Domestic Institutions and the Bypass Effect of International Capital Flows

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Abstract

Why does FDI travel from rich to poor countries but non-FDI doesn't? Could financial and property rights institutions play different roles in understanding capital flows? Unbundling both institutions and capital flows, this paper proposes a simple model to study the relationship between various domestic institutions - financial system, corporate governance, and property rights protection - and patterns of international capital flows. It describes conditions under which inefficient financial system and poor corporate governance in a country may be bypassed by two-way capital flows in which domestic savings would leave the country in the form of outflows of financial capital but domestic investment takes place via the inflows of foreign direct investment. In this framework, financial and property rights institutions can have different effects on capital flows.

Keywords: Gross Capital Flows, Property Rights Protection, Financial Development, Corporate Governance

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Contents

1 Introduction

Cross-border capital flows have been increasing in real value at a pace of about 6 percent a year since 1980, faster than those of world GDP and trade. This reflects falling barriers to capital flows in many parts of the world. Yet, the composition varies across countries. Foreign direct investment (FDI) tends to go from rich to poor countries, but financial capital often travels in the opposite *("wrong")* direction. Many developing countries (e.g., Botswana, China, and Slovenia) import FDI on the one hand, but export financial capital on the other. Many developed countries (e.g., the United States), on the other hand, do the reverse, exporting FDI but importing financial capital. This paper proposes a simple theoretical framework to study the relationship between various domestic institutions - financial system efficiency, corporate governance, and property rights protection - and patterns of international capital flows. Two-way capital flows are shown to be a natural consequence of cross-country differences in the quality of financial system and the strength of corporate governance. In other words, financial globalization allows inefficient domestic financial system and weak corporate governance to be bypassed through international capital flows. The paper studies conditions under which two-way capital flows and the bypassing effect can take place.

Consider the example of China, which is a top recipient of FDI in the world, with an amount in excess of 50 billion US dollars in 2005. While traditional explanations center on China's cheap labor and large market as what attracts foreign firms, MIT political scientist Yasheng Huang (2003) suggested a novel and fascinating hypothesis: the large volume of inward FDI is a reflection of China's inability to allocate its household savings efficiently through its financial sector, rather than its economic strength. More specifically, as a legacy of its central planning past, the financial sector, still dominated by state-owned banks, systematically discriminates against private firms, making it difficult for them to obtain financing. In response,

many entrepreneurs learned to acquire foreign joint venture partners who can solve the financing problem by using banks and financial markets outside China. As an example, Huang observed that there are many foreign joint venture firms in the sector of traditional Chinese medicines, and asked rhetorically what foreign firms could offer to the Chinese partners other than the availability of financing (and some tax advantages). In this case, FDI effectively serves as a tool for Chinese private firms to circumvent the inefficient domestic financial sector.[1]

In the next section, we present some stylized evidence that suggests that countries with a combination of poor financial system/poor corporate governance but an intermediate level of property rights protection (e.g., Czech Republic, China, Chile, Malaysia, Mauritius, and Trinida and Tobago) are most likely to simultaneously be net exporters of financial capital and net importers of FDI. Countries with good financial system/corporate governance and also strong property rights protection (e.g., United States, United Kingdom, and Finland) tend to exhibit the opposite pattern: importing financial capital and exporting FDI on net.

To highlight the role of institutions rather than risk sharing motive as a driver for capital flows, our model assumes that everyone is risk-neutral. By introducing a financial arrangement between entrepreneurs and investors into an otherwise standard neoclassic framework, we derive a *sharing rule of capital revenue* by which expected marginal product of capital is divided into interest rate, cost of financial intermediation, and cost of weak corporate governance. This sharing rule makes explicit the possibility that a developing country (with a scarcity of capital and a potentially high return to physical capital) may nonetheless offer a low return to financial investment/savings due to inefficiency in its financial sector and weak corporate governance. Under some conditions, the country may experience a combination of two-way capital flows: exporting savings and importing FDI at the same time. Interestingly, regardless of

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[1] Dooley, Folkerts-Landau, and Garber (2004) also suggested that multinational firms are part of the mechanism for a vast Chinese labor force to be employed successfully in export-oriented sectors without being dragged down by China's inefficient financial system.

the initial endowment, capital flows may always bring two countries with different institutions into a pattern of two-way capital flows.

The model also defines a notion of "effective capital abundance" which determines the size of net capital flows (while the collective quality of financial institutions and corporate governance determines the composition of gross flows). A country is effectively more capital abundant if it has either a high ratio of physical capital to labor or weak property rights institutions. By reducing profitability of investment, weak property rights protection discourages inward FDI and encourages outflow of savings.

The paper proves a somewhat surprising result: In a frictionless world, international capital flows would generally lead to a complete bypass of inferior financial institution and corporate governance. In a sense, capital mobility and domestic financial reforms are substitutes. The extreme proposition of a complete bypass effect may not be realistic, but hopefully is instructive. The Modigliani-Miller theorem predicts complete subtitutability between debt and equity as forms of corporate financing in a frictionless world, while the Coase theorem predicts complete substitutability between market-based and within-firm transactions if there is no transaction cost. Neither is realistic, but both are considered helpful in clarifying thinking on their respective topics. In our context, it may be realistic that an open capital account partially makes up for the shortcomings of an inferior domestic financial system and corporate governance.

The bypass effect has interesting welfare consequences, highlighting the point that the substitution discussed above is not perfect. First, the country with a better financial system/corporate governance and the world as a whole always gain from free capital mobility. Second, the country with an inferior corporate governance/financial system, may not gain from it. However, the stronger its property rights protection, the more likely it would benefit from capital mobility. These theoretical predictions are consistent with the observation that the United

States and other developed countries tend to be more enthusiatic about global capital account liberalization than many developing countries. They are also consistent with the empirical findings, reviewed in Prasad et al (2003) and Kose et al (2006), that the strength of domestic property rights protection in a developing country may affect its ability to benefit from financial globalization.

The literature that looks into the composition of capital flows is small. Indirectly related to this paper is a theoretical literature that investigates the effect of financial market imperfection on capital flows. Gertler and Rogoff (1990), Gordon and Bovenberg (1996), Shleifer and Wolfenzon (2002), and Matsuyama (2004, 2005) are some of the important papers in that area. Aoki, Benigno, and Kiyotaki (2006) study the effect of credit market constraints on capital flows. Stulz (2005) develops a model of the dual agency problems of government and entrepreneurs that may limit financial globalization. Caballero, Farhi, and Gourinchas (2005) show that an exogenously specified low capacity to generate financial assets reduces the interest rate. Antras, Desai, and Foley (2006) study the choice of multinational firms between licensing a technology to foreign producers versus engaging in FDI and relate that to the strength of financial system in the host country. To our knowledge, the *bypass effect of international capital flows* emphasized by this paper has not been formally studied in the theoretical literature.

There is also a related empirical literature. Alfaro, Kalemli-Ozcan, and Volosovych (2005) show that weak institutions discourage inflow of capital. They do not distinguish between financial flows and FDI. Lane and Milesi-Ferretti (2006) construct updated data on the evolution of external assets and liabilities for a large number of countries. Gourinchas and Jeanne (2006) show that international capital does not flow to countries that have a high domestic investment ratio. Interestingly for our paper, Prasad, Rajan, and Subramanian (2006) find that aggregate capital appears to flow "upstream," i.e., from poor to rich countries, while FDI does go "downstream," from rich to poor countries. The theory developed in this paper

may provide a starting point to explain these empirical patterns of international capital flows.

2 Some Data Patterns

In this section, we report some basic patterns of international capital flows and link them to countries' institutional features. The idea is to see if the pattern of two-way capital flows, or the bypass effect, that characterizes China extends to other countries with similar combinations of financial/corporate governance system and property rights institutions. To do this, we need to have data on quality of financial institution/corporate governance and strength of property rights protection. We then need to relate countries' patterns of capital flows to these indicators.

2.1 Classifying Countries Based on Institutional Features

Since institutional features are not easily quantifiable, measurement is a challenge especially if we need separate measures for strength of property rights protection, quality of financial system, and quality of corporate governance, and aim to have a wide country coverage. Fortunately, we can find one common source for these variables: the Global Competitive Report 2003-2004, published by the World Economic Forum, Geneva, Switzerland, in collaboration with Harvard University.[2]

The survey questions in the Global Competitive Report evolve over time, and the country coverage expands gradually as well. We choose the 2003-2004 report because it covers substantially more countries than the earlier years, and contains measures of all the institutional features that are relevant for us. We define our measures as follows:

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[2]Main authors for this issue: Michael Porter, Klaus Schwab, Xavier Sala-i-Martin, and Angusto Lopez-Claros. The World Economic Forum, known for its annual sponsorship of the Davos meetings that usually gather world's political celebrities, business leaders, and prominent academics, and take place in Davos, Switzerland in January, is a consortium of firms around the world. Beginning in the mid-1990s, it partners with Harvard University, conducts a survey of its member firms around the world for aspects of national economies that affect their economic competitiveness, and produces an annual report.

A. *Strength of Property Rights Protection* is measured by the average of the following two indices:

- Q6.03 *Property Rights*: Financial assets and wealth (1 = are poorly delineated and not protected by law, 7 = are clearly delineated and well protected by law)

- Q6.06 *Burden of Regulation*: Administrative regulation in your country are (1 = burdensome, 7 = not burdensome)

B. *Quality of Corporate Governance* is measured by the average of the following two indices:

- Q10.17 *Efficacy of Corporate Boards*: Corporate boards in your country are (1 = controlled by management, 7 = powerful and represent outside shareholders)

- Q10.24 *Protection of Minority Shareholders' Interests*: Law protection of minority shareholders' interests in your country is (1 = nonexistent or seldom recognized by majority shareholders, 7 = total and actively enforced)

C. *Quality of Financial System* is measured by the average of the following two indices:

- Q2.05 *Financial Market Sophistication*: The level of sophistication of financial markets in your country is (1 = lower than international norms, 7 = higher than international norms)

- Q10.27 *Strength of Auditing and Accounting Standards*: Financial auditing and accounting standards in your country are (1 = extremely weak, 7 = extremely strong, among the best in the world).

D. In anticipation of the predictions of our model, we will look at a collective measure of the quality of Financial System and Corporate Governance rather than

the two separately. The collective quality is defined as the average of quality of Financial System and quality of Corporate Governance.

There are 97 countries in total for which we can have these measures and have data on their patterns of capital flows. Based on these measures, the entire sample is divided into three approximately equal-sized bins:

- *Bin 1* (good collective quality of financial system and corporate governance, and good property rights protection) = all countries with the ratings of the collective quality of financial institutions and corporate governance in the top 33 percentile. These countries also happen to have good property rights institutions. The United States, the United Kingdom, and Finland are examples of countries in this bin.

The remaining 2/3 of the countries are divided based on whether their rating of property rights protection is above or below the median of this set (2/3) of the countries.

- *Bin 2* (bad collective quality of financial system and corporate governance, and intermediate property rights protection) = the half of the countries not in *Bin 1* that have ratings of property rights protection above the median value for this set of countries. China, Vietnam, and Mexico are some examples in this second bin.

- *Bin 3* (bad collective quality of financial system and corporate governance, and bad property rights protection) = the half of the countries not in *Bin 1* that have ratings of property rights protection below the median. Haiti, Angola, and Ukraine are examples of countries in this third bin.

2.2 Capital Flows

We now look at patterns of capital flows. Our subsequent model suggests that population is a better scaling variable than GDP. To minimize possible bias induced

by the disparity in population counts across countries (e.g., 3 million for Jamaica versus 1300 million for China), we compute net cumulative FDI outflows scaled by ln(*population*) and net cumulative financial capital (or non-FDI) outflows scaled by ln(*population*) at the end of 2003 for all countries in our sample. Financial capital includes portfolio equity, portfolio debt, financial derivatives, and foreign exchange reserve minus gold. In addition, we also consider a broader notion of financial capital that attempts to capture capital flight as reflected in the errors and omissions in the balance-of-payments accounting (a negative number implies capital flight). More precisely,

- **Net Cumulative FDI Outflows Relative to Population** = (FDI assets – FDI liabilities)/[ln($Population$) × 1000]

- **Net Cumulative Financial Outflows (a) Relative to Population** = [(portfolio equity assets- portfolio equity liabilities) + (portfolio debt assets- portfolio debt liabilities) +(financial derivatives assets – financial derivatives liabilities) + (total reserves –gold)]/[ln($Population$) × 1000]

- **Net Cumulative Financial Outflows (b) Relative to Population** = Net Cumulative Financial Outflows (a) Relative to Population – (cumulative net errors & omissions)/[ln($Population$) × 1000]

We extract the stock of foreign assets and liabilities (in millions US dollars) in 2003 from Lane and Milesi-Ferreti (2006). The data on population (in millions) come from the IMF's International Financial Statistics.

2.3   Linking Patterns of Capital Flows to Institutional Features

Table 1 reports, for countries in each bin - combinations of strength of property rights protection and collective quality of financial system and corporate governance, the average cumulative net FDI relative to population, and the average cumulative net financial capital relative to population.

Table 1

The difference in the patterns of capital flows across the bins is quite interesting. In particular, it is not uncommon to see financial capital and FDI to go in the opposite direction for a given country group. Countries in the first bin (with a combination of good financial/corporate governance system and strong property rights protection, e.g., the United States) tend to be net suppliers of FDI but net recipients of financial capital. In contrast, countries in the second bin (with a combination of bad financial/corporate governance system but intermediate levels of property rights protection, e.g., China) tend to do the opposite, importing FDI on the one hand, but exporting financial capital on the other. Countries in the third bin (e.g., Haiti) tend to import both FDI and financial capital but at a level much below the countries in the other two bins. The contrast in the patterns of capital flows between countries in the first two bins is striking, and is consistent with the bypass hypothesis that is articulated in the introduction section.

Table 2 reports some OLS regressions of either net financial capital outflows or net FDI outflows on strength of property rights protection and collective quality of financial system/corporate governance. These are by no means a formal test of the hypothesis as they do not capture all determinants of capital flows and do not address potential endogeneity of these institutional variables. Nonetheless, the table reveals some suggestive regularities. In particular, a change in the collective quality of financial system/corporate governance seems to be associated in quite different ways with changes in FDI versus financial capital. Higher quality of financial system/corporate governance tends to be associated with less net outflows of financial capital, but more outflows of net FDI (or less inflow of inward FDI).

Table 2

There is also some evidence from the literature that shows that financial development may have different effects on inward FDI versus inflows of financial capital. In Wei (2006), gross inward FDI and gross inflows of portfolio equity and debt (note: not net flows) are regressed on measures of corruption and financial development across a sample of 40 countries. It also finds differential associations between financial system characteristics and FDI versus financial capital. In particular, higher levels of financial development tend to reduce inward FDI but increase inflows of financial capital. These findings are consistent with, though not identical to, the results reported in Table 2 here.

To summarize, the simple data work in this section suggests a number of interesting patterns about institutions and capital flows:

a) FDI and non-FDI (financial capital) flows may operate in opposite directions for many countries. In particular, countries with good financial development and good property rights protection tend to export FDI and import financial capital. Countries with poor financial development but passable property rights protection tend to do the reverse.

b) Better financial development is often associated with a decrease in the inflow of FDI (or an increase in the outflow of FDI) but an increase in the inflow of financial capital.

The rest of the paper aims to provide a simple, micro-founded model that can explain these patterns.

3   The Model

Let us start with a closed economy. Two factors, labor and capital, are used for producing a good which is used for both consumption and investment. The endowments of labor and capital in the country are L and K. The production function of the good exhibits constant returns to scale and takes the form of $y =$

$F(l, z)$ where l and z are labor and capital usages by the firm, respectively. The wage rate and the interest rate (the return to financial capital) are denoted by w and r, respectively. The product market is perfectly competitive and the good price is normalized to one.

The production process is assumed to take two periods. There are K number of capitalists, each born with 1 unit of capital and facing an endogenous choice of becoming either an entrepreneur or a financial investor at the beginning of the first period. If a capitalist chooses to be an entrepreneur, she would manage one project, investing her 1 unit of capital (labeled as internal capital) and raising x amount of additional capital (external capital) from financial investors, possibly through a financial institution. The total investment in the firm is the sum of internal and external capital, or $z = 1+x$. Let N denote the number of firms (or entrepreneurs) in the market. Since all firms are symmetric, the economy-wide capital stock $K = Nz$. Full employment of labor would ensure that each firm hires $l = z\,(L/K)$ amount of labor.

After the investment decision is made in the first period, production and consumption take place in the second period. The return to one unit of capital, R, and wage rate, w, are determined by

$$R = F_k'(l, z) = F_k'(1, z/l) = F_k'(1, K/L) \text{ and } w = F_l'(1, K/L) \qquad (1)$$

For each firm, if the project succeeds, the value of its output is equal to the total factor payment:

$$F(l, z) = F_l'(1, z/l)l + F_k'(1, z/l)z = wl + Rz$$

Thus, the firm earns zero profit. The return to one unit of investment R, however, has to be sliced and shared among financial investors, the financial intermediary, and the entrepreneur.

We use a framework of moral hazard that is derived and simplified from Holmstrom and Tirole (1997, 1998) to parameterize financial sector efficiency. More precisely, entrepreneurs, whose own capital endowment is insufficient for the firm's financial need, obtain external financing indirectly through an financial intermediation sector from financial investors. While Holmstrom and Tirole (1997) also study the investment by financial intermediaries, we don't. On the other hand, we let agents endowed with capital to endogenously choose to be either a financial investor or an entrepreneur, but Holmstrom and Tirole don't. In addition, we solve for a general equilibrium in an open economy with international capital flows, whereas Holmstrom and Tirole solve for a partial equilibrium in a closed economy.

For a representative firm, the final output depends in part on the entrepreneur's level of effort, which can be low or high, but is not observable by the financial investors or the financial institution. Assume that the entrepreneur can choose among two versions of the project. The "Good" version has a high probability of success, λ^H, while offering no private benefit. The "Bad" version has a lower probability of project success, λ^L, but offering a private benefit per unit of capital managed, b, to the entrepreneur. We further assume that only the "Good" project is (*socially efficient*) **economically viable**. That is, $\lambda^H R - (1 + r) > 0 > \lambda^L R - (1 + r) + b$ so that only "Good" project is implemented in the moral hazard problem. We normalize $\lambda^L = 0$ and assume $\lambda^H = \lambda$ thereafter.

The entrepreneur is paid R^E per unit of capital to induce her to choose the "Good" project. In addition to that, we assume that in a perfectly competitive financial sector, c/θ units of good (but no capital and labor) is used to intermediate one unit of investment. Thus, the pay to the financial intermediation is c/θ units of good per unit of investment. The *efficiency level of the financial system* in the country is then represented by θ. The higher the θ, the lower the financial intermediation cost.[3]

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[3] As in Holmstrom and Tirole (1997), the financial sector can be viewed as monitoring the entrepreneur not to choose a third version project that would give the entrepreneur an even higher

Other than the financial system, the strength of property rights protection, or the control of the risk of expropriation, also plays an important role in this model. One could conveniently think of a higher value of λ in our model as representing better property rights protection (or lower expropriation risk). Equivalently, a higher value of λ also represents a lower tax rate on capital return.

Conditional on the efficiency level of the financial system, an optimal contract between the entrepreneur and the financial investors can be found by choosing total investment of the project and the marginal pay to entrepreneur's effort, $\{z, R^E\}$, to solve the following entrepreneur's optimization problem.

$$\max_{z,\,R^E} U = \left(\frac{1}{1+r}\right) z\lambda R^E - 1 \tag{2}$$

subject to

$$\left(\frac{1}{1+r}\right) \left[\lambda\left(R - R^E\right) - c/\theta\right] z \geq x = z - 1 \tag{3}$$

and

$$\lambda R^E \geq b \tag{4}$$

Expression (2) is the present value of the firm's *net return to internal capital*. (3) is the participation constraint for the outside financial investors, while (4) is the entrepreneur's incentive compatibility constraint.

In equilibrium, the incentive compatibility constraint (4) must be binding, which gives

$$R^E = \frac{b}{\lambda} \tag{5}$$

The participation constraint (3) is also binding.[4] Substituting (5) into (3) gives the

level of private benefit $B > b$. As (3) and (5) indicate, if $b + c/\theta < B$, the firm takes indirect finance, otherwise direct finance will be taken. As we will show in later sections, it is the sum of intermediation cost and average net pay to the entrepreneur that determines the capital flow. Thus the choice between direct finance and indirect finance does not change our results.

[4] The problem is solved by setting the Lagrangian, and then straightforward manipulation of the first order conditions shows that (3) and (4) must bind.

firm's optimal investment

$$z = \frac{1+r}{(1+r) + c/\theta + b - \lambda R} \tag{6}$$

Substituting (5) and (6) into (2), the firm's *net return to internal capital* becomes

$$U = \frac{\lambda R - (1+r) - c/\theta}{(1+r) + c/\theta + b - \lambda R} \tag{7}$$

3.1 A Sharing Rule on Return to Physical Capital

We assume that a capitalist (a potential entrepreneur) needs to pay a fixed entry cost of f units of goods to become an entrepreneur.[5] With free entry and exit of entrepreneurs, the *net return to internal capital*, U, should be equal to f so that capitalists are indifferent to becoming entrepreneurs or financial investors in equilibrium. That is,

$$
\begin{aligned}
U &= \frac{\lambda R - (1+r) - c/\theta}{(1+r) + c/\theta + b - \lambda R} = f \Leftrightarrow \\
\lambda R &= (1+r) + \frac{c}{\theta} + \beta
\end{aligned}
\tag{8}
$$

where $\beta = \frac{bf}{1+f}$ denotes the average net pay to the entrepreneur. To see this, we note that the entrepreneur's expected return net of the opportunity cost of her own endowment, $bz - (1+r)$, is $U(1+r) = f(1+r)$. Thus, $b = (1+f)(1+r)/z$. Using this result, we see that $\beta = U(1+r)/z$. For a given value of f, the higher the private benefit b, the higher the β. Therefore, one could think of β as a measure of the inferiority of corporate governance. That is, the higher β, the lower the quality

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[5] For expositional convenience, we assume that the fixed fee for becoming an entrepreneur does not reduce the amount of capital that can be employed in the firm in the first period. As an illustration, the entry cost can be a government fee that is due only in the second period. The schedule in the first period could specify that the payment in the second period is equal to $\frac{f(1+r)}{\lambda}$ if the project succeeds, and zero otherwise, so that the expected present value of the fee is exactly f.

of corporate governance. The equation (8) is a key expression in this model, as it describes how the expected return to the physical capital is divided up among its usages, which we label as a *capital revenue sharing rule (CRSR)*. The expected marginal product of capital on the left hand side of the equation, is shared by the return to financial investment, $(1+r)$, the cost of financial intermediation, $\frac{c}{\theta}$, and the average net pay to the entrepreneur. The lower the efficiency of the financial sector (as reflected by a higher $\frac{c}{\theta}$ or a lower θ), or the poorer the corporate governance (as reflected by a higher β), the lower is the return to financial investment in the economy. In other words, in spite of a scarcity of capital in a developing country (which normally implies a high return to physical capital), the return on savings and other financial investment may very well be low if the country's financial sector is inefficient or the corporate governance is weak.

4 Capital Flows with No Frictions

Consider capital flows between countries i and j.[6] They differ in the efficiency level of financial system, θ, the strength of property rights protection, λ, the average net pay to the entrepreneur, β, and endowments L and K. For ease of keeping track, let us make country i to have a relatively low capital-to-labor ratio, low financial sector efficiency, and weak corporate governance, i.e., a typical developing country. There are two types of international capital flows in this model. Foreign direct investment (FDI) goes to where the expected return to an entrepreneur is the highest. It takes place when the entrepreneur decides to take her project (and her capital managed) to a foreign country and use foreign labor to produce. Non-FDI or financial capital flow goes to where the interest rate is the highest; it occurs when a financial investor decides to take her endowment out of the country and invests in a foreign financial system. Labor is assumed to be immobile across countries.

We will proceed sequentially. We first study a case in which only financial capital

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[6]We use superscripts i and j to denote variables of countries i and j, respectively.

flow is allowed, and then a case in which only foreign direct investment is allowed. We then study the general case in which both types of capital flows can take place.

4.1 Financial Capital Flows

Let $K^{i0}(K^{j0})$ be the capital stock in country $i(j)$, respectively, before any cross-border capital flows, while K^i and K^j be the capital stocks in the two countries after the capital flows. Financial capital will flow from i to j if and only if $r^i < r^j$. We assume that free trade in goods equalizes the price of good across countries, which is normalized to 1. Using (1) and $CRSR$ (8), we obtain that $r^i = r^j$ if

$$\lambda^j F_k'(1, K^j/L^j) - \lambda^i F_k'(1, K^i/L^i) = \rho^j - \rho^i \tag{9}$$

where $\rho^i = \left(\frac{c}{\theta^i} + \beta^i\right)$. ρ^i is the sum of the cost of financial intermediation and the average net pay to the entrepreneur and are referred to as the *collective agency costs.* Higher ρ^i represents lower collective quality of financial institution and corporate governance in country i. Equation (9) is labeled as a boundary condition for financial capital flows (FCF). Let $k^i = K^i/L^i$, which is represented by horizontal axis in Figure 1, while k^j is represented by vertical axis. The FCF curve in Figure 1 represents condition (9).

We assume that $F_k'(1, 0) = \infty$. The curve FCF starts from origin and is upward sloping. The position of curve FCF is determined by the value of λ^i, λ^j, and $\rho^j - \rho^i$. If $\rho^j - \rho^i$ becomes smaller, or λ^i/λ^j becomes smaller, the curve FCF shifts to the left. A point in the space, (k^i, k^j), represents capital-labor ratios in two countries. $r^i < r^j$ for any point on the right side of the FCF curve so that financial capital flows out of country i. On the other hand, financial capital flows into country i from country j for any point on the left side of the FCF curve.

If country i is poor, that is, $K^i/L^i < K^j/L^j$, the marginal product of capital in country i, $R^i = F_k'(1, K^i/L^i)$ is higher than that in rich country $R^j = F_k'(1, K^j/L^j)$.

However, if country i has lower quality of financial institution and corporate governance $(\rho^i > \rho^j)$, or worse property rights protection $\left(\lambda^i < \lambda^j\right)$, (k^i, k^j) could be in the right side of FCF curve. Hence the interest rate in country i could be lower. Therefore, an inefficient financial system or a poor corporate governance can result in financial capital to flow from poor to rich countries (as found in Prasad, Rajan, and Subramanian, 2006).

4.2 Foreign Direct Investment

FDI takes place when an entrepreneur decides she can earn a higher return by moving her project to a foreign location. We assume that the entrepreneur still uses her native financial system only and pay the domestic interest rate. In other words, if a U.S. multinational firm operates in India, the US firm still uses a US bank or stock market for its financing need. When the entrepreneur in country j directly invests in country i and produces there, using (7), the *net return to internal capital* becomes

$$U^{jd} = \frac{\lambda^i R^i - \left(1 + r^j\right) - c/\theta^j}{\left(1 + r^j\right) + c/\theta^j + b^j - \lambda^i R^i} \tag{10}$$

The entrepreneur produces abroad if and only if $U^{jd} > U^j$, which holds if and only if $\lambda^i R^i > \lambda^j R^j$. Let

$$\lambda^j F_k'(1, K^j/L^j) - \lambda^i F_k'(1, K^i/L^i) = 0 \tag{11}$$

which is labeled as a boundary condition of foreign direct investment (FDI). The condition (11) is indicated by the curve FDI in Figure 1. For any point on the right side of the FDI curve we have $\lambda^j R^j > \lambda^i R^i$ so that FDI flows out of country i, while for any point on the left side of the FDI curve FDI flows into country i from country j.

4.3 Capital Bypass Circulation

We now allow both types of capital flows. The patterns of bilateral capital flows are determined by conditions (9) and (11). Let $\rho^i > \rho^j$ so that country i has a less efficient financial system or weaker corporate governance than country j. In this case, the curve FCF must be above the curve FDI.[7]

We will show that, without frictions to capital flows, the unique equilibrium in the world capital market is a complete *capital bypass circulation* in which all capital owned by country i leaves the country in the form of *financial capital outflow,* but physical capital (and projects) reenters in the form of *FDI.* The lower quality of financial institution and corporate governance in country i is completely bypassed.

When the *collective agency costs* in country i, ρ^i, is higher than that in country j, ρ^j, there will be a *two-way capital flow area* where $\rho^j - \rho^i < \lambda^j R^j - \lambda^i R^i < 0$. Within the area the expected marginal product of capital is higher in country i than that in country j, but the interest rate which equals the difference between the expected marginal product of capital and the *collective agency costs* is higher in country j than that in country i. Thus FDI flows from j to i, but financial capital flows from i to j in the area. The *two-way capital flow area* is represented by the area between curves FCF and FDI in Figure 1.

The high-ρ country sends out financial capital to escape the low home interest rate, and at the same time, receives the inward FDI that is attracted by the high domestic return to physical capital. The key insight of the complete capital bypass circulation is that with two-way capital flows, the downward pressure on the interest rate in the country receiving financial capital is largely offset by the upward pressure from the export of FDI. Conversely, in the country receiving FDI, the downward pressure on the marginal product of physical capital is offset by the upward pressure from the exports of financial capital. Two-way capital flow keeps going until the less

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[7]If $\rho^i = \rho^j$, FCF and FDI coincide so that financial capital and FDI always flow in the same direction. Furthermore, if $\lambda^i = \lambda^j$, FCF and FDI become the straight line at 45-degree. We are back to the prediction of neoclassical model that capital flows from rich to poor countries.

efficient financial institution is completely bypassed. The financial capital flows from i to j ⇒increases the marginal product of capital in i but decreases the marginal product of capital in j ⇒results in more FDI from j to i ⇒decreases the marginal product of capital in i but increases the marginal product of capital in j ⇒the financial capital flows from i to j. Such *capital bypass circulation* continues until all financial capital owned by country i leaves the country.

Let capital/labor ratio of two countries before capital flows, (k^{i0}, k^{j0}), be on the left side of FDI curve, as indicated by point A in Figure 1 in which country i is labor abundant. Since A is on the left side of FDI curve, FDI will flow into i from j until FCF is reached. Although A is also on the left side of FCF curve, expecting that the flow of FDI from j to i would eventually bring (k^i, k^j) to the right side of FCF curve and make financial capital flowing into country i not profitable, financial capital does not flow into country i in the first place. When (k^i, k^j) passes FCF curve, it then enters into the *two-way capital flow area*. The two-way capital flow will continue until all capital owned by country i leaves the country. When that happens, no financial investor uses the financial sector in country i anymore and all capital in both countries is served by country j's financial system. Anticipating this scenario, domestic capitalists in country i would not choose an entrepreneur career either. In this case, all projects in country i will be operated by multinational firms headquartered in country j.

If the capital/labor ratio of two countries before capital flows, (k^{i0}, k^{j0}), is on the right side of FCF curve, as indicated by point B in Figure 1 in which country i is capital abundant. Financial capital flows out of country i into j at the beginning. Expecting that the flow of financial capital from i to j would eventually bring (k^i, k^j) to the left side of FDI curve and make FDI flowing out of country i not profitable, FDI does not flow out of country i in the first place. After (k^i, k^j) passes the FDI curve two countries enter into the *two-way capital flow area* in which FDI flows from country j into country i, while financial capital flowing from i into j. All capital

owned by country i again leaves the country in the form of *financial capital outflows,* but some physical capital (and projects) reenters the country in the form of *FDI.*

It is worth noting that the complete-bypass equilibrium is independent from initial endowment allocation (k^{i0}, k^{j0}). Regardless of whether a country is poor or rich, all of its financial capital will leave the country, with some compensating inflow of FDI, if the collective quality of financial institution and corporate governance in the country is lower.

While all financial capital leaves country i, the amount of FDI flowing into country i is determined by the FDI condition (11). The equilibrium, $E = (K^{i*}/L^i, K^{j*}/L^j)$ is determined by the intersection between the line of $L^i k^i + L^j k^j = K^{i0} + K^{j0}$ and the FDI curve. That is,

$$\lambda^j F'_k(1, \frac{K^{i0} + K^{j0} - K^{i*}}{L^j}) - \lambda^i F'_k(1, \frac{K^{i*}}{L^i}) = 0 \qquad (12)$$

Differentiating the above equation, it can be immediately seen that K^{i*} declines as λ^i decreases: a country with worse property rights protection receives less FDI in the equilibrium.

Using a positive number to represent capital outflow, the net financial capital outflow equals K^{i0} and the net FDI outflow equals $-K^{i*}$ in country i. The net overall capital flow in country i equals $K^{in} = K^{i0} - K^{i*}$, which is positive if and only if (k^{i0}, k^{j0}) is on the right side of the FDI curve. That is, $\lambda^j F'_k(1, k^{j0}) > \lambda^i F'_k(1, k^{i0})$. As an illustration, if $F(L, K) = L^\alpha K^{1-\alpha}$, then

$$\lambda^j F'_k(1, k^{j0}) > \lambda^i F'_k(1, k^{i0}) \Leftrightarrow \frac{\lambda^j}{(k^{j0})^\alpha} > \frac{\lambda^i}{(k^{i0})^\alpha} \qquad (13)$$

We define country i as effectively capital abundant if $\frac{\lambda^j}{(k^{j0})^\alpha} > \frac{\lambda^i}{(k^{i0})^\alpha}$. Country i is a net exporter of capital if and only if the country is effectively capital abundant. Note that even if country i is poor $(k^{i0} < k^{j0})$, it can be effectively capital abundant if it has sufficiently weak property rights protection $(\lambda^i < \lambda^j)$. To summarize:

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Proposition 1 *(A) In a frictionless world capital market, the unique equilibrium of capital flow features a complete* bypass: *all capital originally in the country with lower collective quality of financial institution and corporate governance leaves the country in the form of* financial capital outflow, *but domestic investment takes place in the form of* FDI. (B) *The* FDI *flows less into the country with worse property rights protection.* (C) *A country is a net exporter of capital if and only if it is effectively capital abundant.*

5   Frictions and Capital Flows

It is natural to wonder if the strong result of the complete *capital bypass* of weak domestic financial system/corporate governance is a consequence of the assumption of zero frictions in the capital market. We now introduce a variety of frictions into the model. The key message that emerges is that the unique equilibrium of a complete *bypass* survives as long as the difference in the *collective agency costs* between two countries is larger than costs of capital flows. If this is the case, then the benefit of bypassing the less efficient institution is more than compensating costs of capital flows.

Let τ^{ij} be the cost per unit of financial capital flowing from i to j. It encompasses the cost of acquiring information, sovereign risk, withholding tax in the host country and so on. We assume the cost of capital flows is always non-negative. Financial capital flows from i to j if $r^i \leq r^j - \tau^{ij}$. The *condition for financial outflows (FCF-out)* in country i now becomes:

$$\lambda^j F'_k(1, K^j/L^j) - \lambda^i F'_k(1, K^i/L^i) \geq \rho^j - \rho^i + \tau^{ij} \tag{14}$$

The reverse happens if $r^j \leq r^i - \tau^{ji}$. Note τ^{ji} and τ^{ij} may not be the same. This

condition for financial capital inflow (FCF-in) for country i can also be written as,

$$\lambda^j F'_k(1, K^j/L^j) - \lambda^i F'_k(1, K^i/L^i) \le \rho^j - \rho^i - \tau^{ji} \qquad (15)$$

The *FCF-out* curve in Figure 2 represents condition (14) when the equality holds. At any point on the right side of the *FCF-out* curve, financial capital flows out of country i. Similarly, *FCF-in* curve represents condition (15) when the equality holds. At any point on the left side of *FCF-in* curve, financial capital flows into country i. Since $-\tau^{ji} < \tau^{ij}$, the *FCF-in* curve must be above the *FCF-out* curve.

Let η^{ij} be the cost per unit of foreign direct investment from i to j. There is also a fixed cost for the entrepreneur to move her project from i to j, which is denoted as d^{ij}. The *net return to internal capital* when the entrepreneur in country i directly invests in country j now becomes

$$U^{id} = \frac{\left(\lambda^j R^j - \eta^{ij}\right) - \left(1 + r^i\right) - c/\theta^i}{\left(1 + r^i\right) + c/\theta^i + b^i - \left(\lambda^j R^j - \eta^{ij}\right)} - d^{ij} \qquad (16)$$

The entrepreneur in country i produces abroad if $U^{id} \ge U^i = f^i$. Using *CRSR* (8) and substituting $\left(1 + r^i\right) + c/\theta^i$ by $\lambda^i R^i - b^i f^i / \left(1 + f^i\right)$ into (16), the *FDI outflow condition (FDI-out)* for country i is

$$\lambda^j F'_k(1, K^j/L^j) - \lambda^i F'_k(1, K^i/L^i) \ge \frac{b^i d^{ij}}{\left(1 + f^i + d^{ij}\right)\left(1 + f^i\right)} + \eta^{ij} \qquad (17)$$

Similarly, the *FDI inflow condition (FDI-in)* for country i is

$$\lambda^j F'_k(1, K^j/L^j) - \lambda^i F'_k(1, K^i/L^i) \le -\frac{b^j d^{ji}}{\left(1 + f^j + d^{ji}\right)\left(1 + f^j\right)} - \eta^{ji} \qquad (18)$$

When equalities hold in (17) and (18), they are depicted in Figure 2 by curves *FDI-out* and *FDI-in*, respectively. The *FDI-in* curve must be above the *FDI-out* curve. For all points on the right side of *FDI-out* curve, FDI flows from country i

to j, while for all points on the left side of *FDI-in* curve, FDI flows from j to i.

5.1   Two-Way Capital Flows: the Bypass Effect

The patterns of capital flow are determined by the relative positions of *four threshold curves* in Figure 2. We can show that as long as the *collective agency costs* in country i, ρ^i, is sufficiently larger than ρ^j, two-way capital flows emerge as the unique equilibrium. For example, when θ^i is close to zero, $\rho^j - \rho^i = c\left(\frac{1}{\theta^j} - \frac{1}{\theta^i}\right) + \left(\beta^j - \beta^i\right)$ approaches to negative infinity. More precisely, if

$$\rho^j - \rho^i < -\frac{b^j d^{ji}}{\left(1 + f^j + d^{ji}\right)\left(1 + f^j\right)} - \eta^{ji} - \tau^{ij} = C_I \tag{19}$$

then the curve *FCF-out* is above the curve *FDI-in*, which implies that both curves *FCF-in* and *FCF-out* are above curves *FDI-in* and *FDI-out*. In this case, a complete bypass is the unique equilibrium.

Let capital/labor ratio of two countries before capital flows, (k^{i0}, k^{j0}), be on the left side of *FCF-in* and *FDI-in* curves, as indicated by point A in Figure 2. Since A is on the left of *FDI-in* curve, FDI will flow into i from j. Expecting that the flow of FDI from j to i would eventually bring (k^i, k^j) to the right side of *FCF-in* curve and make financial capital flowing into country i not profitable, financial capital does not flow into country i in the first place. After (k^i, k^j) passes *FCF-out* curve, two countries then enter into an area of *two-way capital flows* between curves *FCF-out* and *FDI-in* in which FDI flows from country j to country i, while financial capital flows from i to j. This pattern of two-way flows will continue until all capital originally in country i leaves the country. In equilibrium the amount of FDI received by country i is determined by the equilibrium condition of FDI inflow, the curve *FDI-in*. Similarly, if (k^{i0}, k^{j0}) is on the right side of *FDI-out* curve, as indicated by point B, we will also have a complete *bypass* in the equilibrium.

When ρ^i is sufficiently smaller than ρ^j, an opposite pattern emerges. More

precisely, if

$$\rho^j - \rho^i > \frac{b^i d^{ij}}{\left(1 + f^i + d^{ij}\right)\left(1 + f^i\right)} + \eta^{ij} + \tau^{ji} = C_{II} \qquad (20)$$

the curve *FCF-in* is under the curve *FDI-out*, which implies that both curves *FCF-in* and *FCF-out* are under curves *FDI-in* and *FDI-out* (not drawn to save space). The area between curves *FDI-out* and *FCF-in* is the *two-way capital flow* area. Similar to the above analysis, the capital flow will bring (k^i, k^j) into *two-way capital flow* area in which financial capital will flow from j to i, while FDI will flow from i to j until all capital owned by country j leaves the country. The amount of FDI received by country j is determined by the curve *FDI-out* in this case.

The intuition of the result is as follows: if the difference in *collective agency costs* between two countries is larger than costs of international capital flows, the benefit of bypassing exceeds the cost of capital flows. Thus, it is rational for investors to bypass poor financial institutions and inefficient entrepreneurs at home. If neither condition (19) nor (20) holds, there will be one-way capital flow, which we turn into in the next subsection.

5.2   One-Way Capital Flows

We now consider a third scenario in which

$$C_I < \rho^j - \rho^i < C_{II} \qquad (21)$$

The condition implies that the *FCF-out* curve is below the *FDI-in* curve, and the *FDI-out* curve is below the *FCF-in* curve. The relative positions of the two outflow curves *FCF-out* and *FDI-out* are determined by a further comparison of the values on the right hand sides of (14) and (17), respectively. A similar examination determines the relative positions of the two inflow curves as well. There are four possible cases. We depict and analyze one case in Figure 3. The analysis for others is similar.

The two inside curves, *FCF-in* and *FDI-out,* jointly determine a "no-capital-flow" zone. If the initial capital allocation (k^{i0}, k^{j0}) is in this zone, as represented by point C in Figure 3, there is no capital flow between two countries. If (k^{i0}, k^{j0}) is outside of "no capital flow" zone, the pattern of capital flows is determined by two inside curves, either *FCF-in* or *FDI-out*, whichever is closer to the starting point.

Let (k^{i0}, k^{j0}) be on the left side of the *FDI-in* curve, as represented by point A in Figure 3. Although A is in the left sides of both *FDI-in* and *FCF-in* curves, expecting that an inflow of financial capital from j to i would eventually make FDI into country i not profitable, FDI does not flow into country i in the first place and only financial capital flowing into country i would occur. The amount of financial capital inflow is determined by the intersection between the line of $L^i k^i + L^j k^j = K^{i0} + K^{j0}$ and the *FCF-in* curve. Similarly, if (k^{i0}, k^{j0}) is on the right side of the *FCF-out* curve, as represented by point B, only FDI flows out of country i since now *FDI-out* is the inside curve.

Similar to Section 3, if (k^{i0}, k^{j0}) is on the right side of at least one of outflow curves, country i is defined as effectively capital abundant than country j. On the other hand, country i is effectively labor abundant if (k^{i0}, k^{j0}) is on the left side of at least one of the inflow curves. We summarize our discussion by the following proposition.

Proposition 2 *If the cross-country difference in the collective agency costs is larger than the aggregate cost of capital flows (i.e., either condition (19) or (20) holds), the unique equilibrium in the world capital market will be two-way capital flows that completely bypasses the inefficient financial system/weak corporate governance. Otherwise there will be one-way capital flows. Either financial capital or FDI will flow out of an effectively capital abundant country into an effectively labor abundant one.*

Note that marginal cost of capital flow is assumed to be constant. If instead

the cost of capital flow is convex, for example, that τ^{ij} and η^{ji} are increasing in the amount of capital flows, there will in general still be two-way capital flows but no complete bypass even if the costs of capital mobility is not large. In this case, the *FCF-out* curve shifts down as financial capital flows out, while the *FDI-in* curve shifts up as FDI flows in. If the amount of capital flow is sufficiently large, the *FCF-out* curve will shift under the *FDI-in* curve, which terminates the *complete bypass.* If entrepreneurs are heterogeneous, as in the model of Ju and Wei (2006), the marginal entrepreneur benefits less with more FDI flows into foreign country. This also prevents a *complete bypass* from occurring (but still generates two-way capital flows).

5.3 Comparative Statics

We now trace out how a change in either the *collective agency costs* ρ or property rights protection λ affects capital flows. We focus on the composition of capital flows for country i, and let country j be the rest of world. A key feature to bear in mind is that the locations of the *FDI-in* and *FDI-out* curves are both affected by λ but not by ρ, whereas the *FCF-in* and *FCF-out* curves would both shift to the right when either λ rises or ρ declines. To preview the results, we will show that as the financial system/corporate governance of a country improves, it would shift from importing to exporting FDI, but would shift from exporting to importing financial capital. As property rights protection strengthens, the expected marginal product of capital in the country increases. As a result, the net exports of both FDI and financial capital would decline (or the inflows of both FDI and financial capital would increase).

Let us start the discussion with changing the collective quality of the country's financial system/corporate governance from the worst possible value to the best one (e.g., from $\rho^i = \infty$ to $\rho^i = 0$) and holding λ^i constant. To illustrate, let (k^{i0}, k^{j0}) be at point A so country i is effectively labor abundant. There are four zones of ρ^i to

be considered. Using condition (19), let ρ_1 be the cutoff point of ρ^i such that the *FCF-out* and *FDI-in* curves coincide, or

$$\rho_1 = \rho^j + \frac{b^j d^{ji}}{\left(1 + f^j + d^{ji}\right)\left(1 + f^j\right)} + \eta^{ji} + \tau^{ij} \tag{22}$$

Suppose $\rho^i \in [\rho_1, \infty)$, both *FCF-in* and *FCF-out* curves must be above *FDI-in* and *FDI-out* curves. This corresponds to the case depicted in Figure 2. The domestic financial institution/corporate governance is completely bypassed. The exact amounts of financial capital flow and FDI can be found as, $FCF = K^{i0}$, and $FDI = -K_1^{i*}$ where K_1^{i*} is determined by the intersection between the line of $L^i k^i + L^j k^j = K^{i0} + K^{j0}$ and the *FDI-in* curve. As long as ρ^i is in the region of $[\rho_1, \infty)$, a change in the value of ρ^i has no effect on the amount and composition of the capital flows.

In the second zone when $\rho^i \in [\rho_2, \rho_1)$, with ρ_2 being the cutoff point of ρ^i such that the *FCF-in* and *FDI-in* curves coincide, or

$$\rho_2^i = \rho^j + \frac{b^j d^{ji}}{\left(1 + f^j + d^{ji}\right)\left(1 + f^j\right)} + \eta^{ji} - \tau^{ji}, \tag{23}$$

the *FCF-out* curve is now below the *FDI-in* curve (indicated by *FCF'-out* in Figure 2). The pattern of capital flows changes from a complete bypass to one-way flows. That is, only FDI flows into country i (recall that the pattern of one-way flows is determined by the inside curve). Financial capital outflow drops from K^{i0} to zero. The capital stock in country i now is K_1^{i*} so that $FDI = -\left(K_1^{i*} - K^{i0}\right)$. Because capital flow is determined by the inside inflow curve now, further decreasing ρ^i until *FCF-in* and *FDI-in* coincide has no effect on capital flow.

In the third zone when $\rho^i \in [\rho_3, \rho_2)$, with ρ_3 being the cutoff point of ρ^i such that the *FCF-in* and *FDI-out* curves coincide, or

$$\rho_3^i = \rho^j - \frac{b^i d^{ij}}{\left(1 + f^i + d^{ij}\right)\left(1 + f^i\right)} - \eta^{ij} - \tau^{ji}, \tag{24}$$

we switch from one-way FDI inflow to one-way financial capital inflow as analyzed in Figure 3 since now FCF-in curve is the inside inflow curve. The FDI inflow drops to zero, whereas the financial inflow $FCF = -(K_2^{i*} - K^{i0})$ where the steady state level of capital stock in this zone K_2^{i*} is determined by the intersection between the line of $L^i k^i + L^j k^j = K^{i0} + K^{j0}$ and the FCF-in curve. Note that the capital stock in this zone is higher than in the second zone or $K_2^{i*} > K_1^{i*}$ since FCF-in is under FDI-in now. K_2^{i*} increases as ρ^i decreases until FCF-in and FDI-out coincide.

In the fourth zone when $\rho^i \in [0, \rho_3)$, we switch from one-way financial capital inflow back to a pattern of two-way flows (but with opposite signs from zone one). Now country i has better collective financial institution and corporate governance. All of K^{j0} flows into country i. Thus, $FCF = -K^{j0} < -(K_2^{i*} - K^{i0})$. The amount of FDI flowing out of country i, $FDI = K_3^{i*}$, where K_3^{i*} is determined by the intersection between the line of $L^i k^i + L^j k^j = K^{i0} + K^{j0}$ and the FDI-out curve. Further decreasing ρ^i has no effect on capital flows.

The result of comparative statics is summarized in Figure 4. $0 < 1/\rho^i < \infty$ is depicted in horizontal axis, while FCF and FDI are represented by vertical axis. As $1/\rho^i$ increases, the collective quality of financial institution and corporate governance is improving. The effect of changing $1/\rho^i$ on financial capital flow is represented by the line $abcdefgh$, while the effect on FDI is represented by the line $a'b'c'd'de'f'g'$. It is clear that as the collective quality of financial institution and corporate governance improves, net FDI outflow increases, but net financial outflow decreases. Similar analysis can be conducted when country i is effectively capital abundant and the same result of comparative statics holds. Summarizing we have:

Proposition 3 *The effects of changing collective quality of financial institution and corporate governance on financial capital flow and FDI are opposite. As the collective quality of financial institution and corporate governance improves, net FDI outflow increases, but net financial outflow decreases.*

Now we turn into the effect of changing property rights protection (changing λ^i), while ρ^i is held constant. Examining conditions (14), (15), (17) and (18), we know that changing λ^i does not affect the relative positions of the four threshold curves. Thus, the pattern of capital flow is not affected by changing λ^i. However, the increase in λ^i shifts all *FCF-in*, *FCF-out*, *FDI-in* and *FDI-out* curves to the right. Therefore, FDI inflow and financial inflow into country i are increased, while FDI outflow and financial outflow from country i are reduced. Summarizing we have:

Proposition 4 *As property rights protection improves, both the net FDI outflow and the net financial outflow decline.*

Propositions 3 and 4 show the contrasting effects of better property rights protection versus better financial development on FDI. The intuition is straightforward: better property rights protection increases expected marginal product of capital and interest rate, leading to more inflow of financial capital and FDI; a better financial system, on the other hand, encourages more financial capital inflow (or less capital flight), which decreases marginal product of capital and therefore reduces inward FDI.

6 Welfare Impact of Capital Flows

There are clearly conflict of interest in the country with lower collective quality of financial institution and corporate governance. With capital mobility, financial investors enjoy higher interest rate by investing in the foreign country, but financial intermediaries and entrepreneurs lose all their payments. In this section, we measure change in social welfare by potential Pareto improvement. In this case, welfare can be represented by Gross National Product (GNP): as long as the GNP increases after the capital becomes mobile internationally, the government can make eveyone at least as better off as before by a lump sum income transfer across individuals. For simplicity we will focus on the case of *capital bypass circulation* in a frictionless

world. We will first study three welfare effects in turn: on the world as a whole, on the country with inferior financial institution/corporate governance, and finally on the country with better financial institution/corporate governance.

6.1 World Welfare

Using superscripts 0 and 1 to denote variables before and after capital flows, respectively, the expected world total output before and after capital flows are:

$$\lambda^i F(L^i, K^{i0}) + \lambda^j F(L^j, K^{j0}) \text{ and } \lambda^i F(L^i, K^{i*}) + \lambda^j F(L^j, K^{i0} + K^{j0} - K^{i*})$$

where K^{i*} is determined by (12). The first order condition to maximize the expected world output is

$$\lambda^i F_k'(L^i, K^i) - \lambda^j F_k'(L^j, K^{i0} + K^{j0} - K^i) = 0$$

which is the same as (12). Therefore, K^{i*} maximizes the expected world output. As long as K^{i0} differs from K^{i*} so that the net capital flow is not zero, the world as a whole must strictly benefit from free capital flows as the efficiency of global capital allocation improves.

6.2 National Welfare

While the world welfare improves, national welfare may not. To see the intuition, recall from the *capital revenue sharing rule* (8) that the expected marginal product of capital has to be distributed among financial investors, financial intermediaries, and entrepreneurs. Free international capital flows and the resulting bypass of the inefficient financial system transfers the revenue allocated to financial intermediation and entrepreneurs from country i to j. The welfare impact on country i, therefore, is determined by the trade off between the efficiency gain from capital mobility and the revenue loss in financial intermediation and management.

Formally, the expected GNP in country i in financial autarky is:

$$W^{i0} = \lambda^i F(L^i, K^{i0}) \tag{25}$$

With free capital movement, all K^{i0} become intermediated and managed by the foreign country. Suppose K^{i*} is the amount of FDI that enters country i from j. Note that the interest rates are equalized across countries with capital mobility, $r^{i1} = r^{j1}$, and marginal products of capital are also equalized $\left(1 + r^{j1}\right) + \rho^j = \lambda^j R^{j1} = \lambda^i R^{i1} = \lambda^i F_k'(L^i, K^{i*})$ from (12). The expected GNP in country i under free capital flows becomes:

$$
\begin{aligned}
W^{i1} &= \lambda^i w^{i1} L^i + \left(1 + r^{i1}\right) K^{i0} = \lambda^i w^{i1} L^i + \left[\left(1 + r^{i1}\right) + \rho^j\right] K^{i0} - \rho^j K^{i0} \\
&= \lambda^i w^{i1} L^i + \lambda^i F_k'(L^i, K^{i*}) K^{i0} - \rho^j K^{i0}
\end{aligned} \tag{26}
$$

The change in the national welfare in country i is given by:

$$W^{i1} - W^{i0} = \left[\lambda^i w^{i1} L^i + \lambda^i F_k'(L^i, K^{i*}) K^{i0} - \lambda^i F(L^i, K^{i0})\right] - \rho^j K^{i0} = A - B \tag{27}$$

where the first term in the squared bracket of (27), denoted by A, represents the standard triangle gain from capital flow in the neoclassic theory. More precisely,

$$
\begin{aligned}
A &= \lambda^i \left[w^{i1} L^i + F_k'(L^i, K^{i*}) K^{i*} - F(L^i, K^{i0}) + F_k'(L^i, K^{i*}) \left(K^{i0} - K^{i*}\right)\right] \\
&= \lambda^i \left[F(L^i, K^{i*}) - F(L^i, K^{i0}) + F_k'(L^i, K^{i*}) \left(K^{i0} - K^{i*}\right)\right] \\
&= \lambda^i \left[\int_{K^{i0}}^{K^{i*}} F_k'(L^i, K^i) dK^i + F_k'(L^i, K^{i*}) \left(K^{i0} - K^{i*}\right)\right]
\end{aligned} \tag{28}
$$

(28) is depicted by the triangle below the curve $F_k'(.)$ in Figure 5 if $K^{i*} > K^{i0}$, or the triangle above the curve $F_k'(.)$ if $K^{i*} < K^{i0}$, which is always positive.

The second term on the right hand side of equality (27), denoted by B, represents

country i's revenue loss from the complete *capital bypass circulation*. B is depicted by the rectangle in Figure 5. Note that investors in country i pay ρ^j per unit of capital to financial intermediaries and entrepreneurs in country j. Therefore, country i's revenue loss equals $\rho^j K^{i0}$. The welfare impact of capital flows in country i is determined by the trade off between A and B. As an example, if $K^{i0} = K^{i*}$ so that net capital flow equals zero, then $A = 0$. In this special case, free capital mobility is guaranteed to reduce the welfare of country i.

As indicated in Figure 5, the magnitude of the triangle gain from capital flow is determined by the size of net capital flow, $K^{i*} - K^{i0}$. Let country i be effective labor abundant. Using (12), we can show that $K^{i*} - K^{i0}$ becomes larger if λ^i is larger. Therefore, the triangle gain from capital flow, A, becomes larger if the the protection of property rights in country i becomes stronger, which implies that the country more likely benefits from free capital mobility.

Finally, we turn to the welfare impact in country j. Similar to the above analysis, $W^{j0} = \lambda^j F(L^j, K^{j0})$, while

$$
\begin{aligned}
W^{j1} &= \lambda^j w^{j1} L^j + \left(1 + r^{j1}\right) K^{j0} + \rho^j \left(K^{i0} + K^{j0}\right) \\
&= \lambda^j w^{j1} L^j + \lambda^j R^{j1} K^{j0} + \rho^j K^{i0} = \lambda^j F(L^j, K^{j1}) + \lambda^j R^{j1} \left(K^{j0} - K^{j1}\right) + \rho^j K^{i0}
\end{aligned}
$$

where $K^{j1} = K^{i0} + K^{j0} - K^{i*}$ is the capital stock in country j with capital mobility. Thus we have

$$
W^{j1} - W^{j0} = \lambda^i \left[\int_{K^{j0}}^{K^{j1}} F_k'(L^j, K^j) dK^j + F_k'(L^j, K^{j1}) \left(K^{j0} - K^{j1}\right) \right] + \rho^j K^{i0} \quad (29)
$$

The first term in the right hand side of (29) is again the traingle gain from capital flows, which is always positive. The second term $\rho^j K^{i0}$ is the revene transferred to country j from country i due to the bypass effect. In contrast to the case for the country with inferior financial system/corporate governance, the second

term is also positive. Therefore, country j - the country with the better financial system/corporate governance - must benefit from global capital mobility. To summarize:

Proposition 5 *In a frictionless world, the world welfare must improve from free capital mobility. The country with higher collective quality of financial institution and corporate governance also gains from global capital mobility. For the country with an inferior financial institution and corporate governance, however, the welfare effect involves a trade off between an efficiency gain from better capital allocation and a loss of revenue previously accrued to domestic entrepreneurs and financial institution. If the country is effectively labor abundant, the stronger the protection of property rights, the more likely the country would benefit from free capital mobility.*

These theoretical predictions are consistent with the observation that advanced countries like the United States tend to be more enthusiastic about pushing for capital account openness around the world than many developing countries. Furthermore, they are consistent with the empirical findings, reviewed in Kose, Prasad, Rogoff, and Wei (2006), that not all developing countries benefit from financial globalization, and that those developing countries with strong property rights protection are more likely to benefit from it. In addition, the model is consistent with the idea that it is better to liberalize FDI inflows than capital outflows. This pattern of liberalization happens to be the one adopted by China, a fast growing economy.

7   Conclusions

Net financial capital and net FDI often go in opposite directions. Countries with an efficient financial system, strong corporate governance, and strong property rights protection are often net exporters of FDI but net importers of financial capital. Countries with an inefficient financial system, weak corporate governance but an intermediate level of property rights protection tend to exhibit an opposite pattern, exporting financial capital, but importing FDI on net. We are not aware of any

micro-founded, general-equilibrium model that explains these patterns. This paper proposes a simple model that does this.

Unlike the neoclassical theory that equates the expected value marginal product of capital to interest rate, the sharing rule on capital revenue derived in this paper states that the expected value marginal product of capital is the sum of the interest rate, the cost of financial intermediation, and the cost of weak corporate governance. In other words, the weaker is the financial system or corporate governance, the lower would the interest rate be in a financial autarky relative to the expected value marginal product of capital. Also, while risk sharing provides an explanation in the literature for two-way capital flows across countries, this paper provides a new explanation based on differences in institutional quality.

This simple model is a first step towards a framework for understanding the composition of international capital flows and its connection with domestic institutions. There are still many areas in which the model can be enriched. First, while the current model lumps together international portfolio equity and portfolio debt flows under the rubric of financial capital, it would be useful to separate them. Second, the efficiency of domestic financial sector and the strength of corporate governance are two parameters in the current model. It would be useful to endogenize them, and in particular, to discuss ways in which they may respond to global capital flows. Third, a systematic empirical investigation should be conducted to examine whether and how financial institutions and property rights protection may affect patterns of international flows differently. Given our theory, one needs to have information on barriers to cross-border financial capital flows and FDI. Comprehensive information on these variable is not yet available. These would all be fruitful directions for future research.

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Table 1: Institutional Quality and Patterns of Capital Flows

Country Groupings	Collective Quality of Financial System and Corporate Governance (mean)	Strength of Property Rights Protection (mean)	Net FDI Outflows relative to population (mean)	Net Financial Capital Outflows(a) relative to population (mean)	Net Financial Capital Outflows(b) relative to population (mean)
All Countries (97 in total)	4.41	3.71	-0.7	-5.0	-4.3
Good Financial Institutions, Good Property Rights # countries: 32; Examples: USA, UK, and Finland	5.41	4.57	7.4	-20.5	-20.6
Bad Financial Institutions, Intermediate Property Rights # countries: 33; Examples: China, Vietnam, and Mexico	4.28	3.83	-6.8	7.4	8.4
Bad Financial Institutions, Bad Property Rights # countries: 32; Examples: Haiti, Angola, Ukraine	3.58	2.76	-2.6	-2.2	-1.0

A negative sign implies "inflows"

Notes: 1. Measures of institutional quality (higher numbers = better quality)
Source: Global Competitive Report 2003-2004, published by the World Economic Forum, Geneva, Switzerland, in collaboration with Harvard University. Main authors for this issue: Michael Porter, Klaus Schwab, Xavier Sala-i-Martin, and Angusto Lopez-Claros.

2. Capital Flows and Population: See the text for the sources and definitions.
Sources: Stock of foreign assets and liabilities in 2003, Philip Lane and Milesi-Ferreti, the Wealth of Nations, Mark II;   population (in millions): the IMF's International Financial Statistics

Table 2: Capital Flows and Institutional Quality

	(1)	(2)	(3)
	Net Financial Outflows(a) relative to population	Net Financial Outflows(b) relative to population	Net FDI Outflows relative to population
Strength of Property Rights Institutions	34.26* (14.31)	30.46* (14.70)	-5.07 (5.38)
Collective Quality of Financial System and Corporate Governance	-41.03* (14.08)	-39.56* (14.47)	11.37* (5.32)
Observations	98	98	97
R-squared	0.08	0.07	0.06

Notes: * denotes significant at the 5 percent level; Standard errors are in parentheses. All regressions have a constant that is not reported. For variable definitions and data sources, see the text.
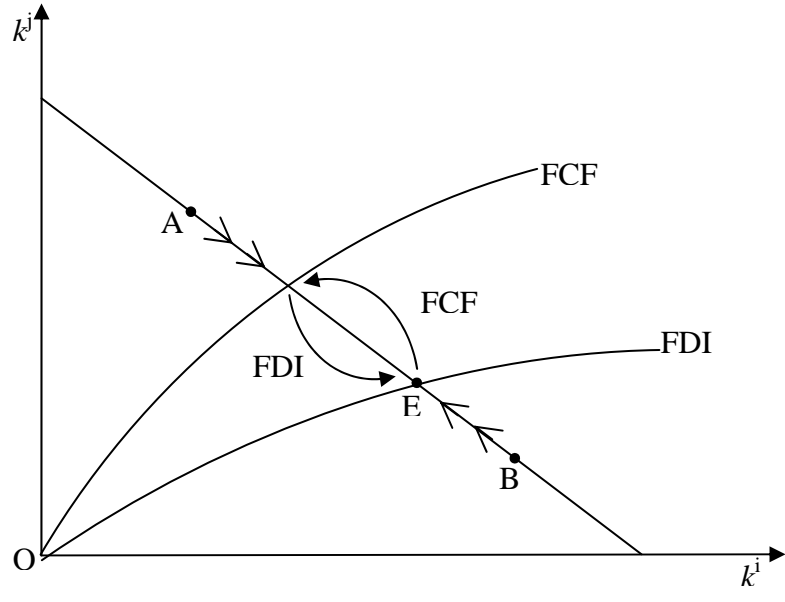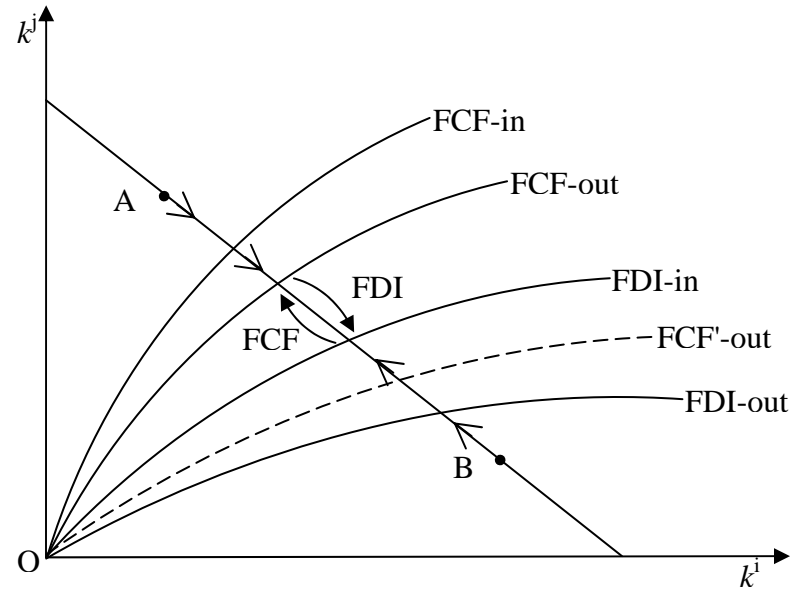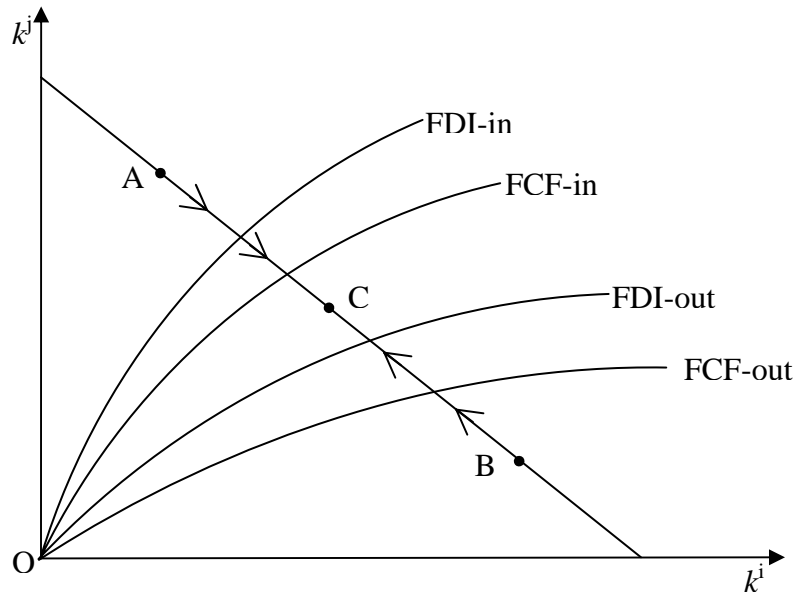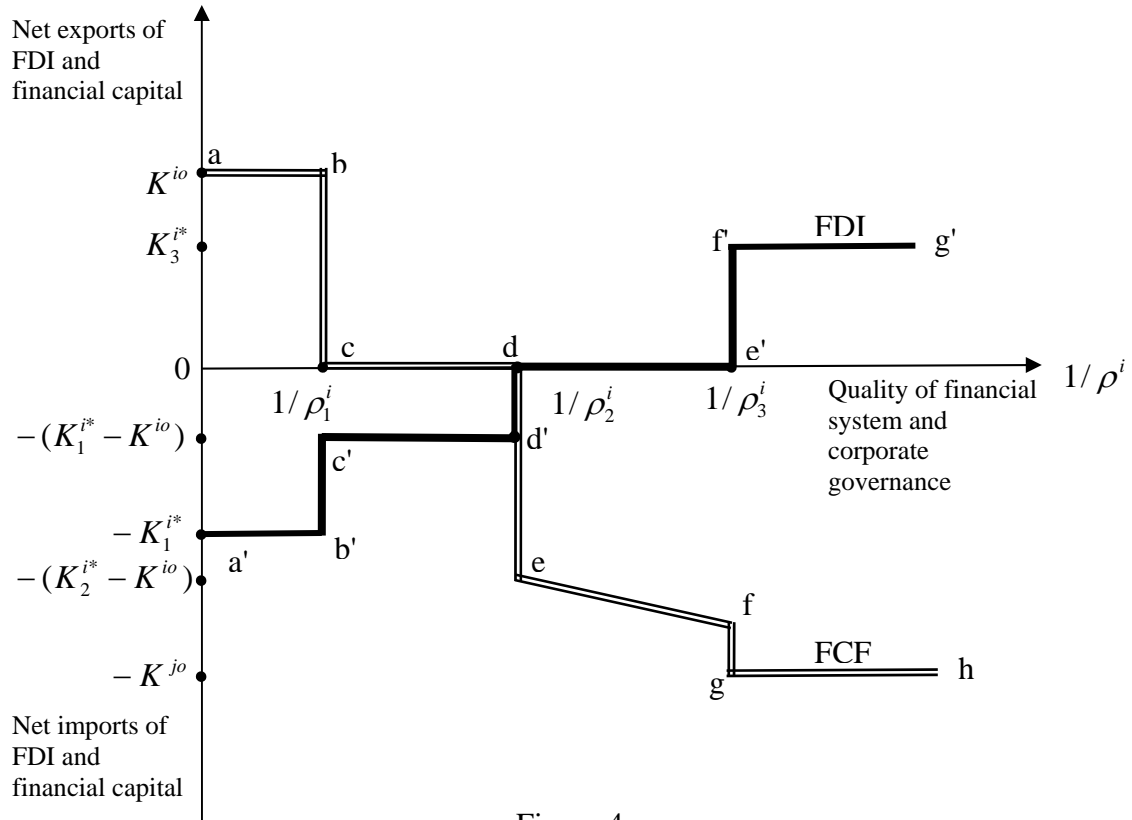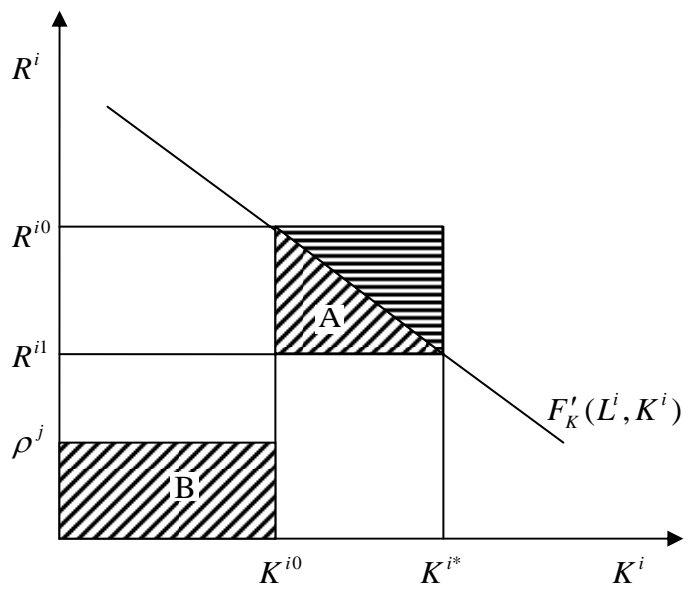
Figure 1

Figure 2

Figure 3

Figure 4

Figure 5