Financial System Architecture and the Patterns of International Trade

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Introduction

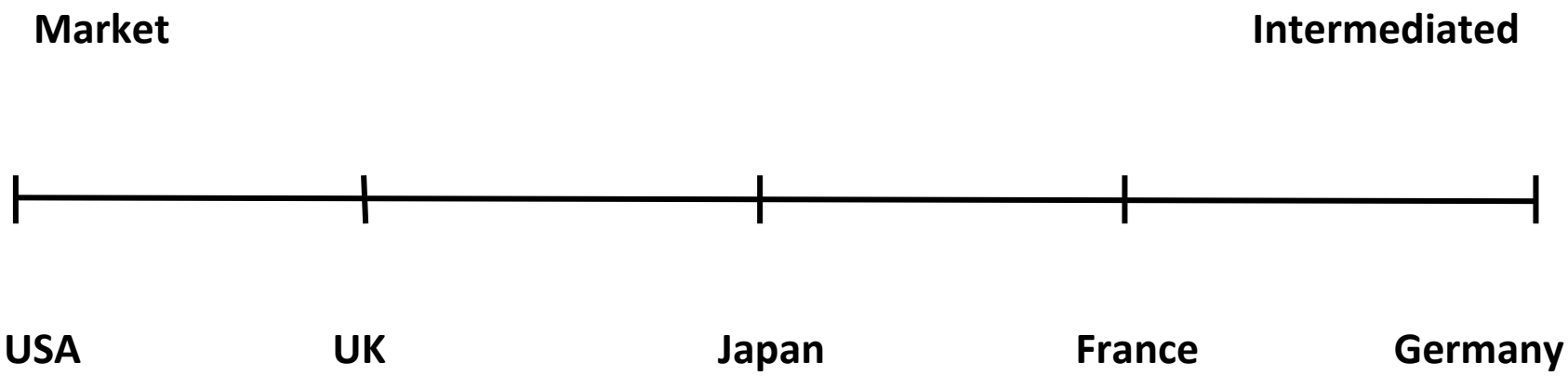
- Finance matters for international trade
- Cross-country correlation between the level of development of financial systems and the export intensity of financially dependent sectors relative to the export intensity of financially independent sectors
- A story about North-South Trade: Financial development is closely correlated with the quality of financial institutions

- **Theory offers two explanations**
  - **Better quality financial systems lead to a comparative advantage in those sectors that are dependent of external finance**
    - **Antras and Caballero (2009), Beck (2002), Bougheas and Falvey (2010), Chaney (2005), Egger and Keuschnigg (2009), Ju and Wei (2008), Kletzer and Bardhan (1987), Manova (2008), Matsuyama (2005) and Wynne (2005)**
  - **Technological comparative advantage in financially dependent sectors encourage the development of the financial sector**
    - **Do and Levchenko (2007) and Huang and Temple (2007)**
- **Evidence suggests that both paths are relevant**
    - **Do and Levchenko (2007) and Manova (2008)**

- **<u>This paper</u>: Variations in financial systems might also matter for comparative advantage – A story of North-North trade**
  - **Among those countries with well developed financial systems there exist significant variations in the relative development between market and intermediated finance**
  - **The advantages of each form of finance are related to how they deal with different types of information**
    - **Market finance has an advantage in collecting and aggregating diverse opinions and thus is more successful in dealing with uncertainty, innovation and new ideas**
    - **Intermediaries benefit from increasing returns to scale in processing standardized information**

- **<u>Hypothesis</u>: Some sectors are more suitable for market finance and other sectors are more suitable for intermediated finance**
- **<u>Prediction</u>: Countries with more developed equity and bond markets should have a comparative advantage in sectors that are dependent on market finance and *vice versa*[2]**
    - **Causation is an empirical issue**

Market vs Intermediated Finance I



Source: Allen and Gale (2001) – Comparing Financial Systems

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Market vs Intermediated Finance II

1993	Banking Assets / GDP	Market Capitalization / GDP
United States	0.53	0.82
United Kingdom	2.59	1.40
Japan	1.50	0.71
France	1.51	0.36
Germany	1.52	0.24

Source: Allen and Gale (2001) – Comparing Financial Systems

CORRELATION COEFFICIENTS OF (WITHIN GROUP) SECTOR NET-EXPORTS (Average: 1976-2004)

	USA	UK	JAPAN	GERMANY	FRANCE
USA	1				
UK	0.9381	1			
JAPAN	-0.9659	-0.9604	1		
GERMANY	-0.8778	-0.8126	0.7722	1	
FRANCE	0.3832	0.5607	-0.5085	-0.3381	1

Source: World Bank

CORRELATION COEFFICIENTS OF (WITHIN GROUP) SECTOR NET-EXPORTS
(Average: 1976-2004)

	USA	UK	JAPAN	GERMANY	ITALY	FRANCE	CANADA	AUSTRALIA
USA	1							
UK	0.81	1						
JAPAN	-0.84	-0.92	1					
GERMANY	-0.90	-0.85	0.83	1				
ITALY	0.46	0.29	-0.30	-0.46	1			
FRANCE	0.00	0.44	-0.40	-0.27	-0.26	1		
CANADA	-0.36	0.02	-0.12	0.09	-0.33	0.59	1	
AUSTRALIA	0.69	0.80	-0.89	-0.80	0.19	0.61	0.28	

CAPITAL MARKET VS BANK DEVELOPMENT
(Average: 1989-2008)

Country	Ratio 1	Ratio 2	Country	Ratio 1	Ratio 2
USA	1.917	3.487	FRANCE	0.572	0.990
UK	1.025	1.142	GERMANY	0.306	0.635
AUSTRALIA	1.013	1.312	ITALY	0.374	0.764
CANADA	0.829	1.020	JAPAN	0.424	0.635

Note:

Ratio 1: Ratio of Capital Market Capitalization to Domestic Bank Assets

Ratio 2: Ratio of Capital Market Capitalization plus Private Bond Capitalization to Domestic Bank Assets

Source: Beck, Demirguc-Kunt and Levine (2009)

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Summary of the Model

- **Two-sector version of the Holmström-Tirole (1997) fixed-investment model of market and intermediated finance**
  - **Continuum of agents that differ according to their *net worth***
    - **Symmetric homothetic preferences**
  - ***Moral hazard* reduces *pledgeable income* and thus causes *credit rationing***
  - **Costly reduction of the impact of moral hazard by *bank monitoring***

Solving the Model

- In a symmetric equilibrium the price is equal to 1
- Introduce a slight advantage in one sector such that the impact of moral hazard is reduced
- At the new equilibrium there will be more agents with access to market finance in the sector where moral hazard is less severe
- *Hypothesis:* In all countries the ranking of sectors according to their relative access to different sources of finance (*Market Dependent vs Bank Dependent*) is the same

Predictions

- **Suppose that country *A* has a slight technological advantage in sector 1**

Result 1: ***(Technological comparative advantage drives financial development)***

If sector 1 is the bank dependent sector then in the new global equilibrium the banking sector of country A will be relatively more developed

- **Suppose that country *A* has a slight more efficient banking sector**

Result 2: ***(Financial comparative advantage drives financial development)***

Country A will export the good produced by the bank dependent sector and its banking sector will be relatively more developed

The Model

- Two sectors {*j*=1, 2}; sector 2 good: numeraire; *P*: price of good 1
- Two types of risk-neutral agents {1, 2} each of measure 1
  - Type 1 (2) can only run a sector 1 (2) project
- Net worth, *A*, is distributed identically across types on $[\overline{A}, \underline{A}]$ with density *f* and distribution *F*
- Homothetic symmetric preferences
- Each good requires an initial investment of *I* units of capital

The Model (cont'd)

- Technology: with probability p a project yields R^j units and with probability 1-p yields 0
- Moral Hazard: $p \in \{p_H, p_L\}$, $(p_H > p_L)$; when effort is low there is an additional benefit B^j
- Financial markets and intermediaries are competitive
- Monitoring at cost c reduces benefit to $b < B^j$
- V_b^{jc}: payoff of an agent who borrows from the capital market
- V_b^{jm}: payoff of an agent who borrows from monitors (banks)

Solving the Model

Capital Market

Zero-profit condition for the capital market

$$p_H\left(PR^j - V_b^{jc}\right) = r(I - A)$$

Incentive compatibility

$$V_b^{jc} \geq \frac{B}{\Delta p}\text{; where } \Delta p = p_H - p_L$$

Capital market threshold

$$A_h^j = I - \frac{p_H}{r}\left(PR^j - \frac{B}{\Delta p}\right)$$

Solving the Model (cont'd)

Banks

Zero-profit condition for banks

$$p_H\left(P(R^j - c) - V_b^{jm}\right) = r(I - A)$$

Incentive compatibility

$$V_b^{jm} \geq \frac{b}{\Delta p}$$

Banking threshold

$$A_l^j = I - \frac{p_H}{r}\left(P(R^j - c) - \frac{b}{\Delta p}\right)$$

Solving the Model (cont'd)

Co-existence of Institutions

$$A_h^j > A_l^j ; \;\; c < \frac{B^j - b}{P\Delta p}$$

Financial market equilibrium

$$\int_{\underline{A}}^{A_l^1} Af(A)dA + \int_{\underline{A}}^{A_l^2} Af(A)dA =$$

$$\int_{A_l^1}^{\overline{A}} (I - A)f(A)dA + \int_{A_l^2}^{\overline{A}} (I - A)f(A)dA \Rightarrow$$

$$2\widehat{A} = \left[2F\left(\overline{A}\right) - F\left(A_l^1\right) - F\left(A_l^2\right)\right]I$$

- **All endowments are allocated on project financing**

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Solving the Model (cont'd)

Goods market equilibrium (sector 1)

$$\textbf{Supply}: \int_{A_1^l}^{A_1^h} \left(p_H\left(R^1 - c\right) - \frac{p_H P\left(R^1 - c\right) - r(I-A)}{2P}\right) f(A)dA +$$

$$\int_{A_1^h}^{\overline{A}} \left(p_H R^1 - \frac{p_H P R^1 - r(I-A)}{2P}\right) f(A)\, dA =$$

$$\textbf{Demand}: \int_{\underline{A}}^{A_1^l} \frac{rA}{2P} f(A)dA + \int_{\underline{A}}^{A_2^l} \frac{rA}{2P} f(A)dA + \int_{A_2^l}^{A_2^h} \left(\frac{p_H\left(R^2 - c\right) - r(I-A)}{2P}\right) f(A)\, dA +$$

$$\int_{A_2^h}^{1} \left(\frac{p_H R^2 - r(I-A)}{2P}\right) f(A)\, dA \Rightarrow$$

$$P\left\{R^1\left[F\left(\overline{A}\right) - F\left(A_l^1\right)\right] - c\left[F\left(A_h^1\right) - F\left(A_l^1\right)\right]\right\} =$$

$$R^2\left[F\left(\overline{A}\right) - F\left(A_l^2\right)\right] - c\left[F\left(A_h^2\right) - F\left(A_l^2\right)\right]$$

- ***P*** **is equal to sector 2 output divided by sector 1 output**

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Results

- **Suppose that $B^1 = B^2$: $P = 1$**
- **Suppose that $B^1 > B^2$: $P > 1$**
  - **Sector 1 is bank finance dependent and sector 2 is market finance dependent**
- **Consider two countries *A* and *B*: $R_A^1 = R_B^1$ and $R_A^2 > R_B^2$**
  - **Country *A* will export good 2 and experience a strong development of its financial market**
- **Consider two countries *A* and *B*: $c_A > c_B$**
  - **Country *A* will export good 2 and experience a strong development of its financial market**