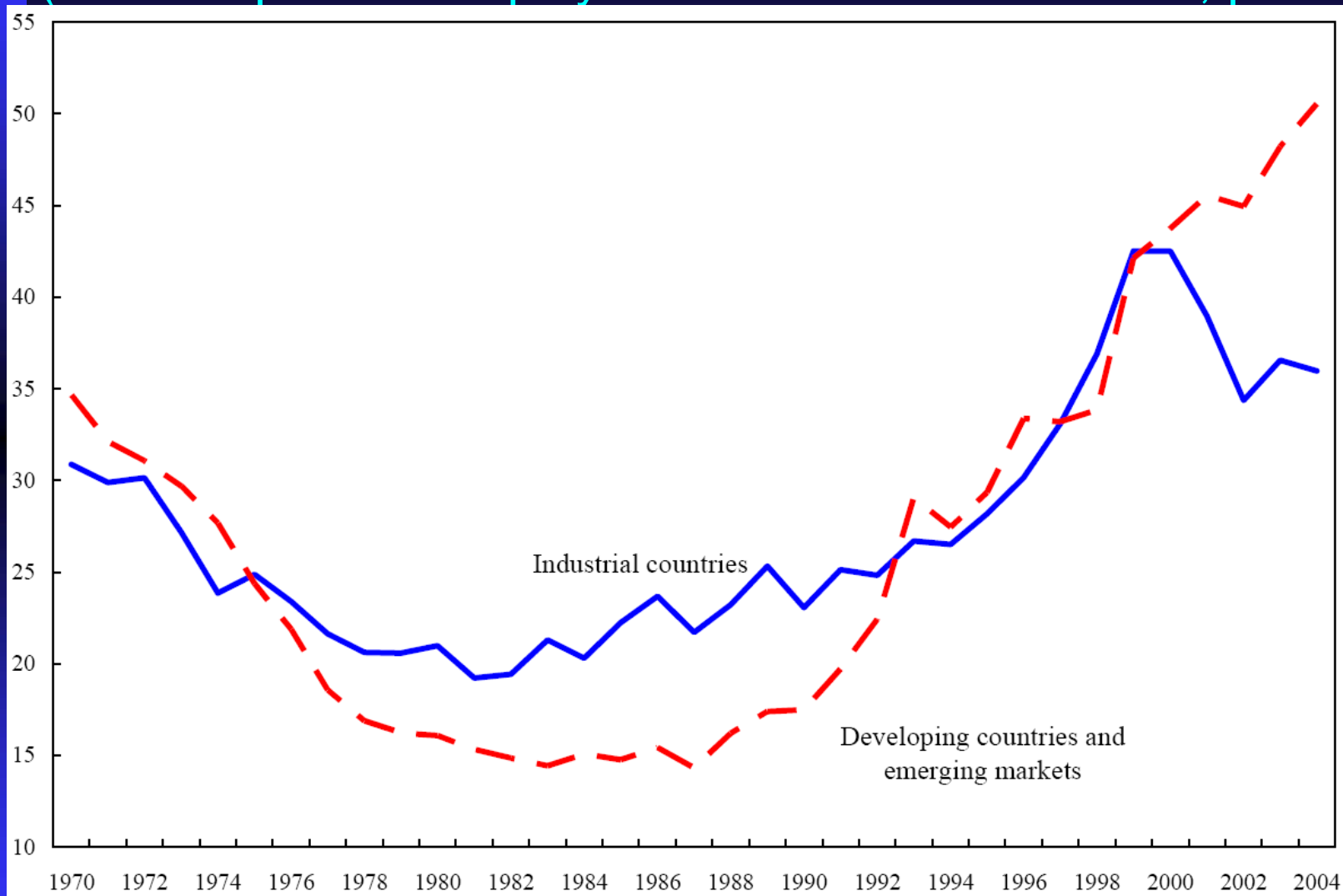
- Better answers at the end of the workshop...Use of indexed debt as a substitute for lack of equity financing (e.g. income-linked loans to students, as in Australia; revenue-linked loans to SMEs)?
- Enhanced use of structured finance and securitization. [**Antonio Baldaque Silva**].
- Better and more ambitious use of project finance and public-private partnerships. [**IAVI, Dirk Pilat**].
- Enhanced use of public guarantees namely when collateral is inexistent or difficult to be accepted (e.g. the new student loan policy in Portugal; the EC/BEI risk-sharing facility). [**Jose de Barros and Luisa Ferreira**].
- Direct extension of the AMC concept to other technologies (e.g. carbon free energy production and transportation technologies; or technologies to address particular national problems). [**Will Masters**].

End



# Equity Share in External Liabilities

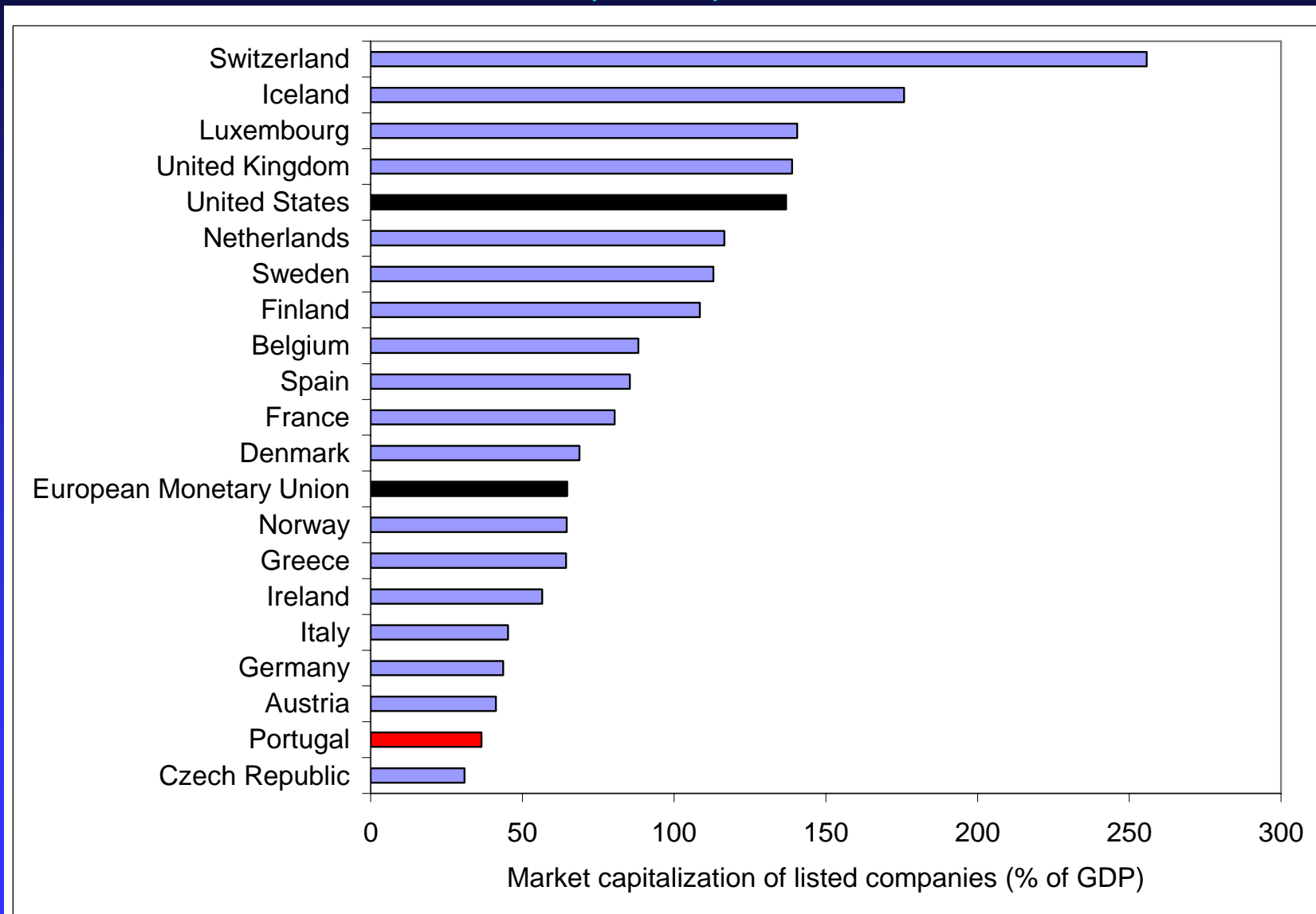
(Ratio of portfolio equity and FDI to total liabilities, percent)



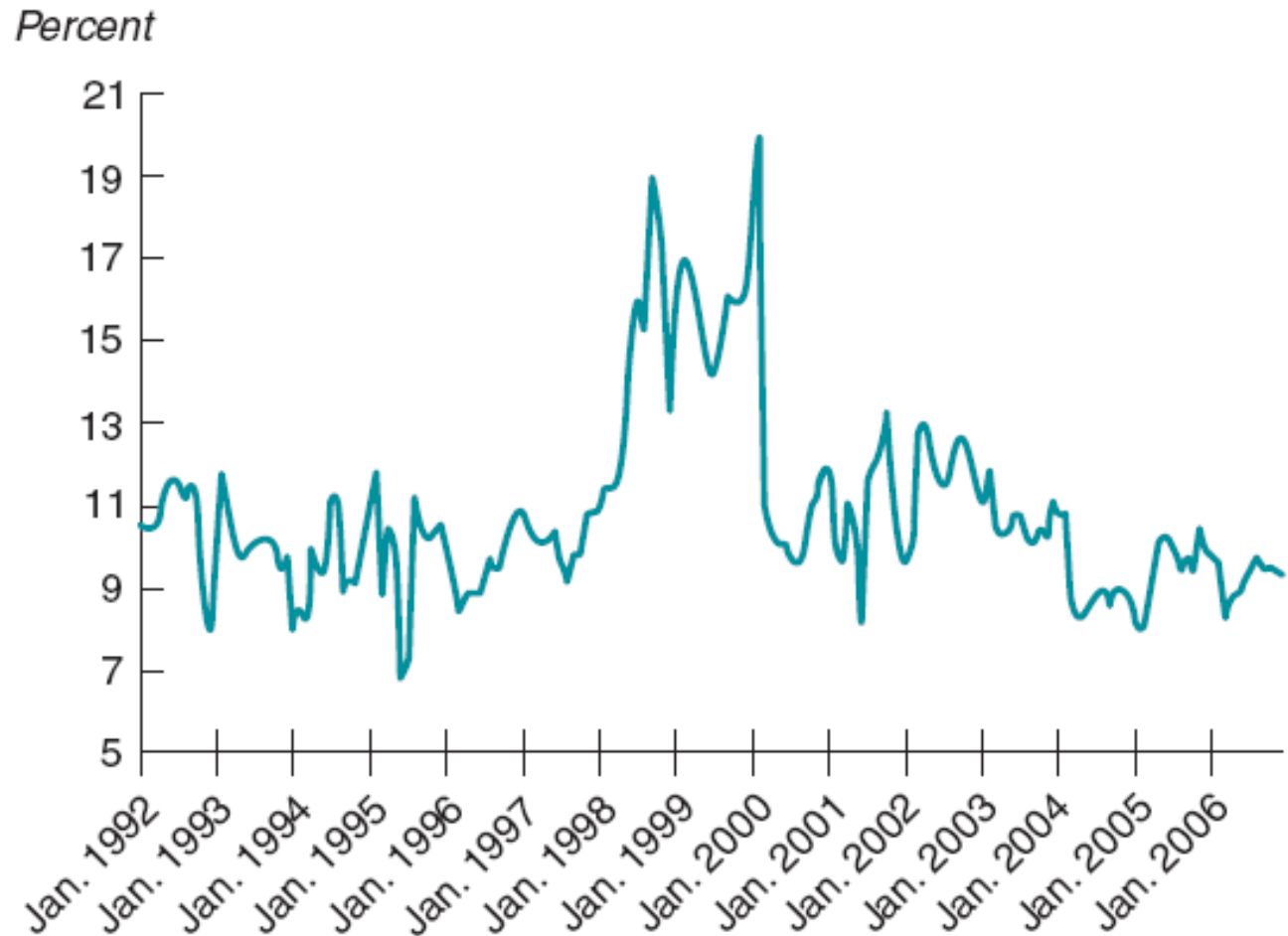
Source: Lane, Philip R. and Gian Maria Milesi-Ferretti. 2006.

“The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970-2004.” IMF Working Paper WP/06/69. Washington, D.C.: IMF.

# Differences in the Use of Equity Financing (2006)

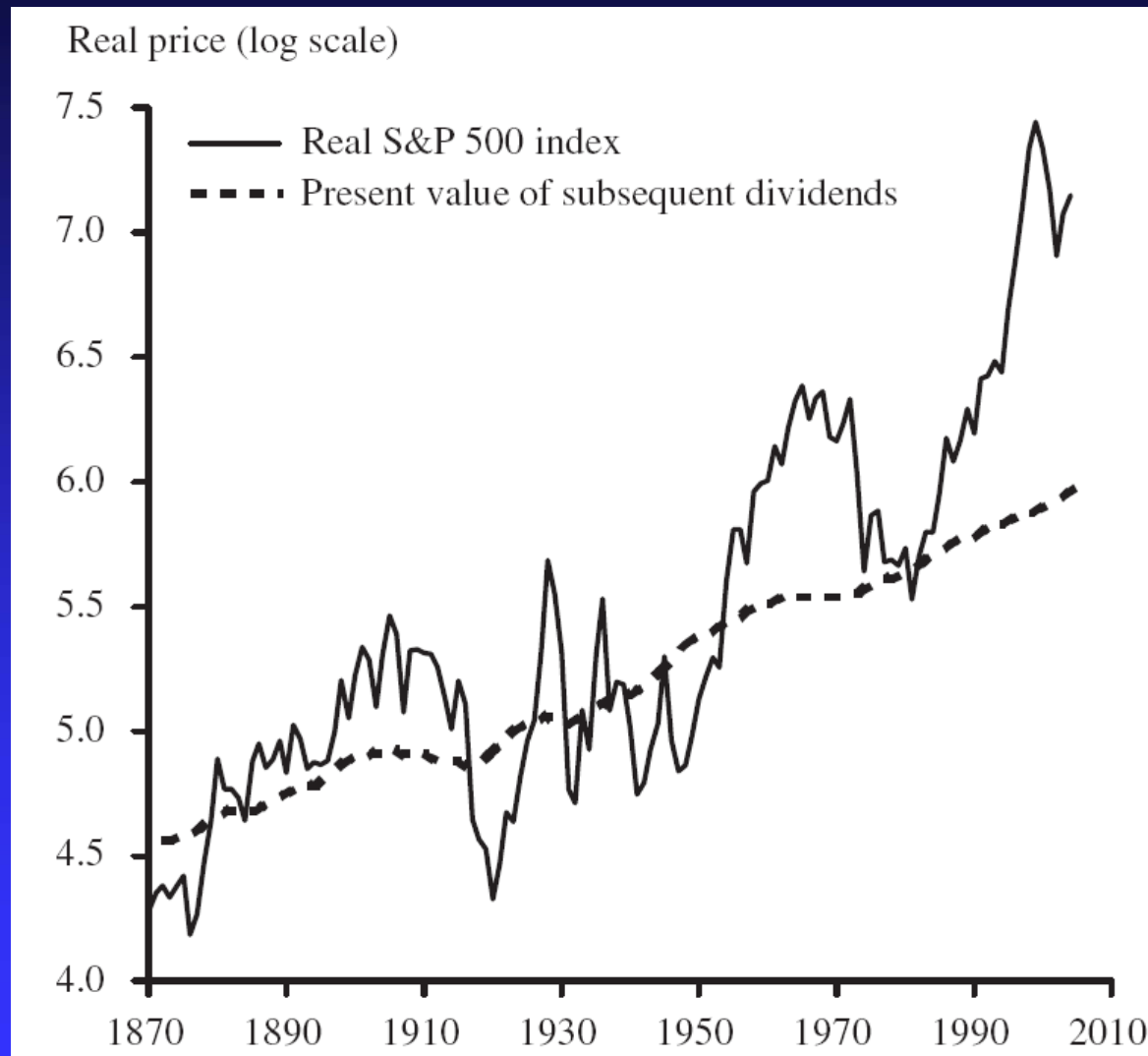


# Implied Cost of Equity Financing in Emerging Markets



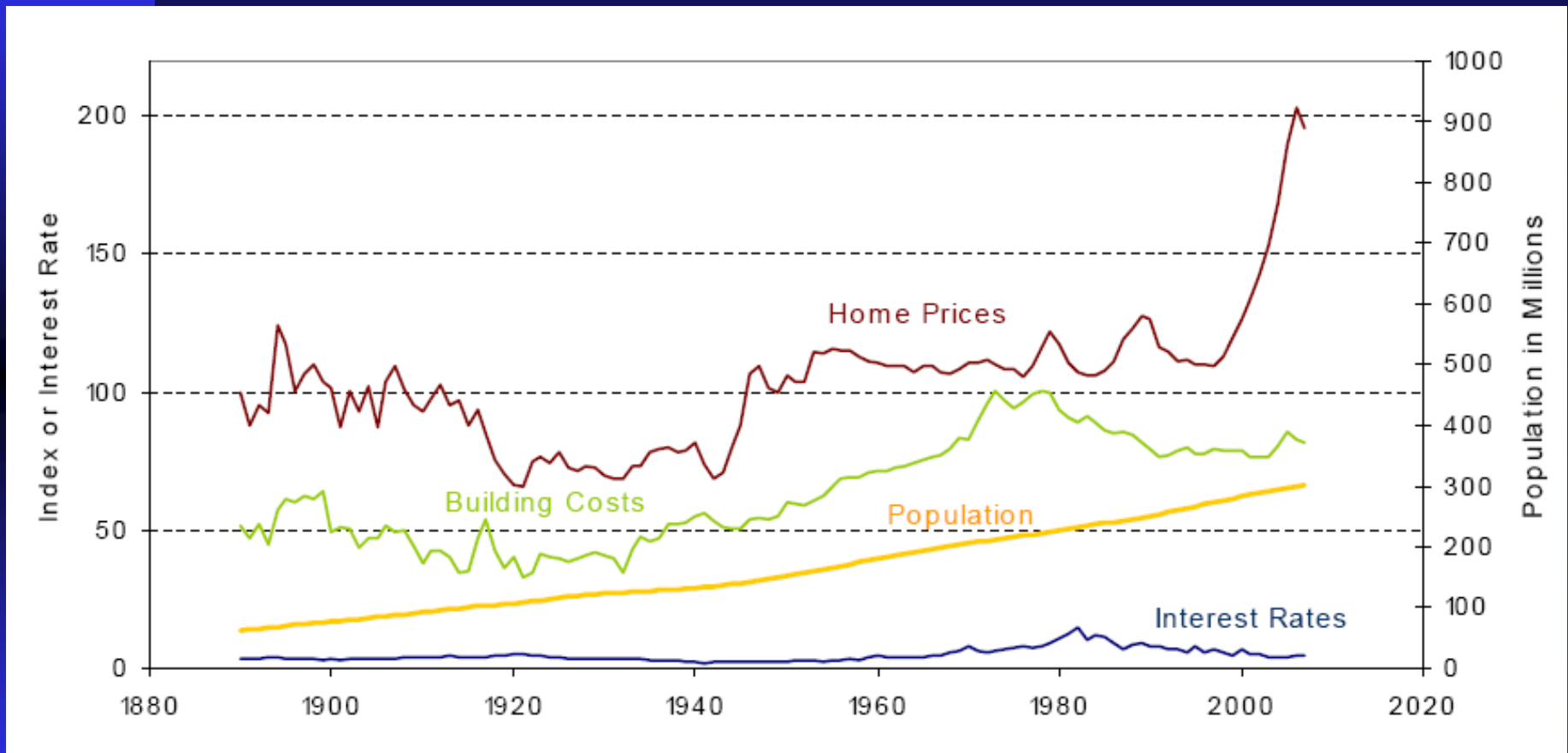
Source: MSCI, Worldscope, Morgan Stanley Research 2006.

# Real S&P 500 Price and Fundamentals (1870-2007)



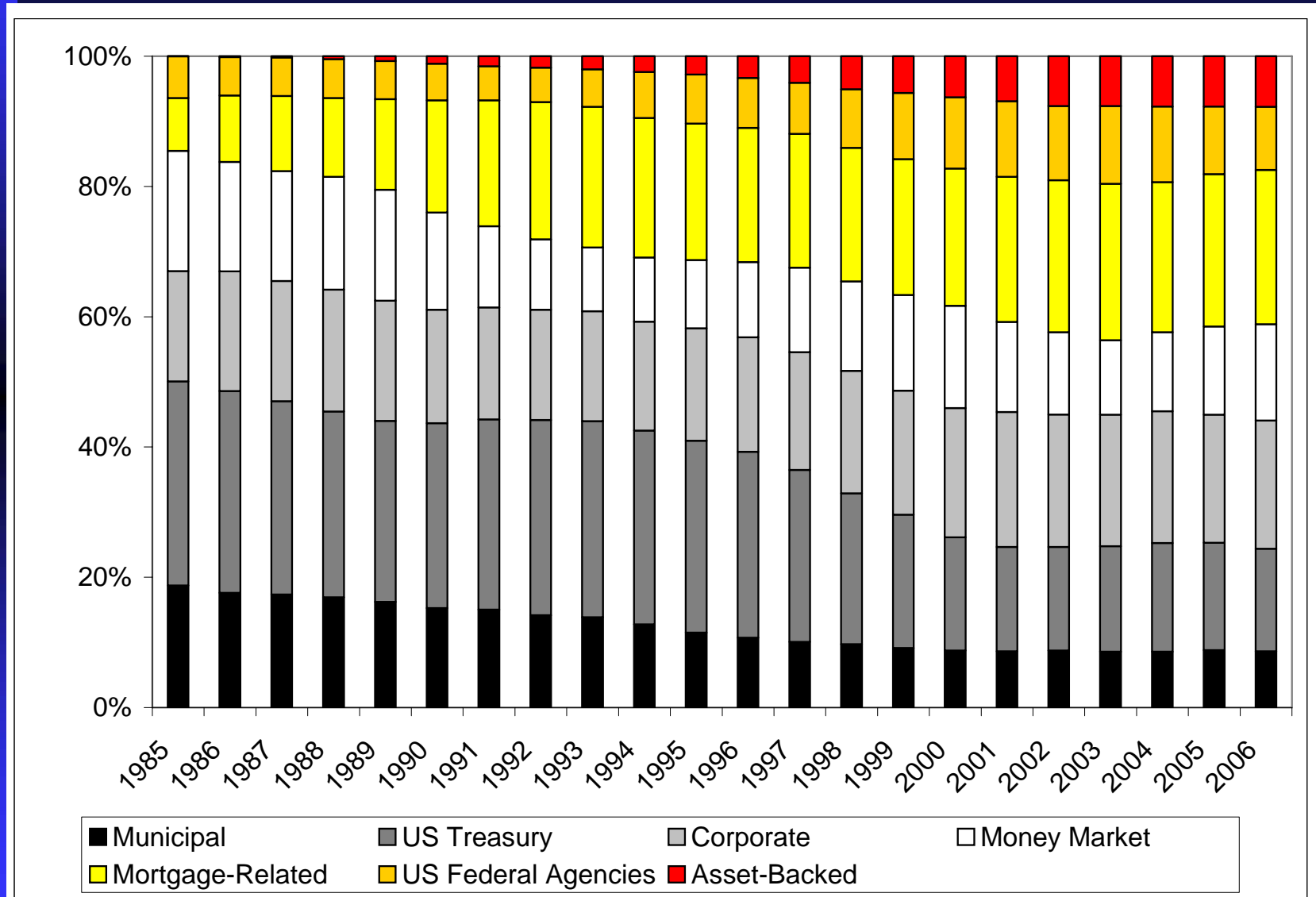
Source: Kevin J. Lansing. 2007. "Asset Price Bubbles." FRBSF Economic Letter No. 2007-32, October 26. San Francisco: FRBSF.

# US Home Prices and Economic Fundamentals (1890-2007)



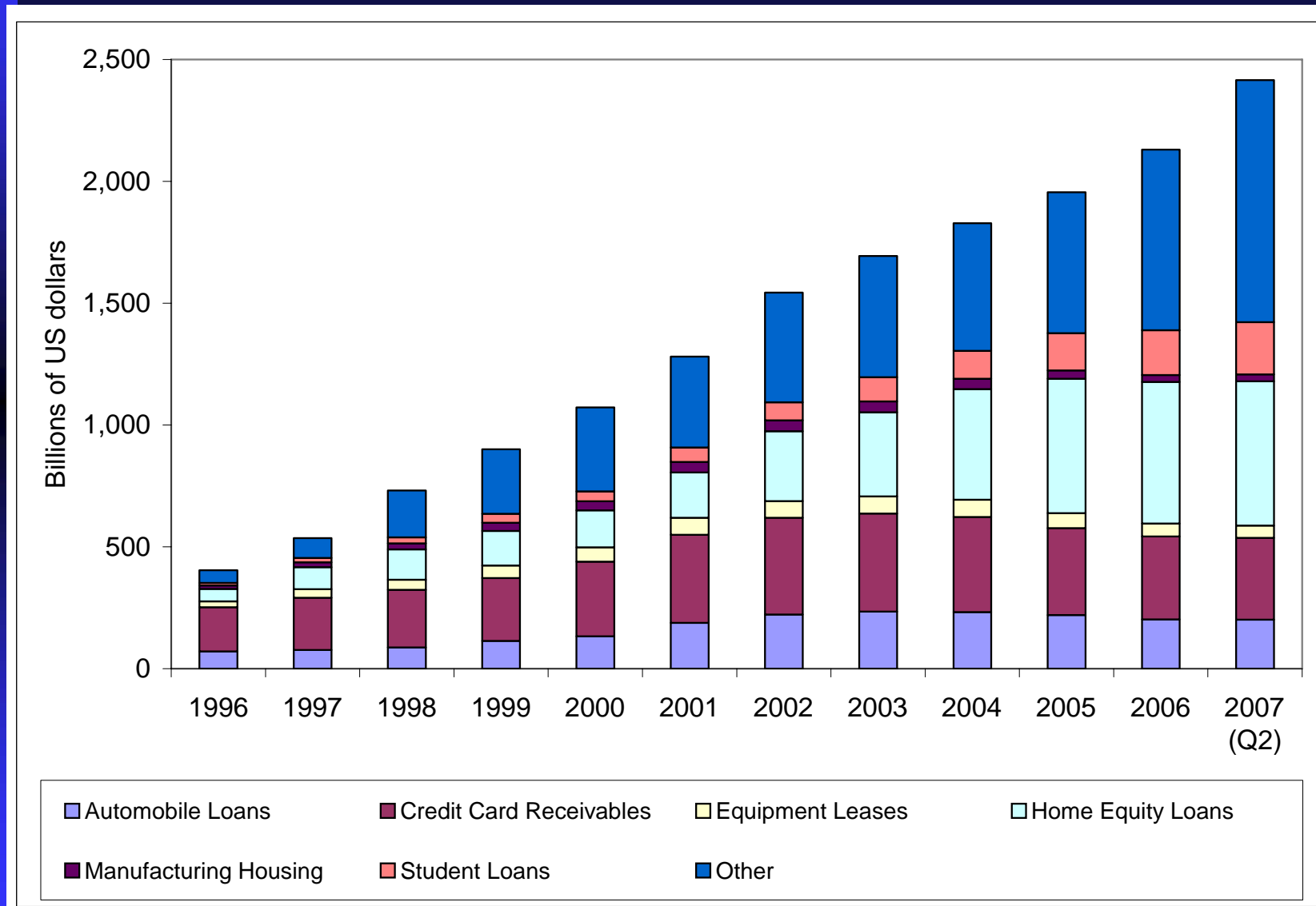
Source: Robert J. Shiller. 2007. "Risk Management for Households The Democratization of Finance." 6th BIS Annual Conference "Financial System and Macroeconomic Resilience." Brunnen, June 19, 2007 .

# Outstanding US Debt by Type of Security



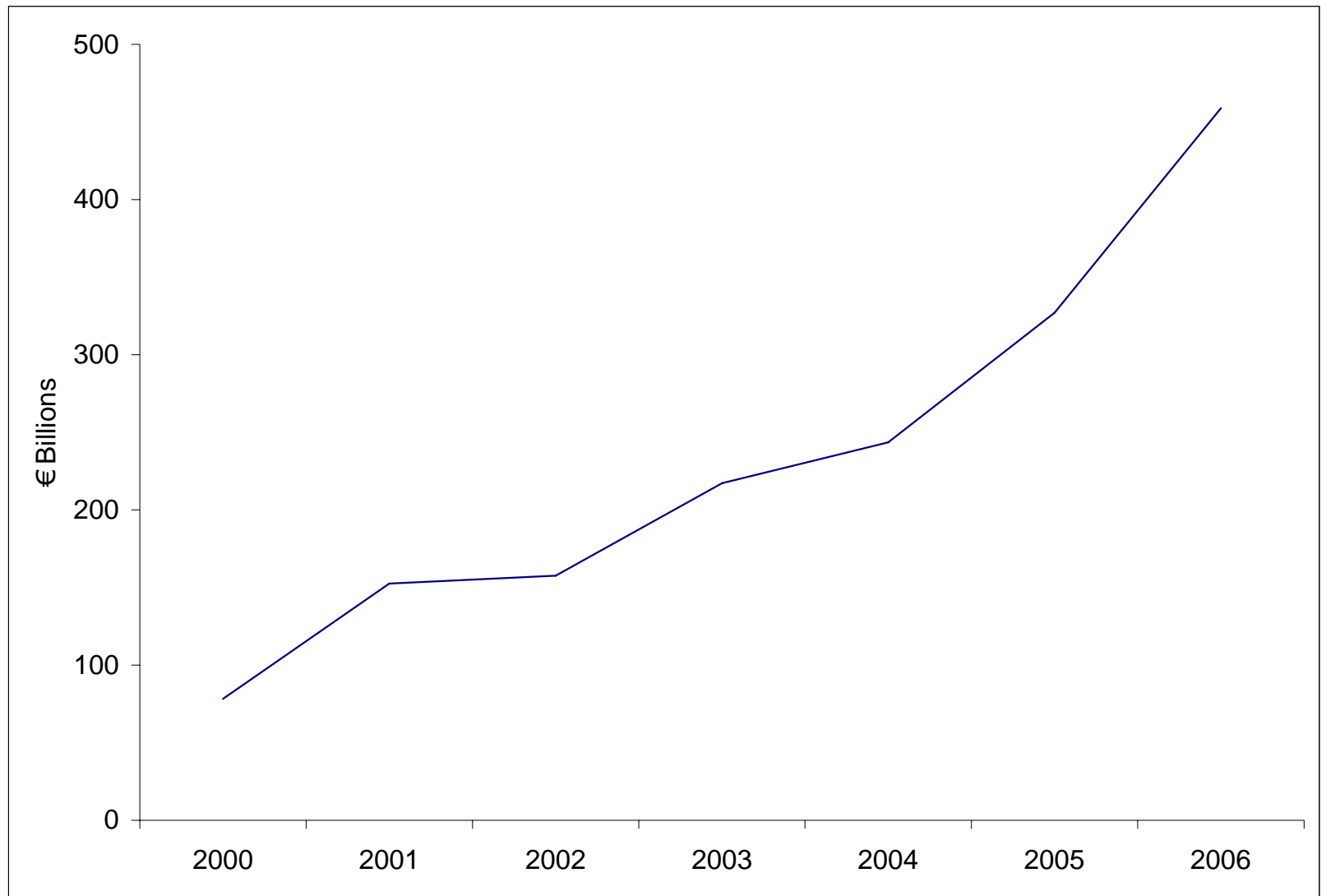
Source: Securities Industry and Financial Markets Association.

# Asset-Backed Securities Outstanding in the US by Type of Collateral



Source: Securities Industry and Financial Markets Association.

# Yearly Issuance of Securitization in Europe



Source: Securities Industry and Financial Markets Association.



# Securitization Issuance in Europe in 2006

(by country and type of collateral, excluding CDOs, € Billions)

	Mortgage- Backed	Auto Loans	Credit Card Rec.	Leases and Loans	Other	Total
Austria	-	0.6	-	-	-	<b>0.6</b>
Belgium	1.6	-	-	-	0.7	<b>2.3</b>
France	1.8	3.1	-	2.2	0.6	<b>7.7</b>
Germany	25.0	4.9	-	0.3	7.5	<b>37.7</b>
Greece	3.6	-	-	-	-	<b>3.6</b>
Ireland	10.6	-	-	-	-	<b>10.6</b>
Italy	18.2	-	-	8.0	4.0	<b>30.2</b>
Netherlands	28.1	-	-	0.5	-	<b>28.6</b>
Portugal	4.4	0.5	-	0.9	-	<b>5.8</b>
Russia	0.1	0.2	-	0.7	0.7	<b>1.7</b>
Spain	36.4	1.4	-	6.2	-	<b>44.0</b>
Sweden	-	-	-	0.2	-	<b>0.2</b>
Turkey	-	-	-	-	1.9	<b>1.9</b>
UK	172.6	-	3.4	2.4	13.8	<b>192.2</b>
Multinational	2.3	1.0	-	0.2	0.3	<b>3.8</b>
<b>Total</b>	<b>304.7</b>	<b>11.7</b>	<b>3.4</b>	<b>21.6</b>	<b>29.5</b>	<b>370.9</b>

# Securitization of SME Loans in Europe (Data for 2006)

- SME loans represent only 3% of all asset classes.
- Only 1-2% of securitizable SME claims in bank balance sheets have been securitized (compared with 10% of the total volume of outstanding residential mortgage loans).
- The Spain case:
  - ◆ Long-running public support to SME loan securitization since 1999.
  - ◆ Spanish Treasury guarantees up to 80 % of notes rated at least “AA”. To qualify, at least 80% of the pool to be securitized must comprise SME loans. The originator must commit to reinvest 80% of the proceeds in the SME sector within one year.
  - ◆ Approximately 60 Spanish banks have participated.
  - ◆ SMEs securitization amount to 19% of the total volume of securitization issuance.
  - ◆ About 37% of all SME risk transferred to the capital market.