7th session

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International Financial Markets

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- Financial Turmoil
  - Contagion.
  - Leading indicators.

  - Presentation of the papers
    - *Dornbusch, Park, Claessens, (2000)* **Contagion: understanding how it spreads,** The World Bank Research Observer, vol.15, no.2, pp.177-97

    - *Frankel and Saravelos (2012)* **Can leading indicators assess country vulnerability? Evidence from the 2008-09 global financial crisis** Journal **of** International Economics vol. 87, no 2, 216–231

Financial Turmoil

- Financial crises: banking and/or currency (balance of payments), sovereign debt, hyperinflation.

- Banking Crises
  - Collapse of financial institutions. Systemic banking failures.
  - Situations of panic, with too many withdrawals of deposits.
  - Massive governmental intervention.

- Currency (Balance of Payments) Crises

- When there is massive sale of a currency (speculative attack).

  - In fixed exchange rates, sale → pressure to devaluation.

  - In floating exchange rates, sale, → larger depreciation.

  - Selling pressure indicators in fixed exchange rate regimes:

    - loss of reserves,

    - rise in short term interest rates

    - currency at a discount,

    - exchange rate depreciating in the black market.

- ## Twin Crises

  - ▪ Feedback mechanisms

Currency Crisis	⇨	Banking Crisis

  - • When bank's liabilities are mainly in foreign currency, but assets are mainly in domestic currency – CURRENCY MISMATCH

Banking Crisis	⇨	Currency Crisis

  - • The cost of addressing the consequences of a banking crisis (liquidation of insolvent banks), is borne by the public sector - worsening of the fiscal position - expectations of monetization of the fiscal deficit and exchange rate depreciation

Models of currency crises

- First generation
  - Crises are viewed as the unavoidable result of unsustainable policies or fundamental imbalances.
    - An expansionary monetary policy (ex. monetization of budget deficits) with a fixed exchange rate – depletion of monetary reserves – increased demand for foreign currency.
    - A key insight of these models is that the exhaustion of reserves takes the form of a sudden depletion, instead of a gradual running down of the stock, as could be expected. Even a Central Bank with a large volume of foreign assets is not safe.

- Second generation
  - Crises are not the unavoidable result of inconsistent policies – CREDIBILITY
  - They result from the interaction between investors' expectations and actual policy outcomes. Investors know that there are conditions under which the authorities will abandon the peg.
  - Different outcomes can occur depending on the agents' expectations – indeterminacy, multiple equilibria – models can rationalize large market movements, even in the absence of corresponding changes in fundamentals.
  - A currency crisis can occur because of a shift in expectations toward the devaluation outcome. Such a shift suddenly makes the defense of the peg excessively costly.

Third generation

- Twin crises

- Also possible, an observed fiscal balance with shocks to the private sector that threaten banks or firms profitability, and that require a bailout of the troubled institutions – agentes anticipate an expansionary monetary policy in the future.

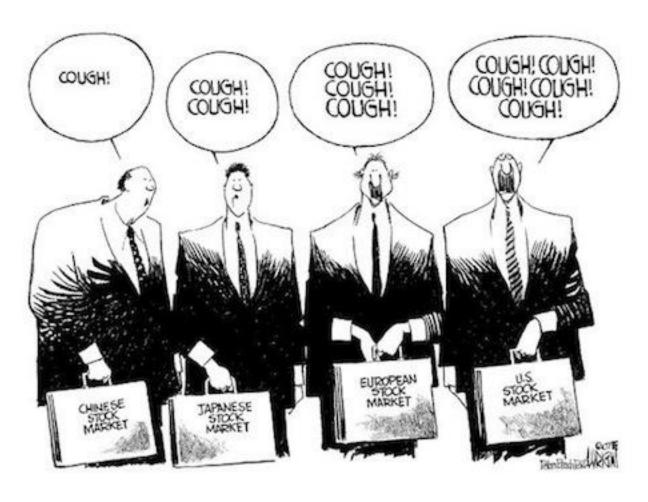- Currency crises leading to Banking crises:

    Devaluation of the currency → banks solvency problems
    when they lend to locals but borrow abroad.

- Banking crises leading to Currency crises:

    Bail-out of banks or activation of deposit insurance → financing of expenses (monetization or rising debt)

Financial Turmoil

CONTAGION

Source: http://newsl.org

Financial Turmoil

CONTAGION

- **Contagion**: transmission of a crisis across countries. The occurrence of a crisis in a country increases the probability of occurrence of crisis in another country.

- Important in the discussion of the best international financial architecture. Identification of transmission channels.

- <u>Presentation of the paper</u>:

Dornbusch et al. 2000, Contagion: understanding how it spreads, *The World Bank Research Observer, vol. 15, no. 2,* 177–97.

- Contagion is observed through comparison of comovements in
  - exchange rates,
  - stock prices,
  - sovereign spreads,
  - capital flows.

after a shock, in comparison with comovements in tranquil times.

Causes of occurrence of contemporaneous crises:

- COMMON SHOCKS

- A common global shock can lead to comovement in asset prices or capital flows and to balance-of-payment difficulties.

- Countries can display similar elements of domestic vulnerability.

- Examples: Changes in global interest rates, exchange rates between major currencies, recessions in major industrial economies.

  Masson and Mussa (1995), Masson (1998): "monsoonal effects"

- TRADE LINKS AND COMPETITIVE DEVALUATIONS
- When a country has relations with the country with a crisis. Example: Two countries with quite specialized and strong trade relations. The one with a crisis may want to defend the value of its currency. $\searrow M^s \Rightarrow \nearrow i \Rightarrow \searrow$ Demand affecting the trade partner.

- When a country sells the same products in the international market. Shifts in the demand of these products. If another country ends up devaluing the other loses competitiveness. - example in Box 1 of Pesenti & Tilee (2000), The Economics of Currency Crisis and Contagion: an Introduction

Transmission of a Currency Crisis via the Trade Channel

Relationship between the **%Devaluation of country A** currency vis-à-vis de currencies of C and D (DEV) and the **%Reduction in B's exports** (EXPRED)

$\rho(k)$: degree of substitutability between goods of countries A and B in market k.

$$\frac{EXPRED}{DEV} = \sum_{k=C,D} [\rho(k) \times EXSH(B,k) \times MKSH(A,k)].$$

EXSH(i,k) = Export Share$_{ij}$: Share of **i**'s Exports to market **k**.

MKSH(i,k) = Market Share$_{ij}$: Share of goods produced in country **i** in market **k**.

i= A, B; **k**=C, D

TABLE 1

Initial Trade Flows to			Export Share (Percent)			Market Share (Percent)	
	C	D	C	D	Total	C	D
From A	90	10	90	10	100	90	10
From B	10	90	10	90	100	10	90
Total						100	100

Note: Country B's exports fall 1.8 percent following a 10.0 percent devaluation of country A's currency.

$$\frac{EXPRED}{DEV} = \sum_{k=C,D} [\rho(k) \times EXSH(B, k) \times MKSH(A, k)]$$

Country A and country B do not trade directly with each other,

Assuming $\rho(k)=1$,

EXPRED/DEV = (0,1*0,9) + (0,9*0,1) = 0,18

TABLE 2

Initial Trade Flows to			Export Share (Percent)			Market Share (Percent)	
	C	D	C	D	Total	C	D
From A	10	90	10	90	100	50	50
From B	10	90	10	90	100	50	50
Total						100	100

Note: Country B's exports fall 5 percent following a 10 percent devaluation in country A's currency.

$$\frac{EXPRED}{DEV} = \sum_{k=C,D} [\rho(k) \times EXSH(B, k) \times MKSH(A, k)]$$

Assuming $\rho(k)=1$,

EXPRED/DEV = (0,1*0,5) + (0,9*0,5) = 0,5

- **Conclusion**: The Trade Channel is especially important in the transmission of currency crises when the countries sell in the same markets.

  The degree of substitutability is also important.

- FINANCIAL LINKS
  - Direct financial effects, including reductions in trade credits, foreign direct investment, and other capital flows abroad. Example: firms in East Asia that are linked to Thailand by trade, investment, and financial transactions would be adversely affected if a crisis were to limit the ability of Thai firms to invest abroad or extend credit.

  - Liquidity and incentive problems

  When two countries have no relationship, there can also be contagion. The fact that many investors suffer losses from a crisis in one country can lead to liquidity constraints, and to having to rearrange their portfolios, removing investments from other countries. It is more likely that this causes crises in countries with small financial markets.

- MEMBERSHIP CONTAGION
  - Political Contagion- *Drazen (1998)* An exchange rate regime that links the parities of a number of currencies can be more politically than economically motivated.
  - Political-economic union, where maintaining a fixed exchange rate is a condition for membership, where the value of membership depends positively on who else is a member. The exit of one element in the group may reduce the interest of other members to remain.

- INFORMATION ASYMMETRIES AND COORDINATION PROBLEMS

  - When investors attribute, even if mistakenly, similar characteristics to different countries.

  - **Herd behaviour** : High demand and high supply of certain assets without apparent justification, by imitation of others. One sells because prices are falling.

    - Herding requires a coordination mechanism – e.g. widely spread rule to coordinate based on some signal (e.g., a price movement)

- May constitute cause for speculative attack.
- Rational or Irrational behaviour?
  - Irrational: Is a result of the psychology of investors.
  - Rational: Is a result of rational behaviours due to the difficulty in obtaining information

- *Devenow and Welch, 1996* – rational herding in financial markets

- Effects that may be present in **rational herding:**
  - Payoff externalities

  The payoffs to an agent adopting an action increase in the number of other agents adopting the same action.

  - Banking panics: depositors running on banks when they observe other depositors doing so.

  - Information acquisition: Under certain circumstances, it is worthwhile to acquire information only if other agents do. Agents herd on information acquisition or lack of it. - e.g. Private information is reflected in stock prices one period after it is acquired, but only if a minimum number of investors have acquired it

- Reputation

  Performance evaluation is often based on relative not absolute results. An individual institutional investor may refrain from acting first, even if market developments favour a new portfolio, for fear of losing his or her reputation if the decision should prove to be wrong. To be on the safe side, individual investors may follow the herd.

Pure contagion

CONTAGION ≠ Connectedness

Criteria that have been used in the literature to identify contagion include:

(i)   the transmission is in excess of what can be explained by economic fundamentals;

(ii)   the transmission is different from regular adjustments observed in tranquil times;

(iii) the transmission is sequential, for example in a causal sense.

No agreement about which of these criteria are necessary or sufficient to characterise contagion.

Empirical Evidence of Contagion

«The definitions of contagion developed in the discursive and theoretical literature are largely divorced from the relatively small empirical literature on this topic».

Dungey & Martin (2001)

- Correlation of Asset Prices or of Capital Flows
  - Studies test correlation among different economies in interest rates, stock prices, and sovereign spreads.

  - Crises of the1990s: cross-market correlation did increase significantly during these crises.

  - A marked increase in correlations among markets in different countries may, however, not be sufficient proof of contagion. An increase in correlations of asset prices may result when changes in economic fundamentals, risk perception, and preferences are correlated, without any additional contagion.

- **Contagion vs. interdependence**: "the observed pattern of comovements in asset prices must be too strong (or too weak) relative to what can be predicted conditional on a constant mechanism of international transmission".

- **Contagion in currency markets** - Masson (1998), (IMF).

Movements in an exchange rate are a combination of

- Country specific events,
- Common events which affect all markets (monsoonal effects),
- Spillover effects, due to the known linkages between countries
- The remaining movement in exchange rates: contagion.

- "the simultaneous occurrence of financial crises seems to be mainly a matter of common shocks and interdependence of fundamentals, and that what is left for pure contagion seems to hint at portfolio rebalancing"

Moser 2003

Early Warning Systems - IMF

Precise definition of Crisis **+** Mechanism for generating Predictions

- The purpose is not to explain the origins of crises.

- Theoretical work provides some guidance (fundamentals as well as variables able to influence expectations). How to discriminate between competing indicators, what weights to attach to each?

- Need to distinguish crises from other movements in exchange rates and reserves.

- If the purpose is to predict only successful attacks – definition of a currency crisis as a sufficiently large change in the exchange rate over a short period of time.

- If the purpose is to predict failed as well as successful attacks – combination of exchange rate changes and reserves changes - Crisis Index

- **Exchange market pressure** = weighted average of the rate of depreciation of the local currency, the monthly percentage changes in international reserves, and the monthly change in the interest rate.

- Currency crisis occur within some time after the measure of the exchange market pressure exceeds a certain threshold.

Kaminsky, Lizondo, Reinhart (1998):

Crisis: *index 3 standard-deviations above the average*

  - The index increases with depreciation, loss of reserves and rise in interest rates.

- *Signals Approach*
  - An indicator is said to issue a signal if it departs from its mean beyond a given threshold level.
  - Level: chosen to balance risk of false positives and risk of false negatives.
  - If a signal is followed by a crisis within the signaling horizon (e.g. 24m) it is a good signal. Otherwise, it is noise.

  - Provides information about the quality of the indicator. It allows ranking the indicators.
  - Conditional probability of a crisis depends on the reliability of the indicators sending the signals.
  - It does not allow interaction between indicators.

- *Alternatives*
  - Estimate the probability of devaluation with a multivariate probit or logit.
  - Artificial neural networks
  - Etc.

  See Holopainen, M and Sarlin, P, (2015) **Toward Robust Early-Warning Models: A Horse Race, Ensembles and Model Uncertainty,** Bank of Finland Research Discussion Paper No. 6/2015. Available at SSRN:http://ssrn.com/abstract=2584343

- *Assessing Financial Vulnerability: An Early Warning System for Emerging Economies* by Morris Goldstein, Graciela Kaminsky, and Carmen Reinhart, 2000

- 'Leading indicators' of crises :
  - Appreciation of the real exchange rate (relative to trend).
  - Decline in equity prices.
  - Fall in exports.
  - High ratio of broad money (M2) to international reserves
  - Recession.
  - Large current-account deficit relative to investment.
- (Other studies)
  - Contagion indicator: equal to the number of countries experiencing a crisis in the preceding quarter in the same region.

- **Practical Issues**

  - How far in advance the prediction is to be made.

  - What set of historical data and what number of countries to use: too large or too small…

  - What variables to include: some potential interesting variables are difficult to measure and/or are not easily comparable across time and countries (e.g. health of financial systems).

  - Balance the number of right signals and false alarms.

- Literature assessing the relative performance of different methods

Presentation of the paper:

Frankel, Jeffrey A., and George Saravelos. 2011. Can Leading Indicators Assess Country Vulnerability? Evidence from the 2008- 09 Global Financial Crisis. HKS Faculty Research Working Paper Series RWP11-024,John F. Kennedy School of Government, Harvard University