An Overview of the Foreign Exchange Market

- Foreign exchange basics - Terminology, Types of contracts
- Dimensions of the foreign exchange market
  - » BIS surveys of daily turnover by location, contract type, currency of denomination, counterparty
- The traditional / classic FX market
  - » Organizational structure
  - » A typical day in the FX market
  - » Foreign exchange trading risks and control measures
- Innovations in foreign exchange trading
  - » Interbank Trading – Automated brokerage, clearing and settlement
  - » Corporate Trading – Web-based multi-bank, B2B systems
- The relationship among spot rates, forward rates and money market interest rates (in Chapter 3, Part 2)

Role of Foreign Exchange Markets

- Member nations of the International Monetary Fund
  - » 184 in 2002, up from 156 in 1991
  - » With few exceptions, each nation issues its own national money (why?) and controls it value (why?)
  - » Exceptions: EMU (12 nations, one money); Panama (US$); former French colonies (French franc).
- In commodity trade between US and Japan
  - » US (Japanese) exporters do not usually accept yen (US$)
- Main roles of the FX market
  - » Medium of exchange - facilitate trade in goods and services
  - » Medium of exchange - facilitate purchase/sale of securities
  - » Medium to re-denominate and manage currency risk in stock asset or liability positions

Foreign Exchange Contracts (1 of 2)

- Spot contract
  - An exchange of two currencies for "immediate delivery"
  - A binding commitment
  - Quoting conventions:
    - Direct terms (American terms): US$/foreign currency
    - Indirect terms (European terms): foreign currency/US$
- Foreign exchange swap
  - Simultaneous borrowing and lending of short-term bank balances in two currencies, for example
    - Bank A borrows $10 million from Bank B for 1-month
    - Bank B borrows $10 million worth of £ from Bank A for 1-month
  - Used to "construct" forward contracts and manage risks

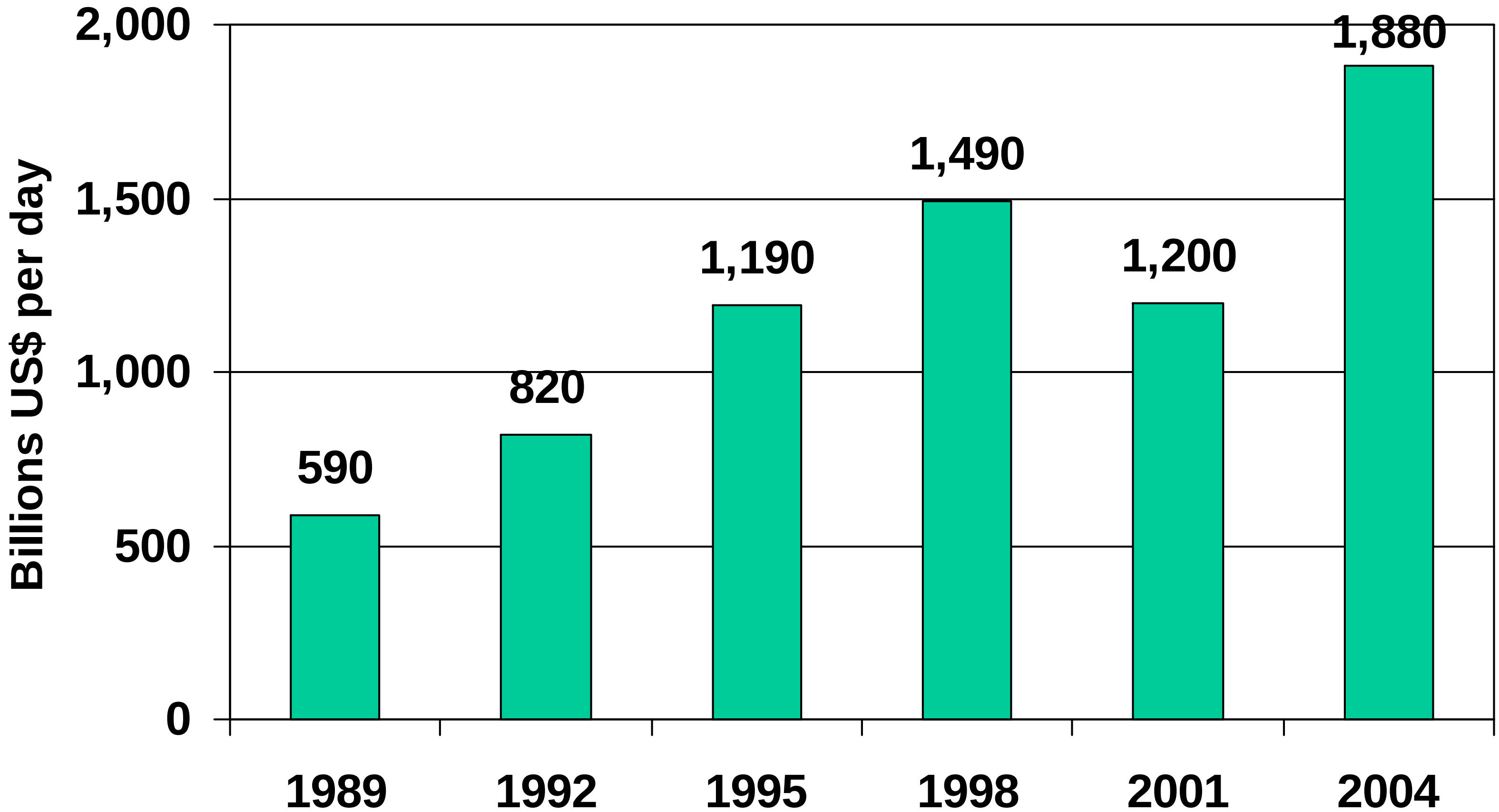
Foreign Exchange Contracts (2 of 2)

- Forward contract
  - » Agreement made today for obligatory exchange at specified time in future: 1, 2, 3, 6, 12 months from today
  - » No exchange of funds on agreement day, or at any time until settlement date
  - » Example:
    - ◆ On 3/23/01 buy £1,000,000 1-month forward at $1.60/ £
    - ◆ On settlement date 4/23/01 when spot pound is $1.55
      - – Take delivery of £1,000,000, pay out $1,600,000
      - – “Cash settle”, pay $50,000 to cancel obligation
  - » Quoting conventions
    - ◆ Outright
    - ◆ % premium or discount relative to spot

FX Terminology: Appreciation and Depreciation

- Because every exchange rate involves two currencies
  - » Appreciation of the US$ against £ $\Leftrightarrow$ Depreciation of £ against US$
  - » Depreciation of the US$ against £ $\Leftrightarrow$ Appreciation of £ against US$
- Examples
  - » Change from 1.50 $/£ to 1.75 $/£ $\Rightarrow$ Appreciation of £ against US$
  - » Change from 1.50 $/£ to 1.25 $/£ $\Rightarrow$ Depreciation of £ against US$
- Exact percentage measures depend on the base rate
  - » x% depreciation of the Mexican peso $\Rightarrow$ x% more pesos to buy $1
    - ◆ from 4 MP/$ to 8 MP/$ $\Rightarrow$ 100% depreciation of the peso
  - » y% appreciation of the US$ $\Rightarrow$ y% fewer dollar to buy 1 peso
    - ◆ from $0.25/MP to $0.125/MP $\Rightarrow$ 50% appreciation of the US$

Growth in Global FX Trading



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.

Recent Ups and Downs in FX Turnover
Possible Explanations

20% drop in 2001

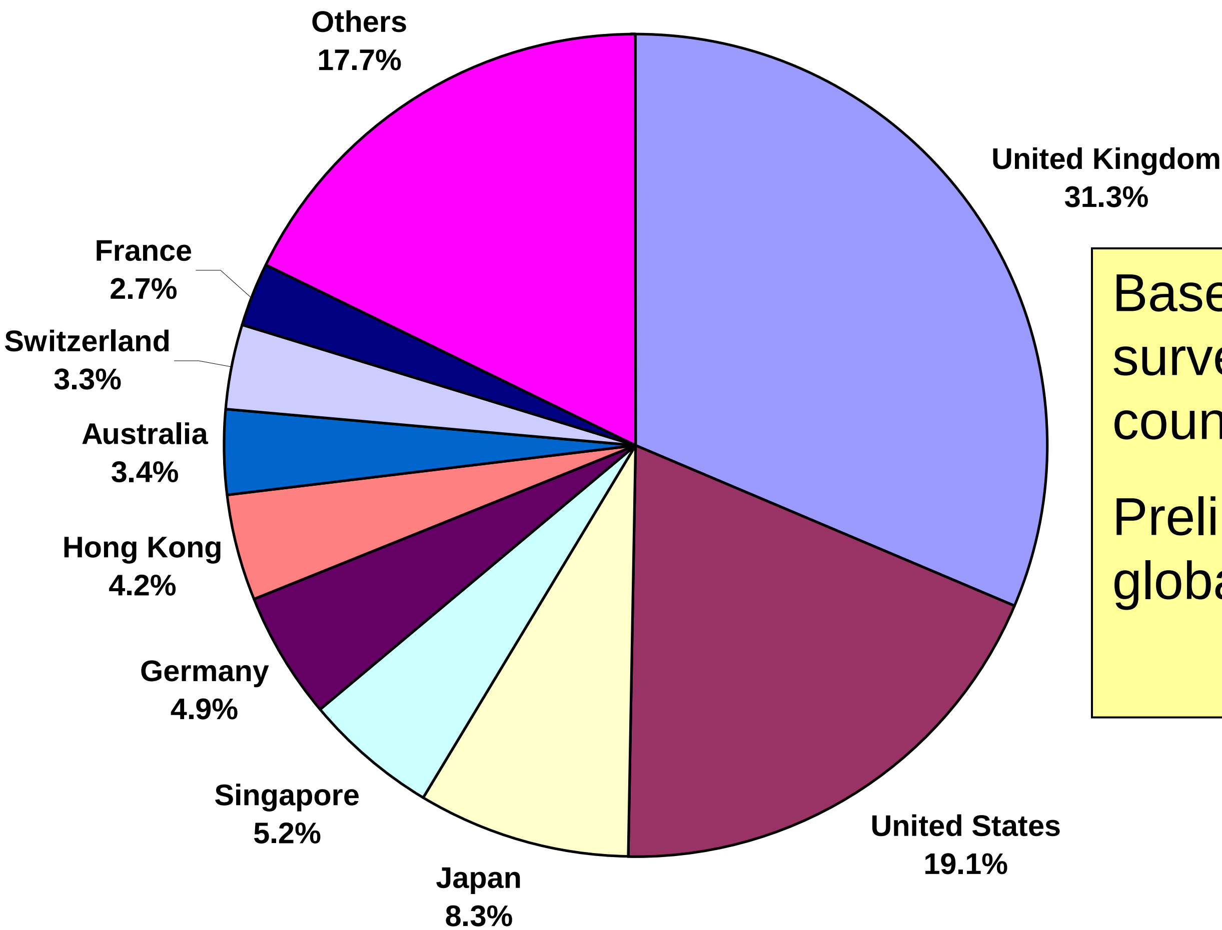
1. Introduction of the Euro
   » Eliminates cross-trades in EMS, legacy currencies
2. Bank consolidation
   » Eliminates trades among banks (e.g. JP Morgan and Chase) that once had separate trading desks
3. Electronic trading platforms
   » Reduces the need for active trading among interbank dealers

50% rise in 2004

1. FX gains status as an asset class
   » Encouraged by down or flat equity markets
2. Growth of hedge funds and commodity trading advisors
   » Again, searching for returns
3. More active role for asset managers
   » Willingness to take directional bets

Daily Volume of FX Trading by Location

percentage market share



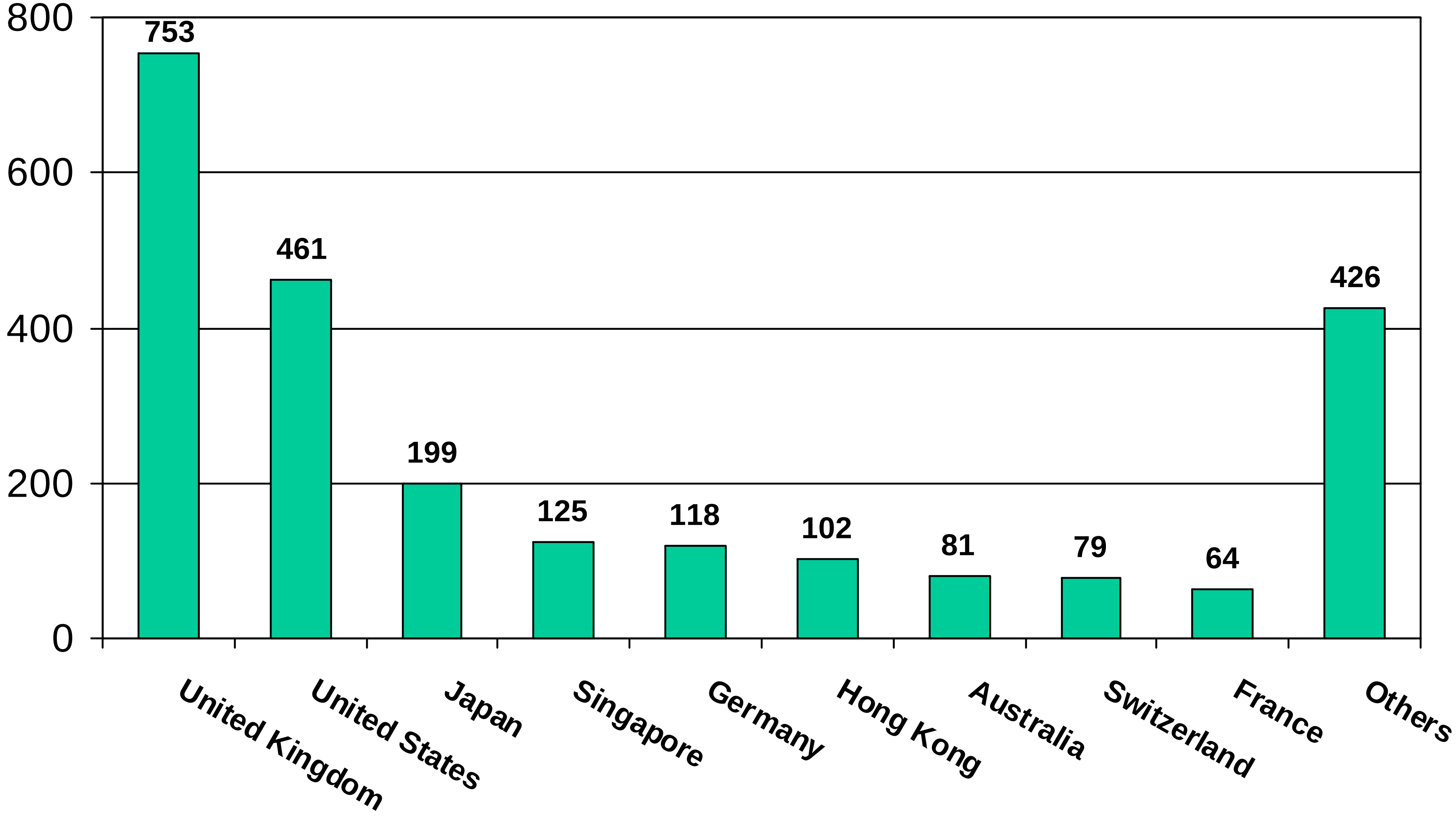
Based on April 2004 BIS survey of trading in 52 countries.

Preliminary estimate of global FX trading:

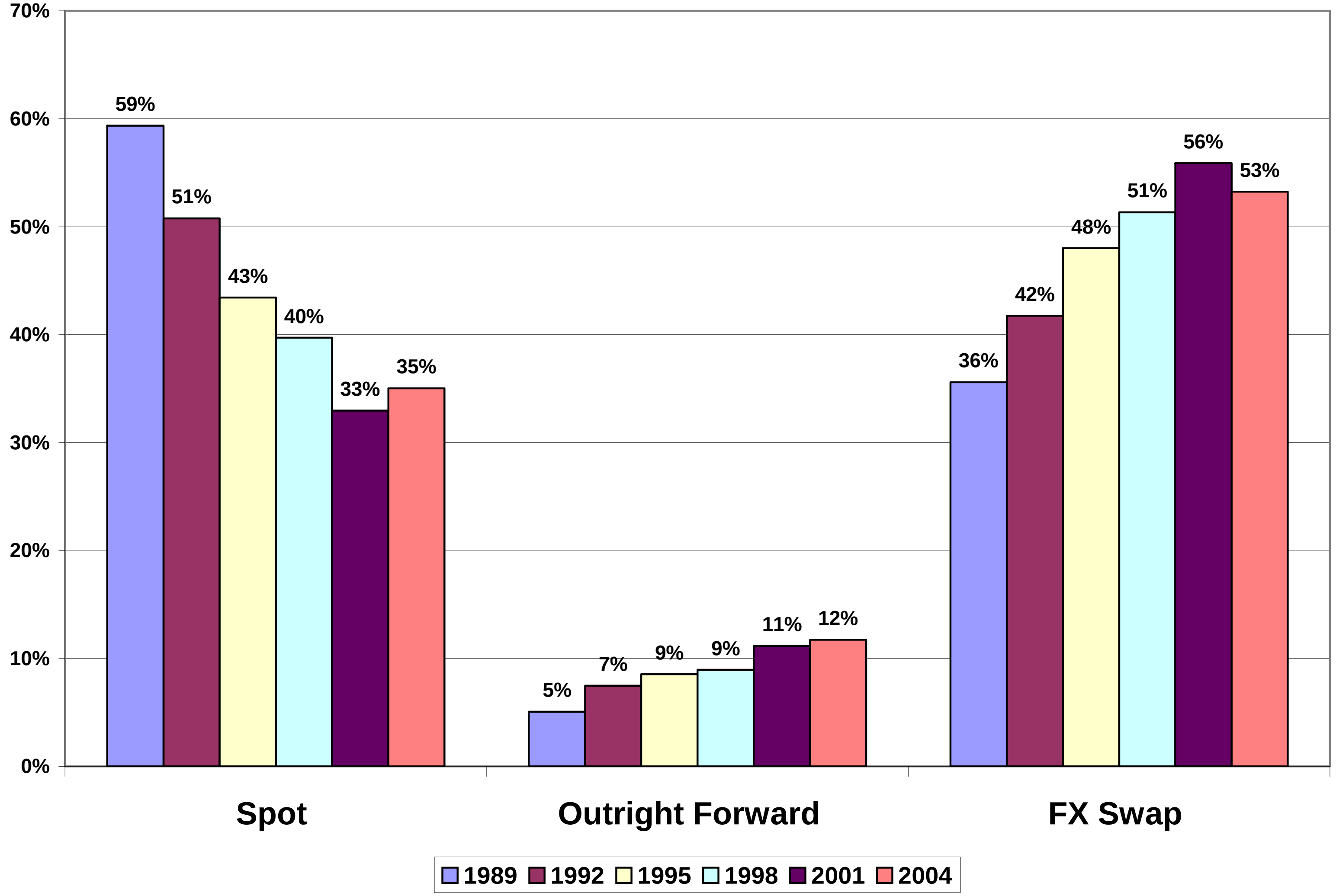
$1.9 trillion/day

Daily Volume of FX Trading by Location

Average for April 2004, in billions of US$

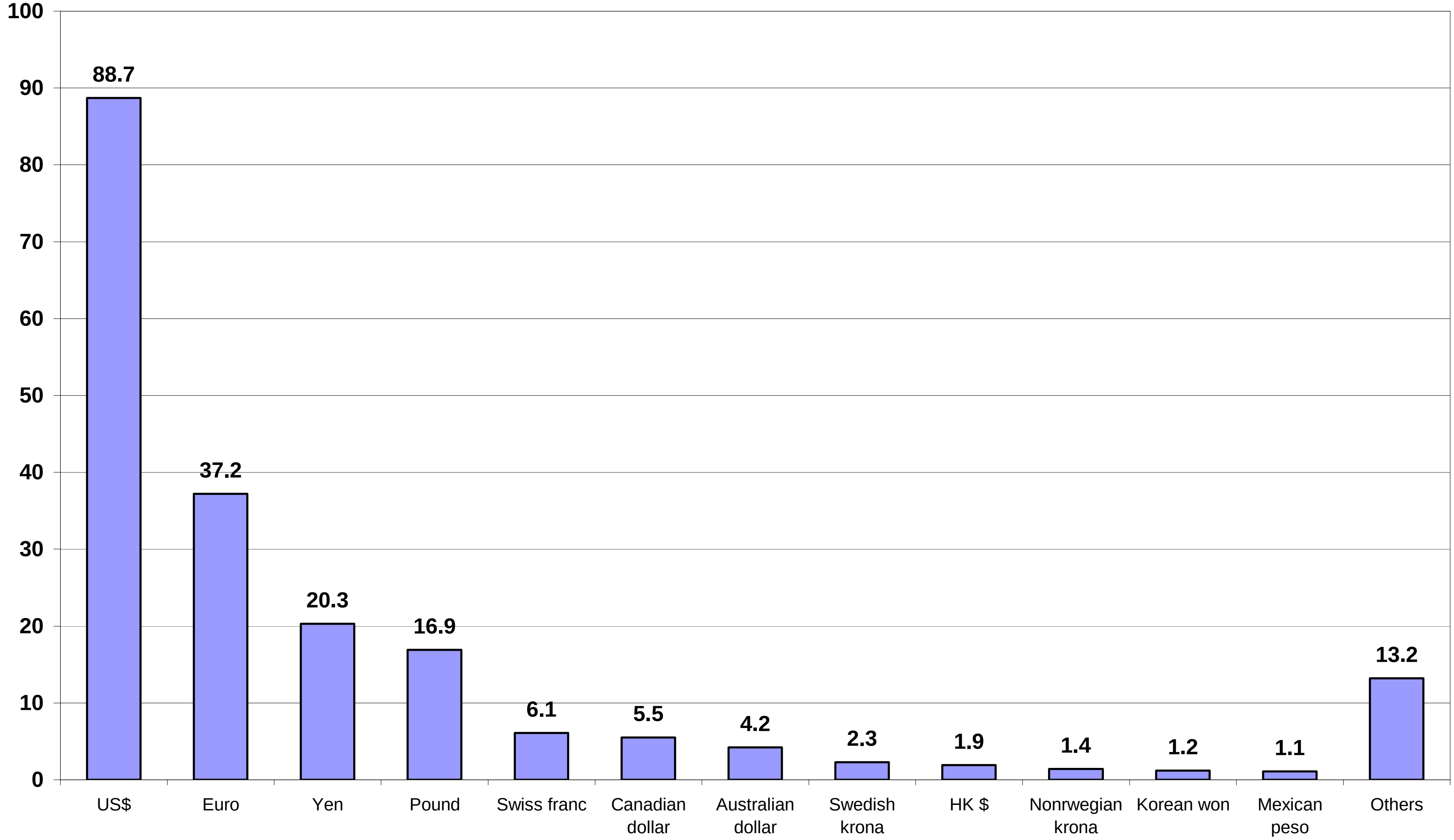


Percentage Share of Trading by Contract Type



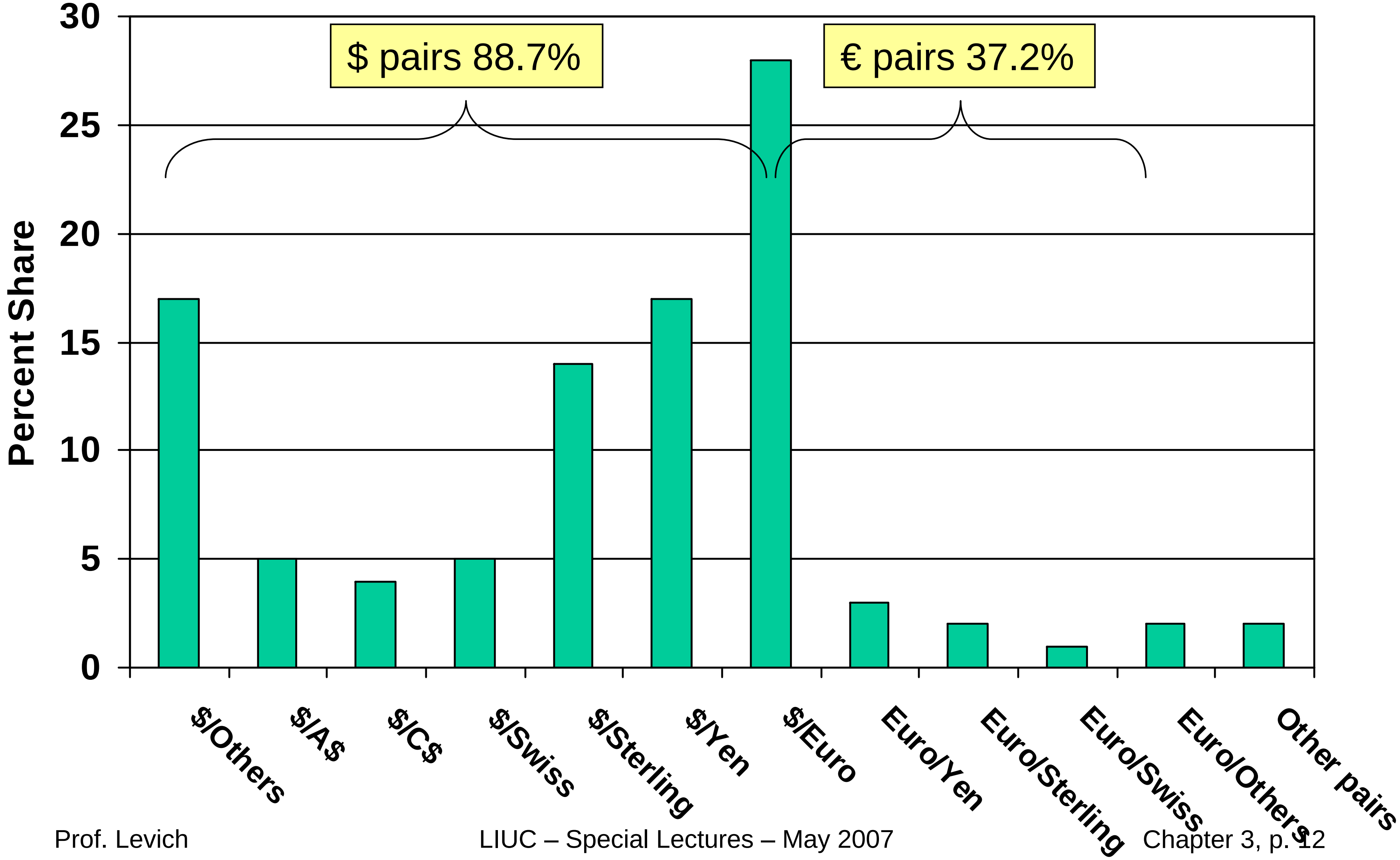
Percentage Share of Trading by Currency of Denomination

Source: April 2004 BIS Survey



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

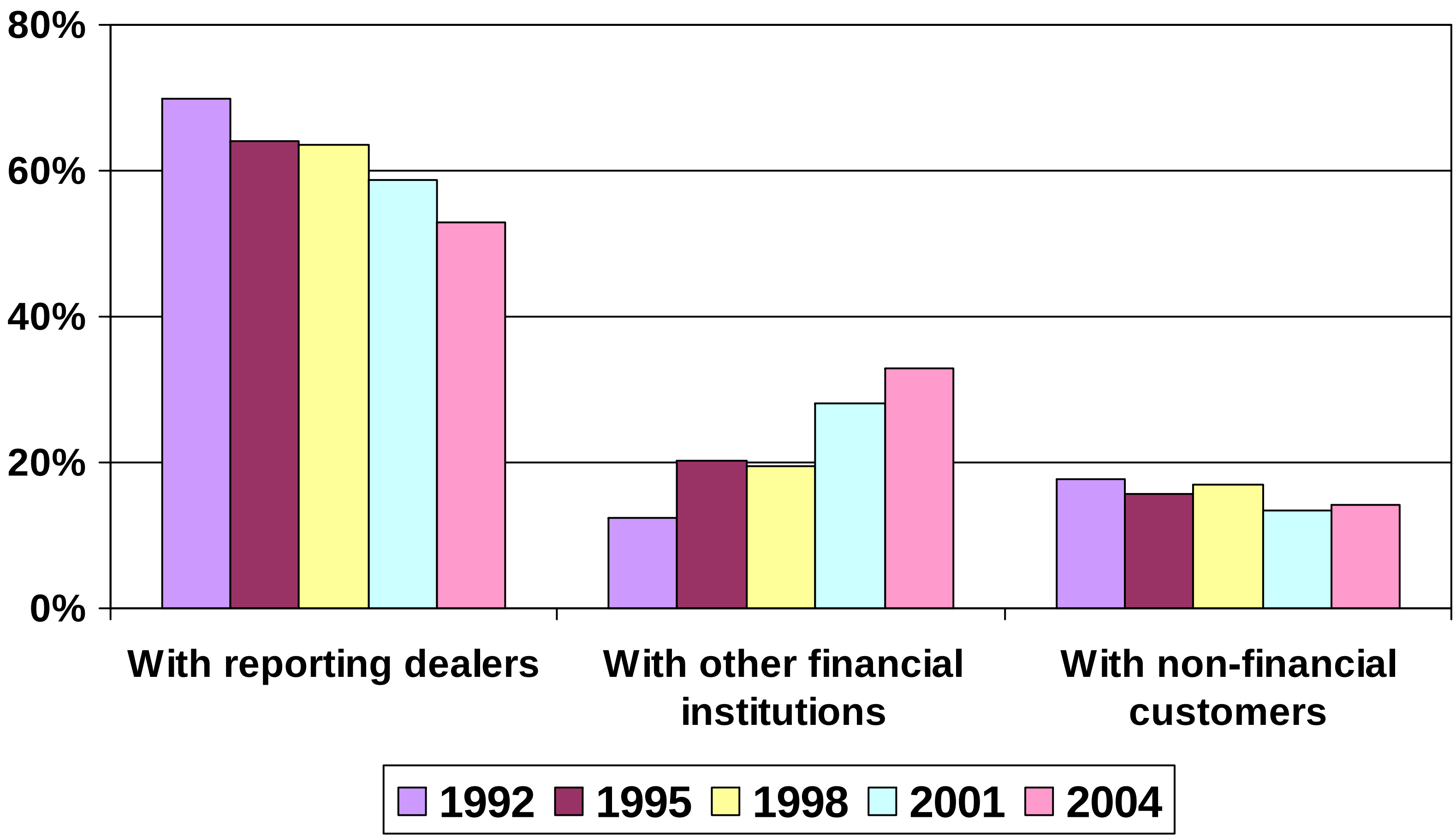
Market Turnover by Currency Pair



The US$ as a "Vehicle Currency"

- US$ involved in 91% + of all FX transactions (2001 survey)
- Transactions that do not use US$:
  - » DM/¥, DM/£, DM/other European before EMU and euro (€)
- US$ used as intermediary or "vehicle currency" (why?)
  - » Yen /Mex Peso rate: ¥/peso = ¥/US$ x US$/peso (1)
  - » 11 ¥/peso = 110 ¥/US$ x 0.10 US$/peso
- Triangular parity - name given to equation (1) and equilibrium relation among any 3 currencies
- Triangular arbitrage - transactions to take advantage of deviations from triangular parity
  - » If (1) does not hold (10.5 ¥/peso ≠ 110 ¥/$ x 0.10 $/peso) ⇒ buy low, sell high to earn risk-free profit (before transaction costs)

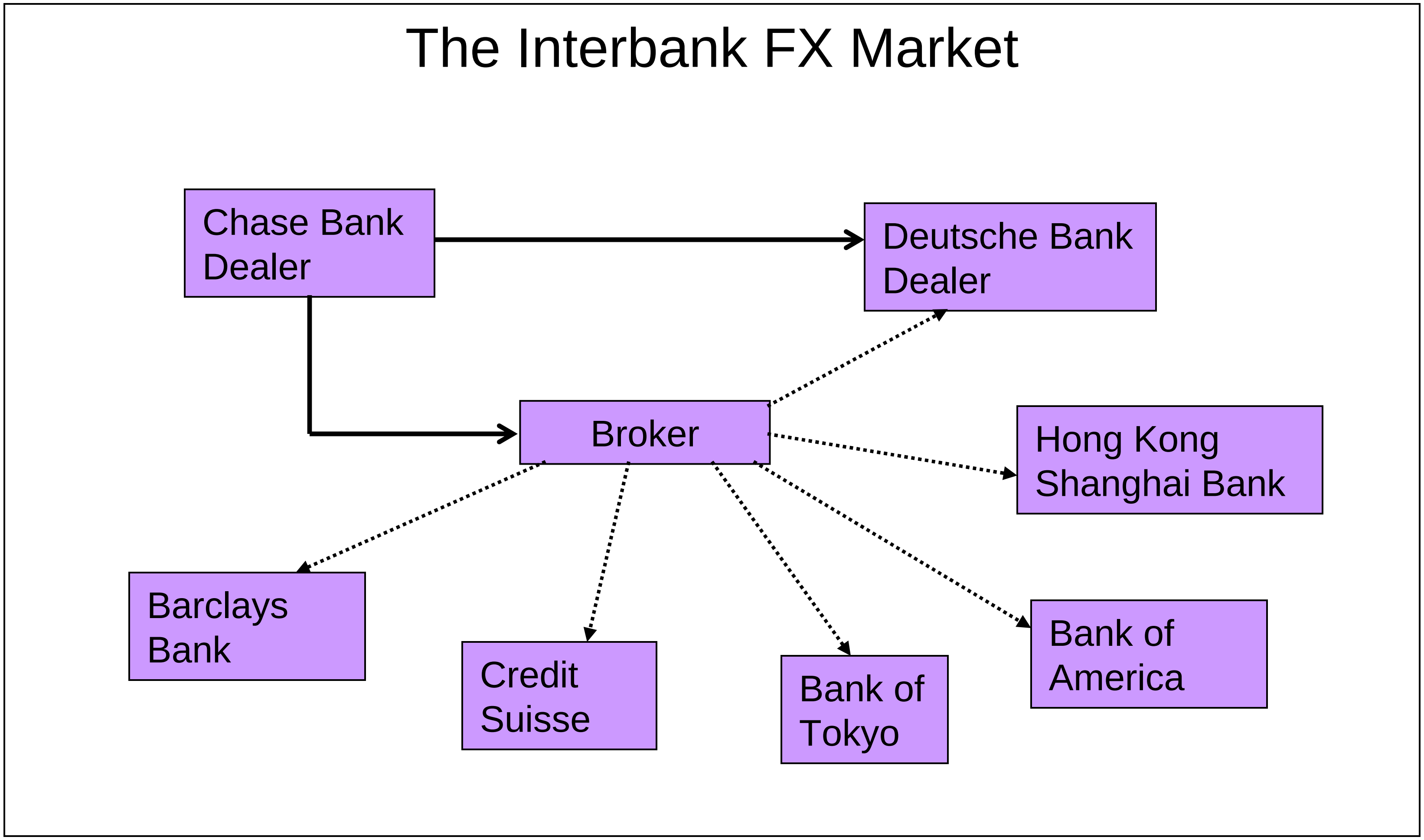
Market Turnover by Counterparty



The Traditional / Classic FX Market

- Organizational Structure - *Interbank Trading*
  - Traders / Market-Makers are geographically dispersed
  - Linked by (a) Voice brokers; (b) Direct dealing through telephone conversations
  - Quotations distributed over proprietary systems (e.g. Reuters)
  - Price quotations typically "for indications", not true transaction prices
  - Automated electronic bilateral dealing (e.g. Reuters 2000-1) introduced in 1980s

Structure of the Foreign Exchange Market



Compare & Contrast –
Structure of the FX Market vs. NYSE or CME

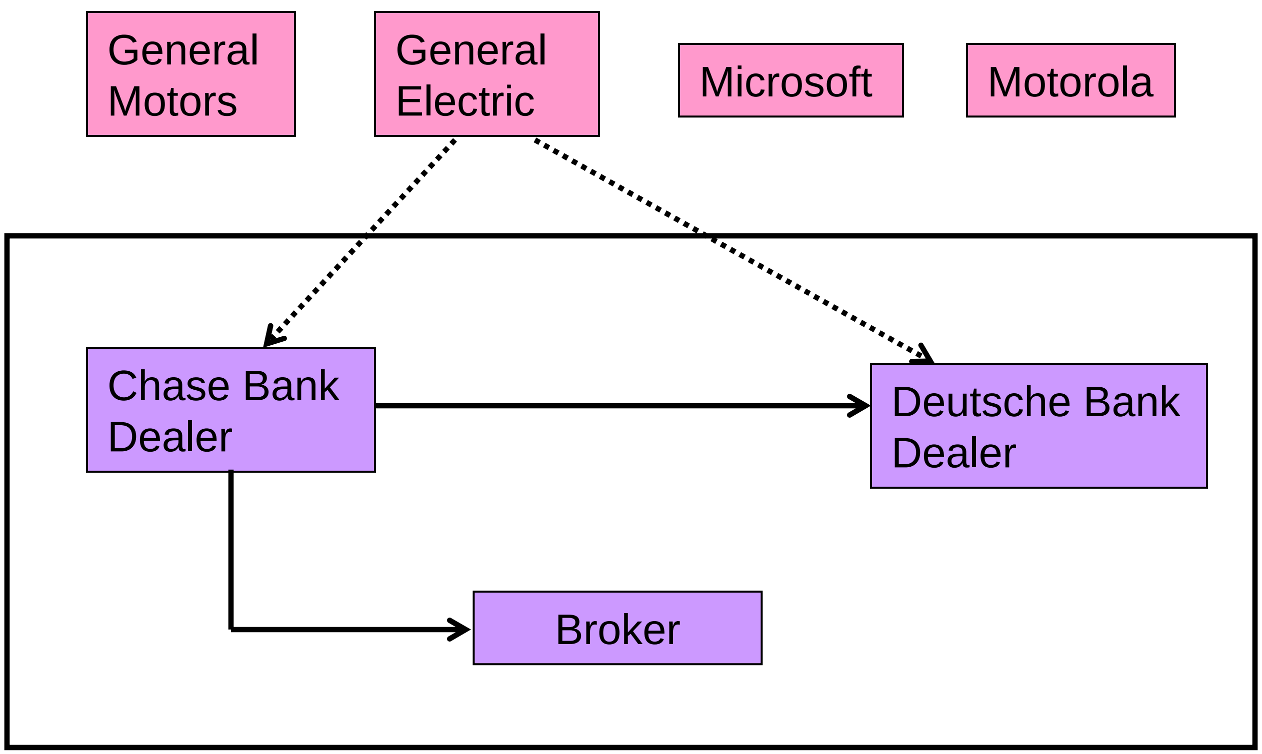
FX	NYSE or CME
Geographically dispersed	Centralized
Broker / Dealer	Specialist / Open outcry
24 – Hour	Set trading hours
Customized	Standardized
Price dispersion	Uniform prices
Risk dispersion	Uniform delivery / counterparty risk

The Traditional / Classic FX Market

- Organizational Structure - *Corporate FX Trading.*
  - Corporate treasury telephones one (or more) bank "corporate" FX dealers
  - Electronic price query and order entry (bilateral) introduced in early 1990s

Structure of the Foreign Exchange Market

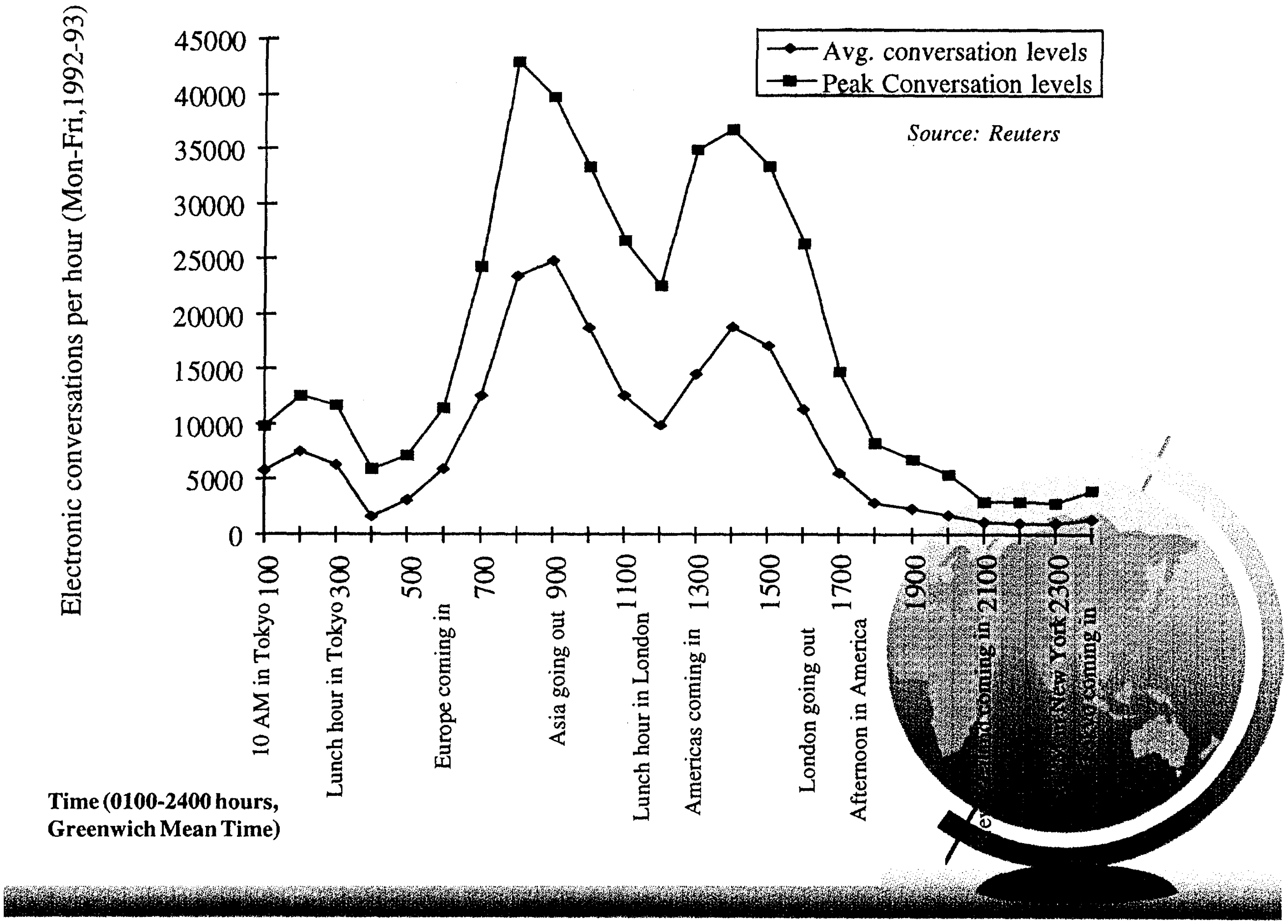
The Corporate (Retail) and Interbank FX Market



A Typical Day in the FX Market

- The Bid-Ask spread (a measure of the cost of liquidity services)
  - » Varies throughout the day
  - » Increases as volatility in the spot rate increases
  - » Decreases when more dealers are in the market
- Holding other factors constant
  - » Spreads fall when more large dealers are in the market
  - » Spreads rise when more small dealers are in the market
- The bid-ask spread tends to be **higher**
  - » At the start of a trading day (as traders get a “feel” for the market)
  - » At the end of the trading day (inventory adjustment to square book)
  - » Fridays at closing, Mondays on opening, Last day of the month
  - » Pacific and European holidays
  - » All possibly related to fewer dealers in the market at these times.

The Circadian Rhythms of the FX Market

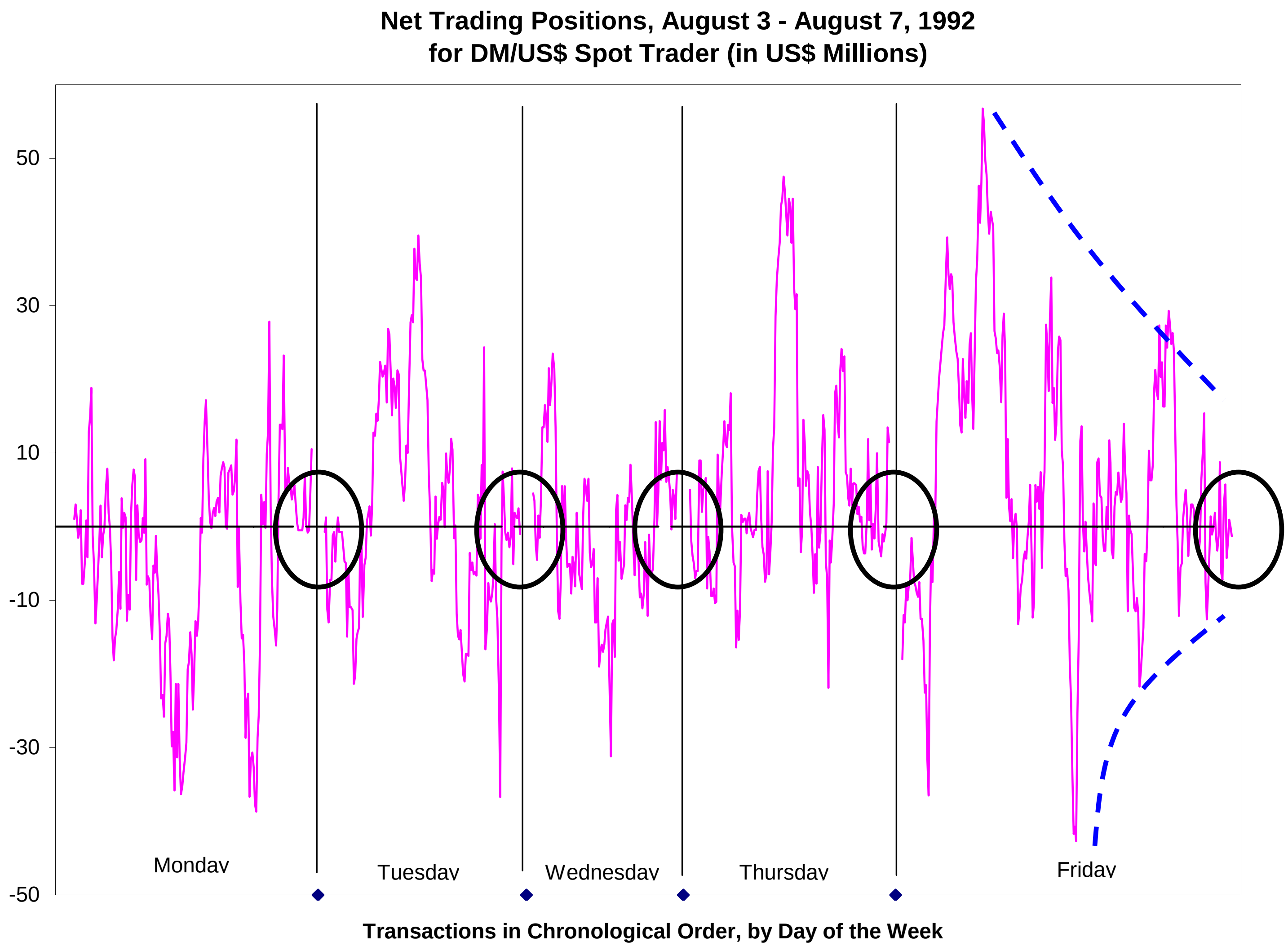


Daily Trading Statistics for a Real-World Spot DM Interbank Dealer

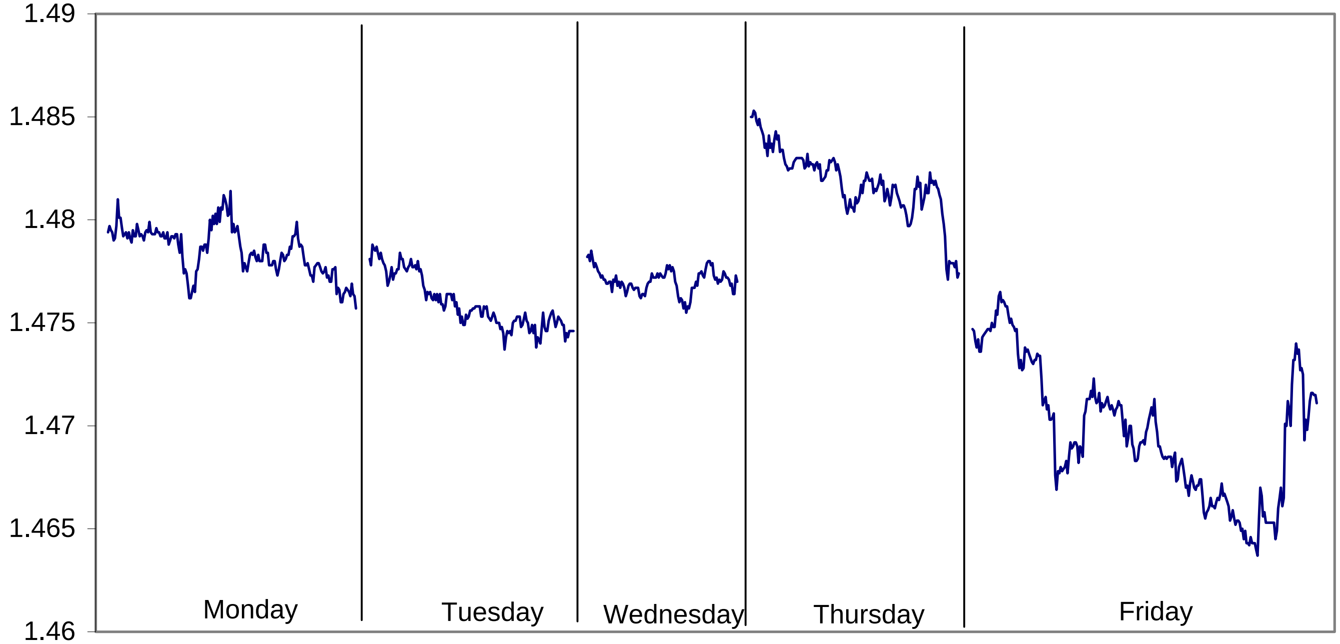
	Direct Transactions	Brokered Transactions	Total Transactions
Number of Transactions	190	77	267
Value of Transactions	$0.8 billion	$0.4 billion	$1.2 billion
Median Transaction Size	$3.0 million	$4.0 million	na
Median Spread Size	DM 0.0003	na	na

Note: The above figures are daily averages for a single trader in the spot DM interbank market for the period Monday, August 3, 1992 - Friday, August 7, 1992.

Source: Richard K. Lyons, "Tests of Microstructural Hypotheses in the Foreign Exchange Market," Journal of Financial Economics 39 (1995): 321-351.


Net Trading Positions, August 3 - August 7, 1992
for DM/US$ Spot Trader (in US$ Millions)
50
30
10
-10
-30
-50
Monday
Tuesday
Wednesday
Thursday
Friday
Transactions in Chronological Order, by Day of the Week

Transaction Prices: DM/US$ on August 3 - August 7, 1992



Transactions in Chronological Order, by Day of the Week

Stylized Findings about FX Dealers (1 of 2)

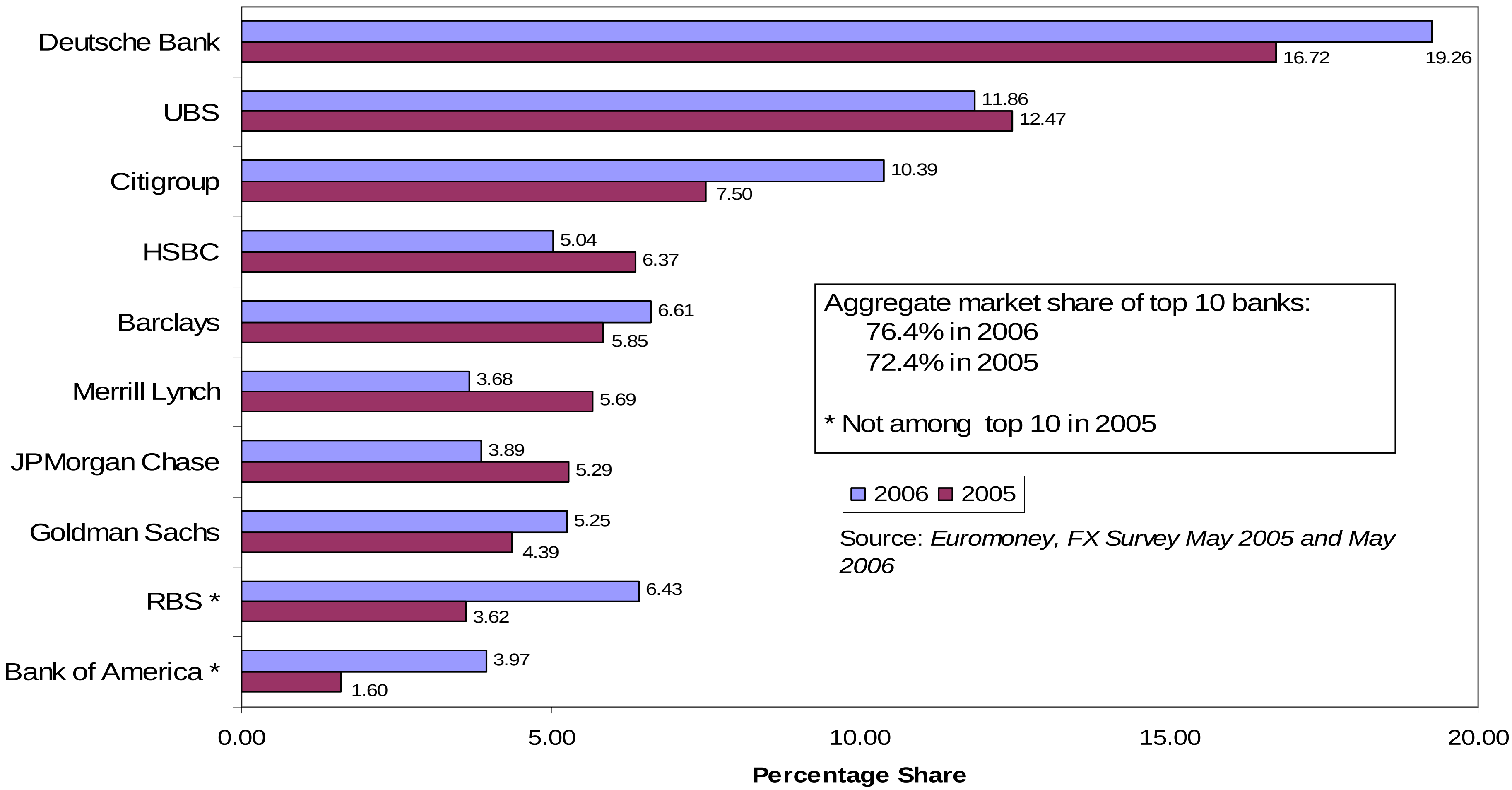
- Quoting Behavior
  - Little evidence of "quote shading" as a tool for inventory control in interbank trades
  - *Quote shading*: Raising quotes when dealer is below the desired inventory level and lowering quotes when above the desired inventory level.
  - Dealer does not want to give away information about his position to other interbank dealers
- Inventory Controls
  - Dealer regains desired inventory level *quickly* (within 5-6 minutes) by actively initiating (outgoing) trades at other dealers quotes.
  - Interbank FX market lacks *transparency*: Other dealers in the interbank market are unaware of a dealer's (bilateral) customer trades, until after the dealer has rebalanced his inventory position.

Stylized Findings about FX Dealers (2 of 2)

- Sources of FX Dealer Profits
  - Conventional wisdom - Dealer's profits result from speculative positioning
  - Study findings
    - Most profits from customer trades.
    - Profits are positively and significantly related to (daily) exchange rate volatility.
- Classification of Dealers Trades
  - Conventional Wisdom - Dealer's engage in speculation
  - Study findings
    - Only a small percentage of dealer trades are speculative in nature
    - The large volume of interbank transactions is primarily related to rebalancing of dealer positions to obtain desired inventory levels,so-called "Hot-Potato Trading"

Concentration in the Foreign Exchange Market

Market Share of Top 10 Dealers, 2006 and 2005



FX Trading Risk and Control Measures

Type of Risk	Caused by	Controlled by
1. Exchange Rate Risk	Unexpected spot rate changes	Limiting open currency positions Trader limits Daytime limits Overnight limits Overall currency limits
2. Interest Rate Risk	Unexpected forward rate changes	Limiting open forward positions Forward maturity limits Maturity limits Gap limits
3. Credit Risks a. Rate Risk	Default on foreign exchange contract (e.g. because of bankruptcy)	Customer trading limits Customer maturity limits Portfolio diversification
3. Credit Risks b. Delivery Risk	Default on foreign exchange contract affect our bank has effected delivery of funds (e.g. because of time zone differences)	Matching delivery time zones Spreading delivery time dates Pre-payment Keep central banks open longer Establish new *pmt v. pmt* banks (Continuous Linked Settlement Bank)
4. Country Risk	Unexpected exchange controls or taxes	Country limits Portfolio diversification

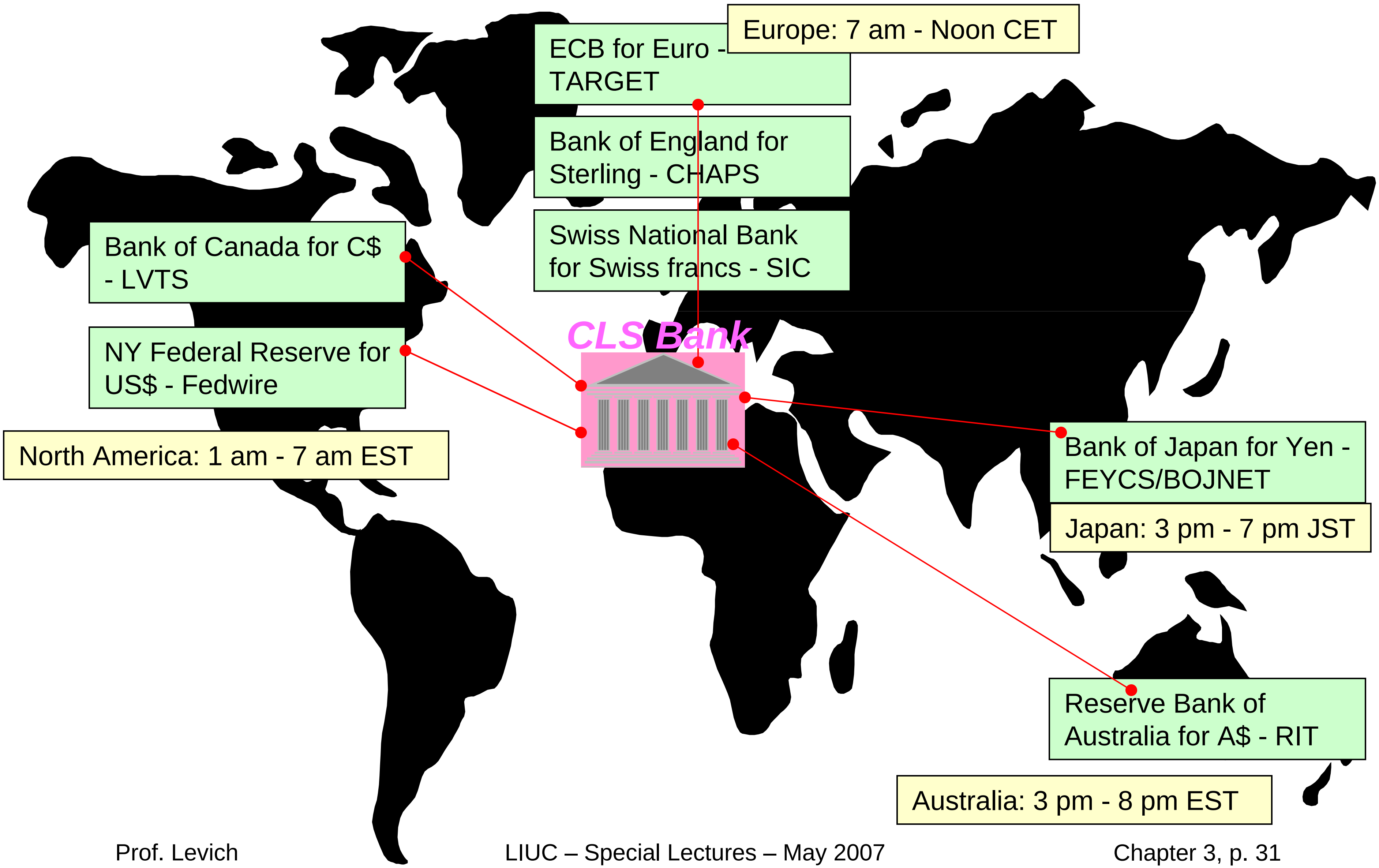
Innovations in FX Trading (1 of 2)

- *Interbank Trading*
  - » Automated brokerage systems
    - ◆ 1. Reuters Matching 3000 (1992 launch of Dealing 2000) [http://about.reuters.com/productinfo/dealing3000spot/]
      - – Largest market share in £, A$, C$, former commonwealth
    - ◆ 2. Electronic Broking Service (1993 launch, consortium of banks) [http://www.ebs.com/]
      - – Largest market share in €, ¥, and Swiss franc (vs. US$)
    - ◆ Impact: Greater pricing transparency, competition, smaller bid-ask spreads, lower profitability of interbank trading - and made voice brokers nearly extinct. [ABS: 50-70% of global spot FX.]
  - » Clearing and Settlement
    - ◆ 1. FX Net (1987 launch) from bi-lateral to multi-lateral netting
    - ◆ 2. Continuous Linked Settlement (CLS) Bank (September 9, 2002 launch, consortium of banks) [http://www.cls-group.com]
      - – With CLS, banks reduce settlement risk, and need for risk capital

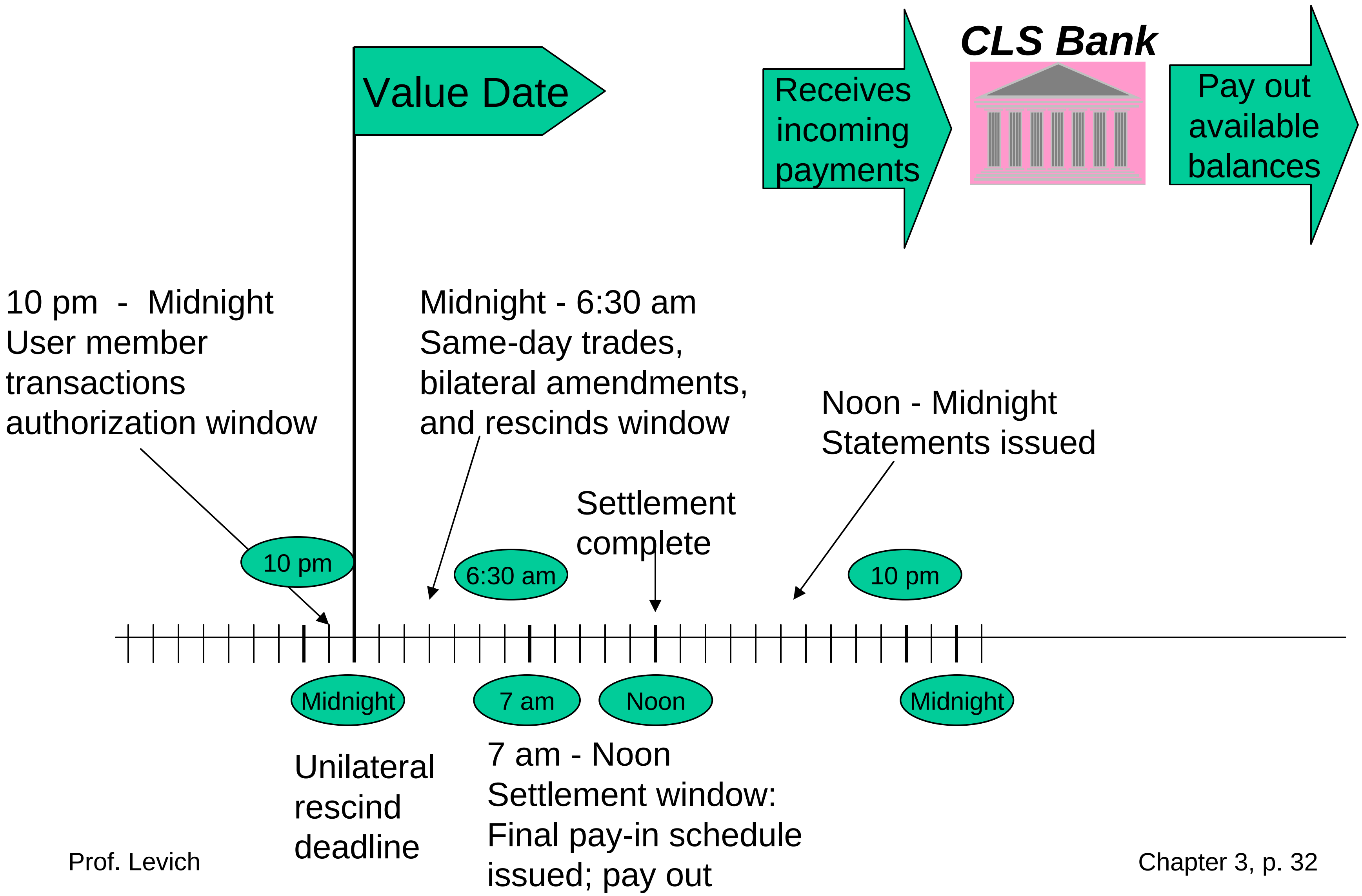
The CLS Bank

- The basic structure
  - » Parent: CLS Group Holdings AG
    - ◆ At present, 70 shareholders (banks) from 19 countries
  - » CLS Bank International (wholly owned subsidiary)
    - ◆ Based in NY, operates under U.S. FRB regulation
    - ◆ At present, 58 "settlement members"
- What does the CLS Bank do?
  - » Settles two or more currency legs using *payment v. payment* in conjunction with national RTGS payment systems
  - » Pays out proceeds and receive funds continuously from 7 am - 12 Noon (CET), settlement members paid simultaneously
  - » Settlement is final and irrevocable
- CLS eligible trades
  - » Both counterparties must be CLS eligible
  - » Both currencies (now at 15) must be CLS eligible
  - » Trades must be submitted and matched by 6:30 on the value date

CLS Bank settlement timings and national RTGS systems overlap



Settlement Cycle at the CLS Bank



Innovations in FX Trading (2 of 2)

- *Corporate Trading*
  - » Web-based, single bank
    - ◆ 1. Reuters Dealing Link [http://about.reuters.com/productinfo/dealing3000/]
    - ◆ 2. Individual bank dealing platforms (CitiFX, iFX, …)
  - » Web-based, multi-bank; B2C
    - ◆ 1. Currenex, live in April 2000 [http://www.currenex.com/]
      - – Reverse auction format: Banks make simultaneous competitive bids for corporate business
      - – Currenex is neutral platform provider
    - ◆ 2. FX Alliance, live in May 2001 [http://www.fxall.com/]
      - – Customers see competitive prices from many liquidity providers
    - ◆ 3. Others: FX Connect, STN Treasury, Atriax (defunct)
  - » All systems: Greater transparency, use secure internet connections rather than proprietary equipment, "straight through processing."

Summary

- The global volume of FX trading is huge
  - » London is the largest center. The US$ plays a part in more transactions than any other currency. FX swaps are most popular contract.
- In the traditional / classic FX market
  - » Interbank transactions rely on direct dealing, or brokers to link physically dispersed dealers
  - » Dealing, or market making is fast paced, but dealers control their inventory positions carefully over the day
  - » Dealing spreads (bid, ask) vary through the day
- Innovations in the FX market
  - » CLS Bank reduces delivery risks in interbank trading
  - » Web-based systems promote transparency and competition