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DOMESTIC INSTITUTIONS AND THE BYPASS EFFECT OF FINANCIAL GLOBALIZATION

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**ABSTRACT**

This paper proposes a simple model to study the relationship between domestic institutions - financial system, corporate governance, and property rights protection - and patterns of international capital flows. It studies conditions under which financial globalization can be a substitute for reforms of domestic financial system. Inefficient financial system and poor corporate governance in a country may be completely bypassed by two-way capital flows in which domestic savings leave the country in the form of financial capital outflows but domestic investment takes place via inward foreign direct investment. While financial globalization always improves the welfare of a developed country with a good financial system, its effect is ambiguous for a developing country with an inefficient financial sector/poor corporate governance. However, the net effect for a developing country is more likely to be positive, the stronger its property rights protection. This is consistent with the observation that developed countries are often more enthusiastic about capital account liberalization around the world than many developing countries. A noteworthy feature of this theory is that financial and property rights institutions can have different effects on capital flows.

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# 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. The progress has been particularly rapid since 1990 (though with a temporary dip during 1997-2002). This reflects falling barriers to capital flows in many parts of the world. Yet, the composition varies across countries. Many developing countries (e.g., China, Malaysia, and South Africa) are net importers of foreign direct investment (FDI) on the one hand, but net exporters of financial capital on the other. Many developed countries (e.g., France, the United Kingdom, and the United States) do the reverse, exporting FDI but importing financial capital.

Consider the example of China. Its large and growing current account surplus implies that it is exporting capital on net to the rest of the world, especially to the United States. At the same time, it is a top recipient of FDI in the world, with an amount in excess of 50 billion US dollars in 2005. While traditional explanations for its large inward FDI center on China's cheap labor and large market, 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. FDI effectively serves as a tool for Chinese private firms to circumvent the inefficient domestic financial sector.<sup>1</sup>

Two-way capital flows are certainly not unique to China. Table 1 reports patterns of capital flows for developed countries, emerging market economies, and other developing countries during 1990-2004 (the most recent period of rapid financial globalization). In 2004, a typical developed country exported 1120 dollars of net cumulative FDI per person, but imported 1382 dollars of net cumulative financial capital per person. In the same year, a typical emerging market economy did the

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<sup>1</sup>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.

opposite thing: importing FDI of 1671 dollars per person, but exporting financial capital of \$5556 dollars per person. Low income developing countries (“other developing countries”) imported both FDI and non-FDI but with a much smaller magnitude. The same qualitative patterns hold in 1990, 1995 and 2000 though the exact dollar amount varies.

### Table 1

This paper proposes a simple theoretical framework to study the relationship between 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 a combination of inward FDI and outward flow of financial capital. The paper studies conditions under which two-way capital flows and the bypassing effect can take place.

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 into an otherwise standard neoclassic framework a financial arrangement between entrepreneurs and investors via a financial institution, we derive a *sharing rule of capital revenue* by which expected marginal product of capital is divided into three components: 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 the inefficiency of its financial sector and the weakness of its 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 the initial endowment, capital flows may always bring two countries with different institutions into a pattern of two-way capital flows.

In contrast to the neoclassical model (as for example in Lucas 1990), our 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 a weak property rights institution. By reducing profitability of investment, weak property rights protection discourages inward FDI and encourages outflow of savings.

The model in this paper makes a somewhat surprising prediction: In a world free of any barriers to international capital flows, financial capital and foreign direct investment not only move in the opposite directions but also reinforce each other in a way that would lead to a complete bypass of inferior financial institution and corporate governance. In a sense, removal of barriers to capital mobility and reforms of domestic financial system are substitutes. We realize that this extreme proposition of a complete bypass effect may not be realistic, but believe it is instructive nonetheless. The Modigliani-Miller theorem predicts complete substitutability between debt and equity as forms of corporate financing in a frictionless world, while the Coase theory 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.

Capital account liberalization has interesting and country-specific welfare consequences. First, from the world’s perspective, as the inferior financial institutions are bypassed, savings in all countries are served by the best financial system, and capital is efficiently allocated to equate expected marginal product of capital across all countries.

The world's welfare improves unambiguously. Second, the country with a strong financial system also gains unambiguously: not only its domestic savings will receive a higher return, but also its financial institutions and entrepreneurs will reap greater reward. Third, for the country with an inferior corporate governance/financial system, however, the welfare effect is not clear-cut as it involves a trade-off between an efficiency gain from free capital mobility on the one hand and a revenue loss by its financial institution and native entrepreneurs on the other. One should note, however, the stronger the country's 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 enthusiastic 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.

This paper is related to the literature that investigates the implications of financial market imperfection on the direction of international capital flows. A seminal paper is Gertler and Rogoff (1990) which shows that a moral hazard problem between foreign investors and domestic entrepreneurs may cause capital to be exported by poor countries to rich ones (contrary to the frictionless neoclassical model). Other important papers include Gordon and Bovenberg (1996) which focuses on asymmetric information across countries as an explanation for differences in real interest rates, Shleifer and Wolfenzon (2002) which argues that better investor protection could generate a higher interest rate, Matsuyama (2004, 2005) and Aoki, Benigno, and Kiyotaki (2006) which study the effects of international credit market constraint on cross-country capital flows, and Stulz (2005) which studies the dual agency problems of government and entrepreneurs in limiting the extent of financial globalization. These papers do not study potentially distinct roles of property rights

protection and financial institutions, and do not endogenously generate two-way capital flows.

Our notion that property rights and financial sector institutions could play different roles in determining patterns of capital flows is most closely related to the work of Acemoglu and Johnson (2005), who, inspired by North (1981), provide a seminal empirical contribution that unbundles property rights and contracting institutions. The former is found to have a first-order effect on long-run growth, while the second appears to matter mainly for financial development.

Several recent papers look into the composition of capital flows. Goldstein and Razin (2006) and Razin and Sadka (2007) use information asymmetry to highlight a trade-off between foreign direct investment and portfolio investment. Caballero, Farhi, and Gourinchas (2005) show that an exogenously specified low capacity to generate financial assets in a country reduces the interest rate in that country. Antras, Desai, and Foley (2006) relate the choice of a multinational firm between licensing a technology to foreign producers versus engaging in FDI to the strength of property rights protection in the host country (though they treat property rights protection and financial development as the same thing). Using a dynamic general equilibrium model with an incomplete asset market, Mendoza, Quadrini, and Rios-Rull (2007) show that a country with a high level of financial development may have a negative net foreign asset position but a still positive position in foreign productive asset. These papers still do not distinguish property rights protection and financial institutions, and do not investigate the conditions under which global capital flows may lead to a complete bypass of inefficient financial system and poor corporate governance.

Several empirical papers links domestic institutions to international capital flows, including Wei (2000a and 2000b) and Alfaro, Kalemli-Ozcan, and Volosovych (2005). These papers do not explore separate roles of different institutions and do not study the bypass effect of capital flows. Two recent empirical papers are particularly



relevant for the current paper. Wei (2006) investigates separate roles of property rights protection and financial development in the composition of capital flows. He finds that, conditional on the quality of property rights protection, more financial development tends to reduce inward FDI but increase gross inflows of financial capital. 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.

The rest of paper is organized as follows. Section 2 sets up the model. Section 3 studies the benchmark case with zero barrier to capital flows and shows a complete bypass of inferior domestic financial system through two-way capital flows as the unique equilibrium. Section 4 then extends the model to allow for a variety of frictions and discusses comparative statics. Section 5 analyses the welfare consequences of international capital flows. Finally, Section 6 concludes.

## 2 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. Let depreciation rate be zero. If the project succeeds, the gross return to one unit of capital,  $R$ , and the wage rate,  $w$ , are determined by

$$R = 1 + F'_k(l, z) = 1 + F'_k(1, z/l) = 1 + F'_k(1, K/L) \text{ and } w = F'_l(1, K/L) \quad (1)$$

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

$$F(l, z) + z = F'_l(1, z/l)l + [1 + F'_k(1, z/l)]z = wl + Rz \quad (2)$$

Thus, the firm earns zero profit. The gross return to one unit of investment  $R$ , however, has to be sliced and shared among financial investors, the financial intermediary, and the entrepreneur. The CRS production function implies that the firm could borrow unlimited of capital if the capital market were perfect. A moral hazard problem that we introduce next, however, results in credit rationing to the entrepreneur.

We use a framework of moral hazard that is derived and simplified from Holmstrom and Tirole (1997) 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. Our main extension to the model of Holmstrom and Tirole (1997) is to let the total return per unit of capital,  $R$ , be endogenously determined by country's characteristics of endowment and institution, which allows us to study international capital flows, whereas Holmstrom and Tirole set  $R$  as exogenously given. In addition, 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.

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,  $\lambda^H$ , while offering no private benefit. The "Bad" version has a lower probability of project success,  $\lambda^L$ , but offering a private benefit per unit of capital managed,  $b$ , to the entrepreneur. Following Holmstrom and Tirole (1997), we further assume that only the "Good" project is 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  $c/\theta$  units of good (but no capital and labor) are used to intermediate one unit of investment. Thus, the pay to the financial intermediation is  $c/\theta$  units of good per unit of investment.  $c/\theta$  may represent the transaction cost, the monitoring cost to reduce the extent of moral hazard, or the expropriation by government officials. The *efficiency level of the financial system* in the country is then represented by  $\theta$ . The higher the  $\theta$ , the lower is the financial intermediation cost.

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  $\lambda$  in our model as representing better property rights protection (or lower expropriation risk). Equivalently, a higher value of  $\lambda$  also represents a lower tax rate on capital return.

Conditional on the efficiency level of the financial system, the entrepreneur chooses the amount of external capital  $x$ , her own capital contribution to the project  $y$ , total investment of the project  $z$ , and the marginal pay to entrepreneur's effort  $R^E$  to solve the following program:

$$\max_{x,y,z,R^E} U = z\lambda R^E + (1+r)(1-y) \quad (3)$$

subject to

$$y \leq 1 \quad (4)$$

$$z \leq x + y \quad (5)$$

$$[\lambda(R - R^E) - c/\theta] z \geq (1+r)x \quad (6)$$

$$\lambda R^E \geq b \quad (7)$$

The objective function (3) represents entrepreneur's expected income. The first term represents the entrepreneur's share in total capital revenue. The second term is the return from investing her own  $1 - y$  capital in the market. Turning into the constraints, inequality (4) requires that entrepreneur's internal capital is less than her capital endowment. Inequality (5) requires that total investment does not exceed the sum of internal and external capitals. Inequality (6) is the participation constraint for the outside financial investors, while inequality (7) is the entrepreneur's incentive compatibility constraint.

It is then straightforward to show that all constraints must be binding in equilibrium.<sup>2</sup>

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<sup>2</sup>The problem is solved by setting the Lagrangian, and then straightforward manipulation of

The entrepreneur will invest all her endowment  $y = 1$  in the firm. The total investment  $z$  equals the sum of internal and external capitals  $x + 1$ . The incentive compatibility constraint (7) must be binding, which gives

$$R^E = \frac{b}{\lambda} \quad (8)$$

The investors' participation constraint (6) is binding. Substituting (8) into (6) gives the firm's optimal investment<sup>3</sup>

$$z = \frac{1 + r}{(1 + r) + c/\theta + b - \lambda R} \quad (9)$$

Substituting (8) and (9) into (3), the entrepreneur's expected income becomes

$$U = \frac{b(1 + r)}{(1 + r) + c/\theta + b - \lambda R} \quad (10)$$

## 2.1 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.<sup>4</sup> With free entry and exit of entrepreneurs, the entrepreneur's expected income,  $U$ , should be equal to  $(1 + r)(1 + f)$  so that capitalists are indifferent between becoming entrepreneurs or financial investors in equilibrium. That is,

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the first order conditions shows that (4), (5), (6), and (7) must bind.

<sup>3</sup>Following Holmstrom and Tirole (1997), we rule out the case that  $(1 + r) + c/\theta + b - \lambda R < 0$  in which the firm would want to invest without limit.

<sup>4</sup>For expositional convenience, we assume that the fixed fee for becoming an entrepreneur is due only in the second period so it does not reduce entrepreneur's capital endowment in the first 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  $f$ .

$$\begin{aligned}
U &= \frac{b(1+r)}{(1+r) + c/\theta + b - \lambda R} = (1+r)(1+f) \Leftrightarrow \\
\lambda R &= (1+r) + \frac{c}{\theta} + \beta
\end{aligned}
\tag{11}$$

where  $\beta = \frac{bf}{1+f}$  denotes the average net pay to the entrepreneur. To see this, note that  $U = bz = (1+r)(1+f)$ . Thus,  $b = (1+f)(1+r)/z$ . Using this result, we have  $\beta = f(1+r)/z$  and note that the entrepreneur's expected return net of the opportunity cost of her own endowment,  $U - (1+r) = f(1+r)$ .

For a given value of  $f$ , the higher the private benefit  $b$ , the higher the  $\beta$ . Therefore, one could think of  $\beta$  as a measure of the inferiority of corporate governance. That is, the higher  $\beta$ , the lower the quality of corporate governance. The equation (11) 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  $\beta$ . The lower the efficiency of the financial sector (as reflected by a higher  $\frac{c}{\theta}$  or a lower  $\theta$ ), or the poorer the corporate governance (as reflected by a higher  $\beta$ ), 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.

### 3 Capital Flows with No Frictions

Consider capital flows between countries  $i$  and  $j$ .<sup>5</sup> They differ in the efficiency level of financial system,  $\theta$ , the strength of property rights protection,  $\lambda$ , the average net

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<sup>5</sup>We use superscripts  $i$  and  $j$  to denote variables of countries  $i$  and  $j$ , respectively.

pay to the entrepreneur,  $\beta$ , 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 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.

### 3.1 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* (11), we obtain that  $r^i = r^j$  if

$$\lambda^j [1 + F'_k(1, K^j/L^j)] - \lambda^i [1 + F'_k(1, K^i/L^i)] = \rho^j - \rho^i \quad (12)$$

where  $\rho^i = \left(\frac{c}{\theta^i} + \beta^i\right)$ .  $\rho^i$  is the sum of the cost of financial intermediation and the average net pay to the entrepreneur and is referred to as the *collective agency costs*. Higher  $\rho^i$  represents lower collective quality of financial institution and corporate governance in country  $i$ . Equation (12) 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 (12).

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  $\lambda^i$ ,  $\lambda^j$ , and  $\rho^j - \rho^i$ . If  $\rho^j - \rho^i$  becomes smaller, or  $\lambda^i/\lambda^j$  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  $i$ ,  $F'_k(1, K^i/L^i)$ , is higher than that in rich country,  $F'_k(1, K^j/L^j)$ . However, if country  $i$  has lower quality of financial institution and corporate governance ( $\rho^i > \rho^j$ ), or worse property rights protection ( $\lambda^i < \lambda^j$ ),  $(k^i, k^j)$  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).

### 3.2 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  $i$  directly invests in country  $j$  and produces there, using (10), the entrepreneur's expected income becomes

$$U^{id} = \frac{b^i (1 + r^i)}{(1 + r^i) + c/\theta^i + b^i - \lambda^j R^j} \quad (13)$$



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

$$\lambda^j [1 + F'_k(1, K^j/L^j)] - \lambda^i [1 + F'_k(1, K^i/L^i)] = 0 \quad (14)$$

This defines a boundary condition for the direction of foreign direct investment (FDI). The condition (14) 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  $j$ .

### 3.3 Capital Bypass Circulation

We now allow both types of capital flows. The patterns of bilateral capital flows are determined by conditions (12) and (14). 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  $FDI$ .<sup>6</sup>

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  $i$ ,  $\rho^i$ , is higher than that in country  $j$ ,  $\rho^j$ , there will be a *two-way capital flow area* where  $\rho^j - \rho^i < \lambda^j R^j - \lambda^i R^i < 0$ , which is represented by the area between curves  $FCF$  and  $FDI$  in Figure 1. 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

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<sup>6</sup>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.

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 high- $\rho$  country sends out financial capital to escape the low home interest rate, and at the same time, receives the inward FDI due to the high domestic return to physical capital. The key insight of the complete capital bypass circulation is that FDI inflow and financial capital outflow *reinforce each other* so that in equilibrium a corner solution must occur. Let capital/labor ratio of two countries before capital flows,  $(k^{i0}, k^{j0})$ , be between curves  $FCF$  and  $FDI$ , as indicated by point  $C$  in Figure 1. The outflow of financial capital from  $i$  to  $j$  increases the marginal product of capital in  $i$  but decreases the marginal product of capital in  $j$ , which results in more FDI flowing from  $j$  to  $i$ . On the other hand, FDI flowing from  $j$  to  $i$  decreases the marginal product of capital in  $i$ , which reduces the interest rate and therefore results in more outflow of financial capital from  $i$  to  $j$ . Such *capital bypass circulation* continues until all financial capital owned by country  $i$  leaves the country, and the less efficient financial institution is completely bypassed.

If the autarky capital/labor ratio,  $(k^{i0}, k^{j0})$ , is on the left side of  $FDI$  curve, as indicated by point  $A$  in Figure 1, then country  $i$  is labor abundant. Since  $A$  is to the left of  $FDI$  curve, FDI will flow into  $i$  from  $j$  until  $FCF$  is reached. Although  $A$  is also to the left 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  $(k^i, k^j)$  crosses  $FCF$  curve, it enters into the *two-way capital flow area*. The two-way capital flows 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  $(k^{i0}, k^{j0})$  is on the right side of  $FCF$  curve, as indicated by point  $B$  in Figure 1, country  $i$  is capital abundant. Financial capital flows out of country  $i$  into  $j$  at the beginning. Expecting that the outflow of financial capital from  $i$  to  $j$  would eventually bring  $(k^i, k^j)$  to the left side of  $FDI$  curve and render FDI flowing out of country  $i$  not profitable, FDI does not flow out of country  $i$  in the first place. After  $(k^i, k^j)$  crosses the  $FDI$  curve, the two countries enter into the *two-way capital flow area* in which FDI moves 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 (14). 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,

$$\lambda^j \left[ 1 + F'_k \left( 1, \frac{K^{i0} + K^{j0} - K^{i*}}{L^j} \right) \right] - \lambda^i \left[ 1 + F'_k \left( 1, \frac{K^{i*}}{L^i} \right) \right] = 0 \quad (15)$$

Differentiating the above equation, it can be immediately seen that  $K^{i*}$  declines as  $\lambda^i$  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, as indicated by  $B$  in Figure 1. That is,  $\lambda^j [1 + F'_k(1, k^{j0})] > \lambda^i [1 + F'_k(1, k^{i0})]$ . As an illustration, if  $F(L, K) = L^\alpha K^{1-\alpha}$ , then it requires

$$\lambda^j \left( 1 + \frac{1-\alpha}{(k^{j0})^\alpha} \right) > \lambda^i \left( 1 + \frac{1-\alpha}{(k^{i0})^\alpha} \right) \quad (16)$$

We define country  $i$  as effectively capital abundant if condition (16) holds. 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 we have:

**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) *Less FDI goes into a country with worse property rights protection.* (C) *A country is a net exporter of capital if and only if it is effectively capital abundant.*

## 4 Frictions and Capital Flows

It is natural to wonder if the strong result of a *complete bypass* of the 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 collective qualities of financial system/corporate governance between two countries is larger than costs of capital flows. In this case, the benefit of bypassing the less efficient financial institution more than compensates the costs of capital flows.

Let  $\tau^{ij}$  be the cost per unit of financial capital moving 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:

$$\lambda^j [1 + F'_k(1, K^j/L^j)] - \lambda^i [1 + F'_k(1, K^i/L^i)] \geq \rho^j - \rho^i + \tau^{ij} \quad (17)$$

The reverse happens if  $r^j \leq r^i - \tau^{ji}$ . Note  $\tau^{ji}$  and  $\tau^{ij}$  may not be the same. This *condition for financial capital inflow (FCF-in)* for country  $i$  can also be written as,

$$\lambda^j [1 + F'_k(1, K^j/L^j)] - \lambda^i [1 + F'_k(1, K^i/L^i)] \leq \rho^j - \rho^i - \tau^{ji} \quad (18)$$

The *FCF-out* curve in Figure 2 represents condition (17) 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 (18) 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 lie above the *FCF-out* curve.

Let  $\eta^{ij}$  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  $(1+r^i)d^{ij}$ . The expected income when the entrepreneur in country  $i$  directly invests in country  $j$  now becomes

$$U^{id} = \frac{b^i (1+r^i)}{(1+r^i) + c/\theta^i + b^i - (\lambda^j R^j - \eta^{ij})} - (1+r^i)d^{ij} \quad (19)$$

The entrepreneur in country  $i$  produces abroad if  $U^{id} \geq U^i = (1+r^i)f^i$ . Using *CRSR* (11) and substituting  $(1+r^i) + c/\theta^i$  by  $\lambda^i R^i - b^i f^i / (1+f^i)$  into (19), the

*FDI outflow condition (FDI-out)* for country  $i$  is

$$\lambda^j [1 + F'_k(1, K^j/L^j)] - \lambda^i [1 + F'_k(1, K^i/L^i)] \geq \frac{b^i d^{ij}}{(1 + f^i + d^{ij})(1 + f^i)} + \eta^{ij} \quad (20)$$

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

$$\lambda^j [1 + F'_k(1, K^j/L^j)] - \lambda^i [1 + F'_k(1, K^i/L^i)] \leq -\frac{b^j d^{ji}}{(1 + f^j + d^{ji})(1 + f^j)} - \eta^{ji} \quad (21)$$

When equalities in (20) and (21) hold, they are depicted in Figure 2 by curves *FDI-out* and *FDI-in*, respectively. The *FDI-in* curve must lie 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  $i$ .

#### 4.1 Is There Still a Bypass Effect?

The patterns of capital flow are determined by the relative positions of *four boundaries* in Figure 2. We can show that as long as the *collective agency costs* in country  $i$ ,  $\rho^i$ , is larger than  $\rho^j$  by a sufficient amount, the complete bypass emerges as the unique equilibrium. More precisely, if

$$\rho^j - \rho^i < -\frac{b^j d^{ji}}{(1 + f^j + d^{ji})(1 + f^j)} - \eta^{ji} - \tau^{ij} = C_I \quad (22)$$

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, the 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 side 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  $\rho^i$  is sufficiently smaller than  $\rho^j$ , an opposite pattern emerges. More precisely, if

$$\rho^j - \rho^i > \frac{b^i d^{ij}}{(1 + f^i + d^{ij})(1 + f^i)} + \eta^{ij} + \tau^{ji} = C_{II} \quad (23)$$

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 avoid overcrowding the space). The region 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 for the result is as follows: if the difference in the *collective agency costs* between two countries is larger than the 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 (22) nor (23) holds, there will be one-way capital flow, which we turn into in the next subsection.

## 4.2 One-Way Capital Flows

We now consider a third scenario in which the cross-country difference in the quality of financial system/corporate governance is in an intermediate range, or more precisely,

$$C_I < \rho^j - \rho^i < C_{II} \quad (24)$$

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 (17) and (20), respectively. A similar examination determines the relative positions of the two inflow curves. There are four possible cases. We depict and analyze in detail one case in Figure 3. The analyses for the others are 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. Note that if the costs of capital flows increase, the two inflow curves would shift to the left and the two outflow curves would shift to the right. Therefore, for sufficiently large costs, the zone of “no-capital-flow” would expand so much that any initial  $(k^{i0}, k^{j0})$  would not lead to capital flows in either direction. 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. In spite of the fact that *A* is to the left of both *FDI-in* and *FCF-in* curves, because 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. Now consider the case in which  $(k^{i0}, k^{j0})$  is on the right side of the *FCF-out* curve, as represented by point *B*. In this case, 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 to the right of at least one of outflow curves, country *i* is defined as effectively capital abundant. On the other hand, country *i* is effectively labor abundant if  $(k^{i0}, k^{j0})$  is to the left 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 sufficiently large (relative to the costs of capital flows, i.e., either condition (22) or (23) holds), the unique equilibrium in the world capital market will be characterized by two-way capital flows that completely bypass 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.*

Intuitively, this proposition implies that sufficiently large marginal costs to capital flows could prevent two-way capital flows (and hence the bypass of inefficient domestic financial institution/corporate governance) from taking place. This is not the only way to break the complete bypass result. If instead of assuming a constant marginal cost of capital flows, let us hypothesize that the cost is convex. For example,  $\tau^{ij}$  and  $\eta^{ji}$  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 eventually move below 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).

### 4.3 Comparative Statics

We now trace out how a change in either the *collective agency costs*  $\rho$  or property rights protection  $\lambda$  affects the patterns of capital flows. This essentially involves discussing the earlier key results from a different angle. We focus on the composition of capital flows for country  $i$ , and let country  $j$  be the rest of the world. A key feature to bear in mind is that the locations of the *FDI-in* and *FDI-out* curves are both affected by  $\lambda$  but not by  $\rho$ , whereas the *FCF-in* and *FCF-out* curves would both shift to the right when either  $\lambda$  rises or  $\rho$  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 consider a gradual improvement in 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  $\rho^i = 0$ ) while holding  $\lambda^i$  constant. To illustrate, let  $(k^{i0}, k^{j0})$  be at point  $A$  in Figure 2 so country  $i$  is effectively labor abundant. There are four zones of  $\rho^i$  to be considered. Using condition (22), let  $\rho_1$  be the cutoff point of  $\rho^i$  such that the *FCF-out* and *FDI-in* curves coincide, or

$$\rho_1 = \rho^j + \frac{b^j d^{ji}}{(1 + f^j + d^{ji})(1 + f^j)} + \eta^{ji} + \tau^{ij} \quad (25)$$

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. In this case, 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  $\rho^i$  is in the region of  $[\rho_1, \infty)$ , a change in the value of  $\rho^i$  has no effect on the amount and composition of the capital flows. This is depicted in the far left part of Figure 4 (*ab* and *a'b'*).

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

$$\rho_2^i = \rho^j + \frac{b^j d^{ji}}{(1 + f^j + d^{ji})(1 + f^j)} + \eta^{ji} - \tau^{ji}, \quad (26)$$

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  $FDI = -(K_1^{i*} - K^{i0})$ . Because capital flow is determined by the inside inflow curve now, further decreasing  $\rho^i$  until *FCF-in* and *FDI-in* coincide has no effect on capital flows. This is represented by the middle left portion of Figure 4 (*cd* and *c'd'*).

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

$$\rho_3^i = \rho^j - \frac{b^i d^{ij}}{(1 + f^i + d^{ij})(1 + f^i)} - \eta^{ij} - \tau^{ji}, \quad (27)$$

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  $FCF = -(K_2^{i*} - K^{i0})$ . The 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  $\rho^i$  decreases until *FCF-in* and *FDI-out* coincide. This is represented by the middle right portion of Figure 4 (*ef* and *de'*).

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  $\rho^i$  has no effect on capital flows. This is depicted by the far right portion of Figure 4 (*gh* and *f'g'*).

The comparative statics can be recapitulated by looking at 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'd'e'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 a change in property rights protection (changing  $\lambda^i$ ), while holding  $\rho^i$  constant. Examining conditions (17), (18), (20) and (21), we

know that changing  $\lambda^i$  does not affect the relative positions of the four threshold curves. Thus, the pattern of capital flow is not affected by changing  $\lambda^i$ . However, the increase in  $\lambda^i$  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.

## 5 Welfare Impact of Capital Flows

Does financial globalization enhance welfare for individual economies and for the world as a whole? This is the subject of this section. We measure a change in social welfare by the occurrence of a *potential Pareto improvement*, which in turn can be represented by a change in aggregate income. For simplicity, we will focus on the case of a frictionless world. A key result is that the welfare effect may diverge between financially sophisticated and financially backward economies.

### 5.1 World Welfare

We first examine the world as a whole. We start by showing that the aggregate income in financial autarky equals the sum of aggregate output produced and the

capital stock left at the end of period 2.<sup>7</sup> Note that the number of entrepreneurs  $N = K/z$ . Assume that all financial intermediation costs,  $(c/\theta)K$ , are distributed to labor, and all license fees paid by entrepreneurs,  $(1+r)fN$ , are distributed to labor as well. The aggregate income in the country,  $W$ , is the sum of expected labor income, entrepreneurs' income, and investors' income. That is,

$$\begin{aligned} W &= \left[ \lambda wL + \frac{cK}{\theta} + (1+r)fN \right] + (1+r)N + (1+r)(K-N) \\ &= \lambda wL + \left[ \frac{c}{\theta} + \beta + (1+r) \right] K = \lambda wL + \lambda RK = \lambda F(L, K) + \lambda K \quad (28) \end{aligned}$$

where we have used the result that  $\beta = (1+r)f/z$ , and equations (2) and (11), for the above derivations. Thus, with the depreciation rate set at zero, the aggregate income equals the sum of total output produced and capital left at the end of period 2.

Let us use superscripts 0 and 1 to denote variables before and after free capital mobility, respectively. The expected world total output before free capital mobility is  $\lambda^i [F(L^i, K^{i0}) + K^{i0}] + \lambda^j [F(L^j, K^{j0}) + K^{j0}]$ . A social planner of the world will choose capital stocks,  $K^i$  and  $K^j$ , to maximize the expected world total output. That is,

$$\begin{aligned} \max_{K^i, K^j} W^* &= \lambda^i [F(L^i, K^i) + K^i] + \lambda^j [F(L^j, K^j) + K^j] \quad (29) \\ \text{s.t. } K^i + K^j &= K^{i0} + K^{j0} \end{aligned}$$

One can see that the first order condition of the above optimization problem is exactly the same as (15). Therefore,  $K^{i*}$  determined by condition (15) maximizes the expected world aggregate income. One can also check that the world aggregate

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<sup>7</sup>As in the leading graduate-level textbook for international macroeconomics (Obstfeld and Rogoff, 1996, Chapter 1), the capital stock is eaten after date 2 production. Thus welfare is measured by the sum of the second-period GNP and the capital stock.

income with free capital flows equals  $W^*$ . 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.

To put it differently, financial globalization in this case is a substitute for reforms of weak domestic financial institutions/corporate governance in developing countries. As the inferior financial system is completely bypassed by saving and investment, return on savings becomes higher, and capital mobility equates the expected marginal products of capital across all countries.

## 5.2 National Welfare

Unlike the world welfare, national welfare may not be higher with financial globalization for every individual economy. To be precise, we will show that the country with a strong financial institution/corporate governance always benefits from free capital mobility. However, the country with a weak financial system/corporate governance may lose out. For the latter country, the strength of its property rights protection also plays a role in determining how likely it may benefit from financial globalization.

To see some of the intuition, recall from the *capital revenue sharing rule* (11) 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 of financial intermediation and management from country  $i$  (the one with a weak financial system) to  $j$  (the one with a strong financial system). The welfare impact on country  $i$ , therefore, is determined by the trade-off between an efficiency gain from capital mobility and a revenue loss in financial intermediation and entrepreneurial pay.

### 5.2.1 The Country with a Weak Financial Sector

In general, the costs of financial intermediation and business entry have both a rent and a waste (deadweight loss) component. We denote  $\phi_1^i$  and  $\phi_2^i$ , where  $\phi_1^i, \phi_2^i \leq 1$ , as the fractions of the intermediation and business entry costs that are wasted, respectively. Formally, the expected aggregate income in country  $i$  in financial autarky is:

$$W^{i0} = \lambda^i [F(L^i, K^{i0}) + K^{i0}] - (\phi_1^i c / \theta^i + \phi_2^i \beta^i) K^{i0} \quad (30)$$

With free capital movement, all  $K^{i0}$  are intermediated through the foreign financial system. Suppose  $K^{i*}$  is the amount of FDI that enters country  $i$  from  $j$ . Note that the interest rates are equalized across countries with free capital mobility,  $r^{i1} = r^{j1}$ , and marginal products of capital are also equalized,  $(1 + r^{j1}) + \rho^j = \lambda^j R^{j1} = \lambda^i R^{i1} = \lambda^i [1 + F'_k(L^i, K^{i*})]$  from (15). The expected aggregate income in country  $i$  under free capital flows becomes:

$$\begin{aligned} W^{i1} &= \lambda^i w^{i1} L^i + (1 + r^{i1}) K^{i0} = \lambda^i w^{i1} L^i + [(1 + r^{i1}) + \rho^j] K^{i0} - \rho^j K^{i0} \\ &= \lambda^i w^{i1} L^i + \lambda^i [1 + F'_k(L^i, K^{i*})] K^{i0} - \rho^j K^{i0} \end{aligned} \quad (31)$$

The change in national welfare in country  $i$  is given by  $W^{i1} - W^{i0}$

$$\begin{aligned} &= [\lambda^i w^{i1} L^i + \lambda^i F'_k(L^i, K^{i*}) K^{i0} - \lambda^i F(L^i, K^{i0})] - (\rho^j - \phi_1^i c / \theta^i - \phi_2^i \beta^i) K^{i0} \\ &= A - \mu^{ij} K^{i0} = A - B \end{aligned} \quad (32)$$

where  $\mu^{ij} = \rho^j - \phi_1^i c / \theta^i - \phi_2^i \beta^i$ . The first term in squared bracket in (32), denoted by  $A$ , represents the standard triangle gain from free capital flows in the neoclassic theory. More precisely,



$$\begin{aligned}
A &= \lambda^i [w^{i1}L^i + F'_k(L^i, K^{i*})K^{i*} - F(L^i, K^{i0}) + F'_k(L^i, K^{i*})(K^{i0} - K^{i*})] \\
&= \lambda^i [F(L^i, K^{i*}) - F(L^i, K^{i0}) + F'_k(L^i, K^{i*})(K^{i0} - K^{i*})] \\
&= \lambda^i \left[ \int_{K^{i0}}^{K^{i*}} F'_k(L^i, K^i) dK^i + F'_k(L^i, K^{i*})(K^{i0} - K^{i*}) \right] \tag{33}
\end{aligned}$$

In Figure 5, expression (33) is depicted by the triangle below the curve  $F'_k(\cdot)$  if  $K^{i*} > K^{i0}$ , or the triangle above the curve  $F'_k(\cdot)$  if  $K^{i*} < K^{i0}$ . In either case, it is always positive.

The second term on the right hand side of equality (32), denoted by  $B$ , represents country  $i$ 's revenue loss from a complete bypass. In Figure 5, it is depicted by the rectangle  $B$ . The overall welfare impact of financial globalization for country  $i$  is determined by the trade-off between  $A$  and  $B$ . As an example, if  $K^{i0} = K^{i*}$  and  $\phi_1^i = \phi_2^i = 0$  so that net capital flows happen to be zero with financial globalization (but the gross capital flows could be massive), and the fees paid for financial intermediation and business licenses before financial globalization are pure rents in country  $i$ , then  $A = 0$  and  $B = \rho^j K^{i0}$ . In this example, free capital mobility is guaranteed to reduce the welfare of country  $i$ . On the other hand, if  $\phi_1^i = \phi_2^i = 1$  so all intermediation cost and license fee are deadweight loss in financial autarky,  $B$  then becomes negative since  $\rho^j < \rho^i$ . In this case, free capital mobility must improve country  $i$ 's welfare.

As indicated in Figure 5, the magnitude of the triangle gain from capital flows,  $A$ , is determined by the size of net capital flow,  $K^{i*} - K^{i0}$ . Let country  $i$  be effectively labor abundant. Using (15), we can show that  $K^{i*} - K^{i0}$  becomes larger if  $\lambda^i$  is larger. Therefore, the triangle gain from free capital flows,  $A$ , becomes larger if the protection of property rights in country  $i$  is stronger. Therefore, the country with a weak financial system is more likely to benefit from free capital mobility if its property rights protection is strong.

### 5.2.2 The Country with a Strong Financial Sector

We turn now to the welfare impact of financial globalization for country  $j$  - the one with a strong financial system. Similar to the above analysis,  $W^{j0} = \lambda^j [F(L^j, K^{j0}) + K^{j0}] - (\phi_1^j c/\theta^j + \phi_2^j \beta^j) K^{j0}$ , while

$$\begin{aligned} W^{j1} &= \lambda^j w^{j1} L^j + (1 + r^{j1}) K^{j0} + \rho^j (K^{i0} + K^{j0}) - (\phi_1^j c/\theta^j + \phi_2^j \beta^j) (K^{i0} + K^{j0}) \\ &= \lambda^j [F(L^j, K^{j1}) + K^{j0}] + \lambda^j F'_k(L^j, K^{j1}) (K^{j0} - K^{j1}) - (\phi_1^j c/\theta^j + \phi_2^j \beta^j) K^{j0} \\ &\quad + \left[ (1 - \phi_1^j) c/\theta^j + (1 - \phi_2^j) \beta^j \right] K^{i0} \end{aligned}$$

where  $K^{j1} = K^{i0} + K^{j0} - K^{i*}$  is the capital stock in country  $j$  with capital mobility. We have used the fact that  $(1 + r^{j1} + \rho^j) K^{j0} = \lambda^j [1 + F'_k(L^j, K^{j1})] K^{j0}$  to derive the above expression. Thus we have

$$\begin{aligned} W^{j1} - W^{j0} &= \lambda^j \left[ \int_{K^{j0}}^{K^{j1}} F'_k(L^j, K^j) dK^j + F'_k(L^j, K^{j1}) (K^{j0} - K^{j1}) \right] \\ &\quad + \left[ (1 - \phi_1^j) c/\theta^j + (1 - \phi_2^j) \beta^j \right] K^{i0} \end{aligned} \quad (34)$$

The first term in the right hand side of (34) is again the triangle gain from capital flows, which is always positive. The second term is the rent (i.e., not wasted) part of the revenue transferred to country  $j$  from country  $i$  due to the bypass effect. In contrast to the previous case, the second term is also positive. Therefore, the country with the good financial system/corporate governance must benefit from global capital mobility. To summarize we have:

**Proposition 5** (A) *In a frictionless world, the inferior financial system/corporate governance is completely bypassed. All savings are served by the world's best financial system and the world's first best efficiency is reached through free international capital flows.* (B) *The country with a strong financial institution and corporate*

*governance gains unambiguously from global capital mobility. (C) The country with a weak financial institution and corporate governance, however, may not benefit from financial globalization, depending on the 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.

## **6 Conclusions**

Net financial capital and net FDI often go in opposite directions. Developed 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. Developing 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. If the difference in the quality of financial system/corporate governance between the two sets of countries is sufficiently large (relative to the costs of cross-border capital flows), the theory developed in this paper suggests that the inferior financial system/corporate governance can be completely bypassed by two-way capital flows. In a sense,

financial globalization is a substitute for reforms of domestic financial sector as capital can be put to the most efficient use in this case even without domestic financial reforms. However, the net welfare effect on a developing country with a weak financial system may not always be positive, if the fees paid for financial intermediation and business entry have a rent component. While the welfare effect for a developing country may be ambiguous, the model suggests that the net effect is more likely to be positive the stronger is the quality of property rights protection.

Unlike the neoclassical theory that equates the expected marginal product of capital to interest rate, the sharing rule on capital revenue derived in this paper states that the expected 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 the financial system or the corporate governance in a country, the greater the gap between the interest rate and the expected marginal product of capital. Also, while risk sharing is an explanation in the literature for two-way portfolio capital flows across countries, this paper provides a new explanation based on differences in institutional quality (even with risk neutral investors).

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 analysis groups quality of financial system and quality of corporate governance together, future work could investigate their separate implications. For example, if one allows for international direct investment in the banking sector, then the efficiency of a developing country's banking sector (though not the strength of its corporate governance) may be improved partially. If one introduces joint venture between foreign and local entrepreneurs, perhaps the quality of local corporate governance can be partially modified as well. Second, 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. Third, the quality of domestic financial sector and the efficiency 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. Fourth, a systematic empirical investigation can 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 could be fruitful directions for future research.

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**Table 1: Patterns of Capital Flows by Country Groups, 1990-2004**  
(Unit: current U.S. dollars per person)

Year	Country Group	Per Capita Net FDI Outflows	Per Capita Net Financial Capital Outflows
		(average within the group)	(average within the group)
1990	Developed Countries	165	-1564
	Emerging Markets	-756	1541
	Other Developing Countries	-226	-483
1995	Developed Countries	275	-1773
	Emerging Markets	-1462	2184
	Other Developing Countries	-273	-437
2000	Developed Countries	1204	-2486
	Emerging Markets	-1668	3680
	Other Developing Countries	-406	-281
2004	Developed Countries	1120	-1382
	Emerging Markets	-1671	5556
	Other Developing Countries	-569	-138

Notes:

1) **Source:** Authors' calculations based on the database described in "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970-2004", by Philip R. Lane and Gian Maria Milesi-Ferretti, IMF Working Paper 06/69, 2006. Population data is from the IMF's "International Financial Statistics".

2) **Variable Definitions:**

Per capita net FDI outflows = (FDI Asset – FDI Liability)/population

Per capita net financial capital outflows = [(total foreign asset-FDI asset)-(total foreign liability-FDI liability)]/population

Numbers are averaged across countries within the group. Negative numbers indicate inflows.

3) **Country Groups** (based on IMF Occasional Paper 220, "Effects of Financial Globalization on Developing Countries: Some Empirical Evidence," Eswar Prasad, Kenneth Rogoff, Shang-Jin Wei, and Ayhan Kose (2003), Washington DC: International Monetary Fund.)

21 *Developed Countries:* Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

22 *Emerging Markets:* Argentina, Brazil, Chile, China, Colombia, Egypt, Hong Kong SAR, India, Indonesia, Israel, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Singapore, South Africa, Thailand, Turkey, and Venezuela.

33 *Other Developing Countries:* Algeria, Bangladesh, Benin, Bolivia, Botswana, Burkina Faso, Burundi, Cameroon, Costa Rica, Côte d'Ivoire, the Dominican Republic, Ecuador, El Salvador, Gabon, Ghana, Guatemala, Haiti, Honduras, Jamaica, Kenya, Mauritius, Nicaragua, Niger, Nigeria, Panama, Papua New Guinea, Paraguay, Senegal, Sri Lanka, the Syrian Arab Republic, Togo, Tunisia, and Uruguay.



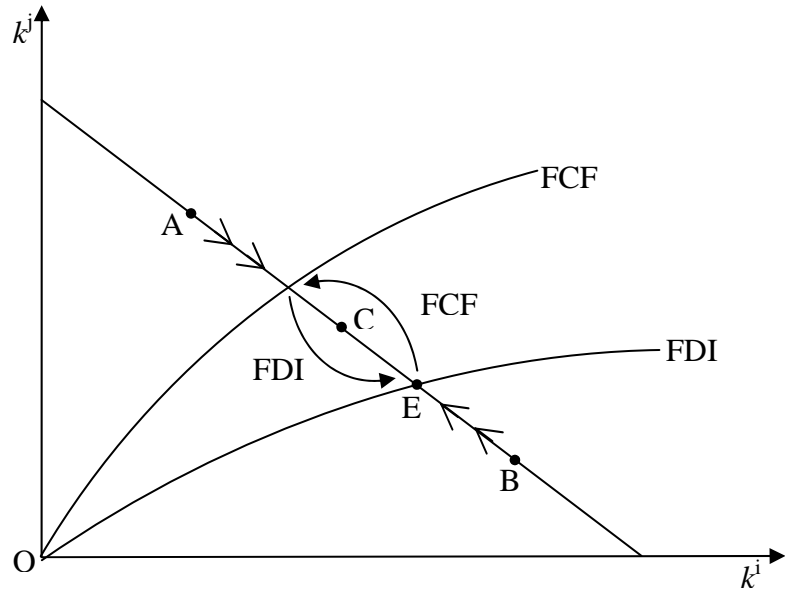


Figure 1: Boundary Conditions for Capital Flows

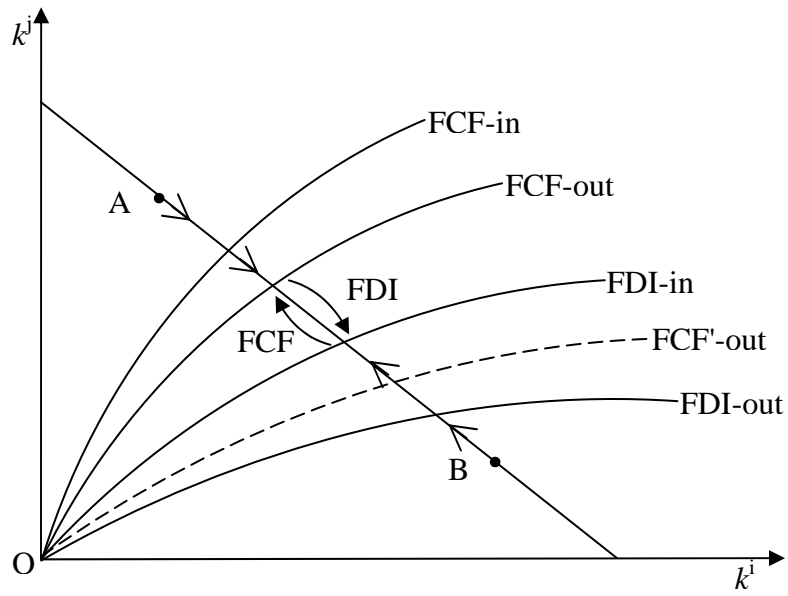


Figure 2: Boundary Conditions with Barriers to Capital Flows

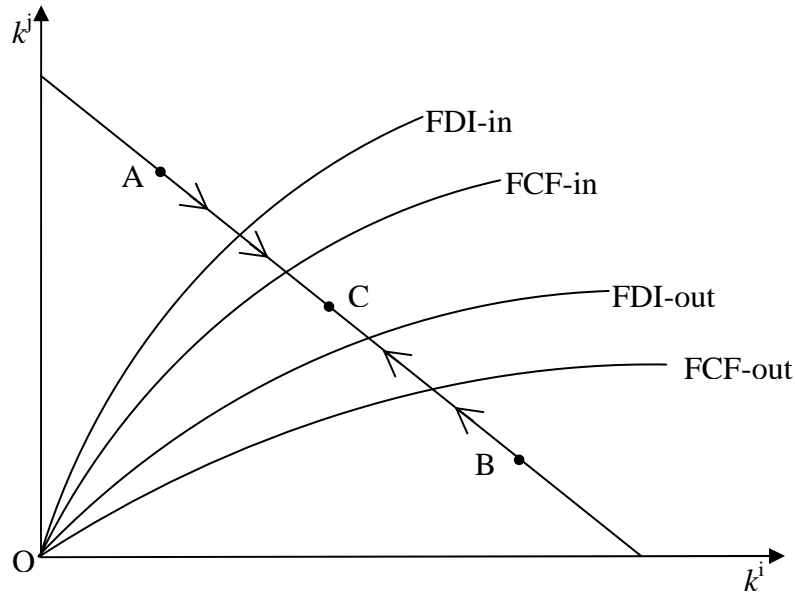


Figure 3: One-way Capital Flows

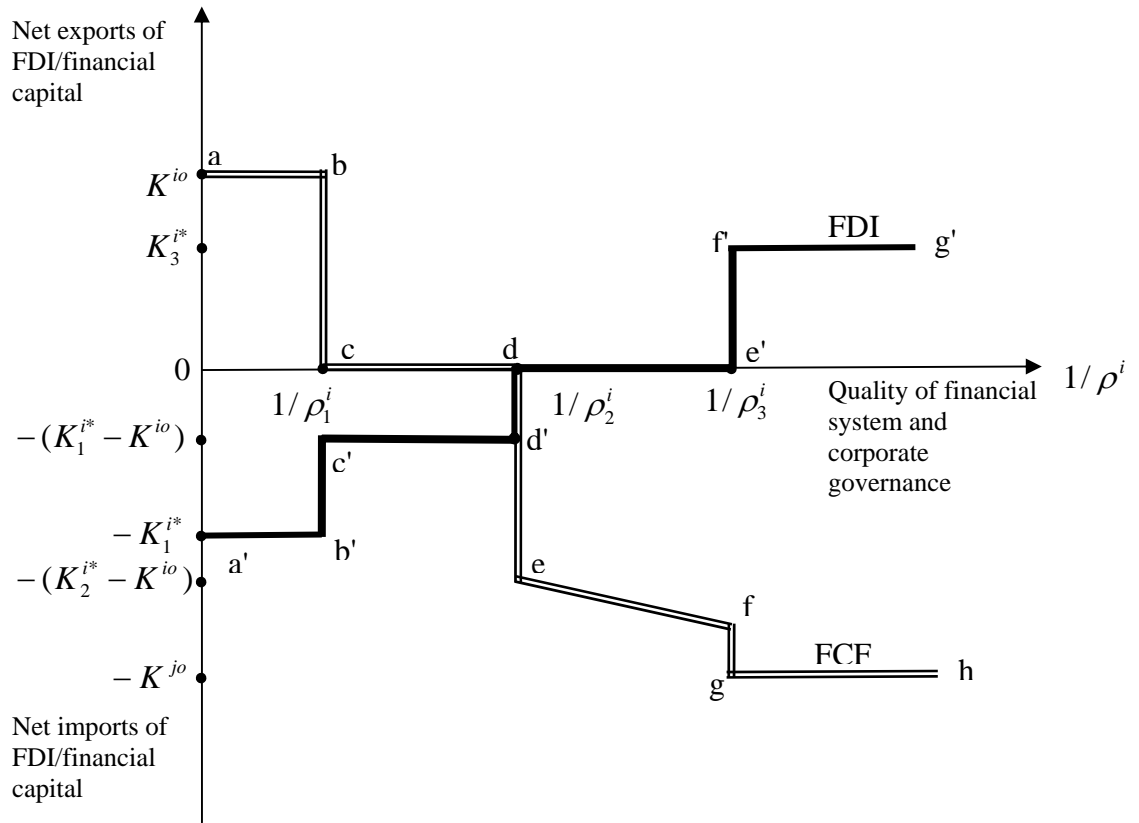


Figure 4: Comparative Statistics – Patterns of Capital Flows as a Function of Quality of Financial System/Corporate Governance

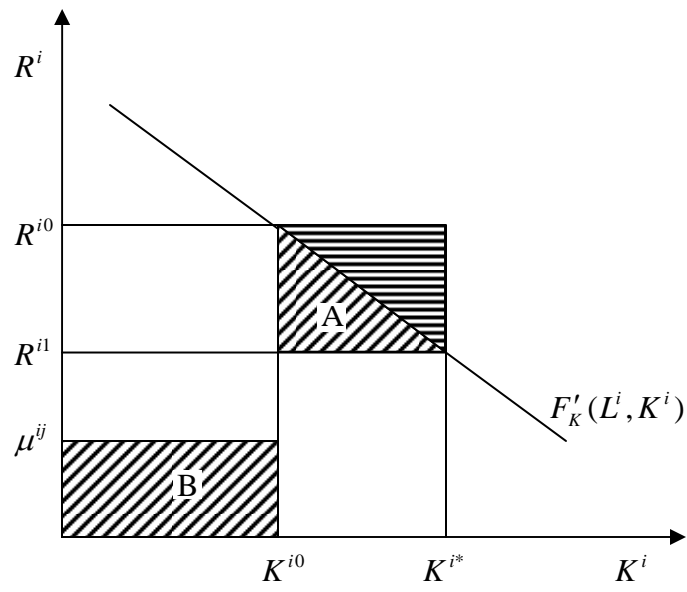


Figure 5: Welfare Effect of Financial Globalization