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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 how domestic institutions affect patterns of international capital flows. Inefficient financial system and poor corporate governance may be 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 FDI. 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 or poor corporate governance. Interestingly, financial and property rights institutions can have opposite effects on capital flows.

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 drop during 1997-2002, and another probably temporary dip that started in 2008). 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.[1] While there is a well-established literature on two-way flows within a subset of capital category such as portfolio investment motivated by a risk-sharing desire, and horizontal FDIs when gains of multinationals from selling locally more than offset the plant-specific fixed costs (e.g., Markusen, 2002; and Helpman, Melitz and Yeaple, 2004), two-way capital flows across the categories of financial capital and FDI have not received much attention in the literature.

This paper aims to propose a simple theoretical framework on institutions and capital flows. It unbundles institutions into property rights protection and financial system efficiency, and unbundles cross-border capital flows into FDI and financial capital. It explores potentially distinct roles of different domestic institutions in determining the structure of international capital flows.

To incorporate these features, we introduce a modified version of the financial contract model of Holmstrom and Tirole (1997) to the neoclassical model. 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. What emerges from the model is a wedge between the expected marginal product of capital and the financial interest rate, and the wedge widens as the cost of financial intermediation or the cost of weak corporate governance increases. This relationship 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 of its financial sector and weakness of its corporate governance. The country may experience inward FDI, which is attracted by its high marginal product of capital. At the same time, it may export financial capital, due to its lower interest rate relative to the foreign country.

In a world free of any barriers to cross-border capital flows, financial capital and foreign direct investment not only move in opposite directions but also reinforce each other in a way that would lead to a complete

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[1]   Yasheng Huang (2003) suggests that China's inward FDI is a reflection of its inability to allocate its household savings efficiently through its financial sector. FDI is often used by Chinese private firms to deal with financing difficulties. Dooley, Folkerts-Landau, and Garber (2004) also suggest 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.

bypass of the inferior financial institution and corporate governance. With convex costs of capital flows, two-way capital flows are likely to emerge, but the bypass is incomplete. In general, the country with better financial institutions (via a combination of better corporate governance and lower costs of financial intermediation) emerges as the global financial center, attracting financial capital from all countries and dispensing direct investment around the world.

One notable feature of our model is that financial development and property rights protection can have qualitatively different effects on capital flows. In particular, an improvement in financial system efficiency leads to a higher financial interest rate (for a given capital/labor ratio), but does not directly affect the expected marginal product of capital. As a result, there is less incentive for financial capital to leave the country. As more financial capital stays with local firms, the expected marginal product of capital declines, which makes it less attractive for FDI. In contrast, an improvement in property rights protection, by directly increasing the expected marginal product of capital, and for a given cost of financial intermediation, also directly increasing the financial interest rate, helps to attract both more financial capital inflows and more FDI inflows.

Capital account liberalization has interesting and country-specific welfare consequences. First, from the world's perspective, as the inferior financial institutions are bypassed (partially or completely), savings in all countries earn a better interest rate, and capital is more 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 will its domestic savings 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 institutions 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 empirical findings, reviewed in Prasad *et al.* (2003) and Kose *et al.* (2006 and 2010), that the strength of domestic property rights protection in a developing country may affect its ability to benefit from financial globalization.

The rest of the paper is organized as follows. Section 2 reviews the existing literature and presents some salient data patterns as a motivation for our model. Section 3 sets up the model and discusses the institutional causes of the wedge between the return to physical capital and the financial interest rate. Sections 4 and 5 study the patterns and the welfare consequences of international capital flows. Section 6 concludes. A set of appendices contains the proofs to the propositions together with some extensions.

2.   The Literature and Some Data Patterns

2.1   Relations to the Existing Literature

Several recent theoretical papers on capital flows focus on the role of domestic financial development and therefore are related to our paper. Caballero, Farhi, and Gourinchas (2008) show that an exogenously low capacity to generate financial assets in an exogenously fast-growing economy induces households in that country to demand savings instruments from a financially more advanced foreign country. Rather than modeling financial market deficiency by an inability to generate financial assets, we model it by a combination of low efficiency in the financial sector and weak corporate governance via Holmstrom and Tirole (1997). Mendoza, Quadrini, and Rios-Rull (2007) show that differences in domestic financial development could induce the financially most developed countries to accumulate net foreign liabilities while simultaneously accumulating positive positions in foreign risky assets (FDIs and equity investment). The existence of production risks and risk aversion of the agents in the model are key to generating the composition of capital flows in that paper. In comparison, we shut down that channel by assuming risk neutrality in the model. The key driver for the two-way flows in our model is a wedge between returns to physical capital and financial interest rate generated by institutional weakness. In addition, we study distinct roles of property rights protection and financial development in determining the composition of capital flows, something the previous papers do not do.

Other recent papers also 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. Antras, Desai, and Foley (2009) 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. Giannetti and Koskinen (2009) study the effects of investor protection on stock prices and equity portfolio investment, and show generally that portfolio investors are more willing to invest abroad when the domestic regime of investor protection is weaker. These papers do not study two-way flows (of FDI and financial capital), do not investigate potentially distinct roles of different types of institutions, and do not generate the bypass effect of financial globalization that is emphasized in our paper. By incorporating a Heckscher-Ohlin production structure, Ju and Wei (2007b) and Jin (2008) study how a change in industrial structure could substitute for international capital flows. Neither paper studies the role of financial development or property rights protection in capital flows.

This paper is also 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. Unlike our paper, these papers do not unbundle institutions nor capital flows.

The comparative statics in our model indicates that as the quality of financial institution and corporate governance improves, one expects to see less financial capital outflow but more FDI outflow. Two recent empirical studies are of particular relevance for this paper. Kristin Forbes (2008) uses data on foreign financial capital flows into the United States to test various hypotheses and finds that standard portfolio allocation models and diversification motives are poor predictors of foreign holdings of U.S. liabilities. Instead, a foreign country tends to have a greater share of their equity and bond investments in the United States if it has less developed financial markets. Using a data set on bilateral capital flows for 77 industrial and emerging economies, Christian Daude and Marcel Fratzscher (2006) study the roles of informational frictions and institutional development in capital flows. Of particular interest to us, they report that as a country's financial development rises, it tends to receive more inward portfolio capital relative to inward FDI.

Several additional empirical papers links domestic institutions to international capital flows, including Wei (2000a and 2000b) and Alfaro, Kalemli-Ozcan, and Volosovych (2008). 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. Desai and Dharmapala (2007) document that international investors appear to alter their portfolio choices to bypass home country tax regimes and weak host country investor protections.

2.2   Empirical Motivation

We provide some additional stylized facts as an empirical motivation for our theory. In particular, we document that it is not unusual for a country's net financial capital flows and net FDI to go in the opposite directions. Table 1 reports average compositions of capital flows for developed countries, emerging market economies, and other developing countries, respectively, during 1990-2004. 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 opposite thing: importing net FDI of 1671 dollars per person, but exporting net financial capital of 5556

dollars per person. Low income developing countries (" other developing countries") imported both net FDI and net financial capital but with a much smaller magnitude. The same qualitative patterns hold in 1990, 1995 and 2000 though the exact dollar amount varies.

Since our theory relates the structure of net capital flows to domestic institutions, we also re-classify all countries into three bins based on their institutional features. The first bin consists of economies with both a good financial system and adequate property rights protection. An example would be the United Kingdom. The second bin is a collection of economies with an inadequate financial system but still passable property rights protection. An example would be Chile. The third bin consists of those with both a poor financial system and poor property rights protection. An example would be Haiti. (There are no countries that have a terrible property rights protection but a wonderful financial system.) Table 2 reports, for each bin, its average institutional values and its composition of net capital flows. For countries in Bin 1 (with a good financial system and property rights protection), they tend to export net FDI and import net financial capital. For countries in Bin 2, they tend to do the opposite, importing net FDI and exporting net financial capital. Countries in Bin 3 tend to import both net FDI and net financial capital, but by a smaller amount.[2]

In Table 3, we report simple regressions of net financial outflows and net FDI outflows on a country's quality of financial system and strength of property rights protection. It is interesting to see that the quality of the financial system appears to have very different effects on outbound FDI and outbound financial capital. In particular, a country with a better financial system (such as the United Kingdom or the United States) tends to export more net FDI but less net financial capital, while a country with a worse financial system (such as Vietnam or China) tends to do the opposite.

To summarize, there are some interesting patterns about institutions and capital flows. First, net FDI and net financial capital flows often move in the opposite directions. In particular, countries with both 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. Second, a higher level of financial development is 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 explains why these patterns might happen.

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[2]   To reduce the influence of a large populous country such as China and India, we scale the capital flows by log population in Table 2. However, the same qualitative pattern would be preserved if we simply delete China, India and the United States from the list of countries.

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. Let the 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

$$R = 1 + F_k'(l, z) = 1 + F_k'\left(1, \frac{z}{l}\right) = 1 + F_k'\left(1, \frac{K}{L}\right) \text{ and } w = F_l'\left(1, \frac{K}{L}\right) \tag{1}$$

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

$$F(l, z) + z = F_l'\left(1, \frac{z}{l}\right) l + \left[1 + F_k'\left(1, \frac{z}{l}\right)\right] z = wl + Rz \tag{2}$$

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 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 a 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 a 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 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, λ^H, while offering no private benefit. The "Bad" version has a lower probability of success, λ^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 the "Good" project is implemented in the moral hazard problem.

We use g to denote a country's level of property rights protection, where $(1 - g)$ could be understood as a tax rate on the capital returns, where taxation is broadly defined to include state expropriation. We normalize $\lambda^L = 0$ and define $\lambda = g\lambda^H$ thereafter. Since we fix λ^H, without loss of generality, we can conveniently refer to λ directly as an index of property rights protection.

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/θ 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/θ units of good per unit of investment. c/θ 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 θ. The higher the θ, the lower is the financial intermediation cost.[3]

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[3]   In the moral hazard model developed in Holmstrom and Tirole (1997), the financial intermediation is to monitor the entrepreneur not to select the bad project. In this sense, financial intermediation and corporate governance are connected. For simplicity, we assume c/θ and b to be independent. However, if we assume a more general form of financial intermediation costs, consisting of a part proportional to b, and another part equal to c/θ, the results in later sections will stay the same.

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 the entrepreneur's effort R^E to solve the following program:

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

subject to

$$y \leq 1 \tag{4}$$

$$z \leq x + y \tag{5}$$

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

$$\lambda R^E \geq b \tag{7}$$

The objective function (3) represents the 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,[4] while inequality (7) is the entrepreneur's incentive compatibility constraint.

It is then straightforward to show that all constraints must be binding in equilibrium.[5] 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) gives

$$R^E = \frac{b}{\lambda} \tag{8}$$

Substituting (8) into (6) gives the firm's optimal investment[6]

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[4] Following Holmstrom and Tirole (1997), it is assumed that financial intermediaries monitor the entire project to ensure entrepreneurs behave. Thus, the intermediation cost is proportional to the amount of total capital, not just external capital.

[5] The problem is solved by setting the Lagrangian. The marginal return to internal capital must be higher than the financial interest rate as the entrepreneur needs to pay an entry cost (to be specified later). Then straightforward manipulation of the first order conditions shows that (4), (5), (6), and (7) must bind.

[6] 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.

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

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

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

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. With free entry and exit of entrepreneurs, an entrepreneur's expected income net of the entry cost, $U - (1+r)f$, should be equal to $(1+r)$ so that capitalists are indifferent between becoming entrepreneurs or financial investors in equilibrium.[7] That is,

$$U - (1+r)f = (1+r) \tag{11}$$

Using (10), the free entry condition (11) implies that

$$\lambda R = (1+r) + \frac{c}{\theta} + \beta \tag{12}$$

where $\beta = \frac{bf}{1+f}$ can be interpreted as the net pay to the entrepreneur per unit of investment. To see this, note that $U = bz = (1+r)(1+f)$. Thus, $b = (1+f)(1+r)/z$. This implies that $\beta = f(1+r)/z$. Since the numerator is equal to the entrepreneur's expected return net of the opportunity cost, $U - (1+r) = (1+r)f$, β is the net pay to the entrepreneur per unit of investment.

The equation (12) 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

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[7]   For expositional convenience, we assume that the entrepreneur borrows in the first period an amount equal to f from a financier and repays it in the second period. If instead, the fixed cost f was paid out of the entrepreneur's own capital endowment in the first period, the right hand side of constraint (4) would become $1 - f$, and the optimal investment (9) would be reduced to $(1-f)z$. However, condition (12) would still hold with β being replaced by bf, and all of our results in later sections would not be affected. Furthermore, if f were due only in the second period, condition (12) would become $\lambda R = (1+r) + \frac{c}{\theta} + bf/(1+f+r)$, and our results would still remain qualitatively under some conditions.

financial investment, $1 + r$, the cost of financial intermediation, $\frac{c}{\theta}$, and the net pay to the entrepreneur per unit of investment β. 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 b), 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

Consider capital flows between countries i and j.[8] Countries differ in the efficiency level of their financial system, θ, the strength of property rights protection, λ, the agency cost (private benefit), b, the entry cost for entrepreneurs, f, and endowments L and K. For ease of keeping track, let us make country i have 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 the capital under her management) to a foreign country and use foreign labor to produce. Financial capital goes where the interest rate is the highest. Labor is assumed to be immobile across countries.

We proceed sequentially. First, we let costs of capital flows be increasing and convex, and show that an interior solution exists in the equilibrium, which features an incomplete bypass of inferior domestic institutions. Second, we present a special case without frictions, and show a complete bypass as the unique corner solution.

Patterns of capital flows generally change in response to changes in the quality of institutions and factor endowments in the two countries. To make the presentation easier to follow, we first analyze the case that financial capital flows from i to j, while FDI flows from j to i. The determinants of patterns of capital flows will then be studied at the end of section 4.3.

4.1   Financial Capital Flows with Convex Costs

Let $K^{i0}(K^{j0})$ be the capital stock in country $i(j)$, respectively, before any cross-border capital flows. Let K^i and K^j be the capital stocks in two countries after the capital flows. Let K^{iF} be the amount of

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

financial capital outflow from country i. (A negative number represents an inflow), and $\tau^{ij}\left(K^{iF}\right)$ be the marginal cost of financial capital flow from i to j, which is positive and increasing by assumption. Investors receive the financial return (interest rate) from the country where they invest. We assume that free trade in goods equalizes the price of the good between the countries, which is normalized to 1. In equilibrium we must have $r^j - \tau^{ij}\left(K^{iF}\right) = r^i$. Using (1) and *CRSR* (12), we obtain the equilibrium condition

$$\lambda^j\left[1 + F_k'(1, K^j/L^j)\right] - \lambda^i\left[1 + F_k'(1, K^i/L^i)\right] = \rho^j - \rho^i + \tau^{ij}\left(K^{iF}\right) \tag{13}$$

where $\rho^i = \left(\frac{c}{\theta^i} + \beta^i\right)$. ρ^i is the sum of the cost of financial intermediation and the net pay to the entrepreneur per unit of investment, and is referred to as the *collective agency costs.* A higher ρ^i represents a lower collective quality of financial institution and corporate governance in country i.

4.2   Foreign Direct Investment with Convex Costs

Consider an entrepreneur from country j who invests directly in country i. She uses α fraction of her capital endowment (i.e., one unit) to raise external financing in country i, x^{ji}, and uses the remaining $1 - \alpha$ fraction of her endowment to raise external financing in country j, x^{jj}. She is assumed to have to deal with the local financial institutions in the country that provides the funding. That is, the entrepreneur pays the local financial interest rate and the local cost of financial intermediation, and receives the local private benefit for the two parts of financing, respectively.[9] The entrepreneur then chooses α to maximize her expected income. In equilibrium, the entrepreneur's marginal expected returns from raising external finance in the two countries must be equal. Furthermore, in an interior solution, the entrepreneur's expected income in the FDI project must be equal to the expected income if she operates the project at home. In such an equilibrium, some entrepreneurs in country j engage in FDI projects in the foreign country while others stay at home.

Let K^{iD} be the amount of FDI outflow in country i, and $\eta^{ji}\left(K^{jD}\right)$ represent the marginal cost of FDI from j to i, which is increasing in the volume of FDI by assumption. For simplicity, we assume that there are no fixed costs in FDI. In Appendix 1, we show that the equilibrium condition for FDI from j to i is:

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[9]   Giannetti and Koskinen (2009) assume that foreign controlling shareholders prefer to invest in a weak investor protection country to enjoy higher private benefits. We modify their assumption by letting the entrepreneur to receive the local private benefit only for the part of the external financing that is raised locally.

$$\lambda^j \left[1 + F_k'(1, K^j/L^j) \right] - \lambda^i \left[1 + F_k'(1, K^i/L^i) \right] = -\eta^{ji}\left(-K^{iD}\right) \qquad (14)$$

The equilibrium amount of financial capital flow from country i to j, K^{iF}, and the equilibrium amount of FDI from j to i, K^{jD} (or $-K^{iD}$) are obtained by solving the system (13) and (14), together with two conditions that the net capital outflow must be equal to the difference in the amounts of the domestic capital stock before and after the capital flows:

$$K^i = K^{i0} - \left(K^{iF} + K^{iD}\right) \qquad (15)$$

$$K^j = K^{j0} + \left(K^{iF} + K^{iD}\right) \qquad (16)$$

4.3   Comparative Statics with Costly Capital Flows

We will perform comparative statics by varying the quality of the institutions in country i, while holding constant the institutional quality and the factor endowment in the other country. Substituting equations (15) and (16) into equilibrium conditions (13) and (14), and totally differentiating them with respect to ρ^i, λ^i and k^{i0}, we obtain:

$$a_{F1}dK^{iF} + a_{F2}dK^{iD} = -d\rho^i + R^i d\lambda^i + \lambda^i F_{kk}^i dk^{i0} \qquad (17)$$

$$a_{D1}dK^{iF} + a_{D2}dK^{iD} = R^i d\lambda^i + \lambda^i F_{kk}^i dk^{i0} \qquad (18)$$

where a_{F1}, a_{F2}, a_{D1} and a_{D2} are calculated and presented in Appendix 2. The Appendix shows that the determinant of the 2×2 matrix on the left hand side of the system $|a| > 0$. It is then straightforward to show that $\frac{dK^{iF}}{d\rho^i} > 0$, $\frac{dK^{iD}}{d\rho^i} < 0$, $\frac{dK^{iF}}{d\lambda^i} < 0$, $\frac{dK^{iD}}{d\lambda^i} < 0$, $\frac{dK^{iF}}{dk^{i0}} > 0$, and $\frac{dK^{iD}}{dk^{i0}} > 0$.

Let us explain these results in words and with intuition. First, an improvement in a typical developing country's quality of financial institutions (or a reduction in ρ^i, through either better corporate governance or a lower cost of financial intermediation) tends to simultaneously reduce its financial capital outflow and FDI inflow. While a reduction in ρ^i does not directly affect the expected marginal product of capital in conditions (13) and (14), it leads to a higher financial interest rate. As a result, there is less incentive for financial capital to leave the country. As more financial capital stays with local firms, the expected marginal product of capital declines, which makes it less attractive for inward FDI. Second, in comparison, an improvement in property rights protection in a developing country tends to reduce its financial capital outflow but increase FDI inflow. To see this, we note that there are a direct effect and an indirect effect following an improvement in property rights protection. The direct effect is a rise in the marginal product of

capital (which attracts more inward FDI), and a rise in the domestic financial interest rate (which reduces financial capital outflows). There is also an indirect effect: with more financial capital staying at home, the marginal product of capital would decline, which would make it less attractive for inward FDI. However, as Appendix 2 shows rigorously, under the assumption of convex costs of capital flows, the direct effect dominates the indirect effect unambiguously.

To summarize, an improvement in the financial sector efficiency and an improvement in property rights protection could have different effects on the directions and the composition of capital flows. This is partially borne out in Table 3. In particular, better financial development appears to have opposite effects on FDI and financial capital flows across countries. This is in line with the theoretical predictions. On the other hand, the effects of better property rights protection are more elusive empirically. While the coefficient on property rights protection in the net FDI regression is consistent with the theoretical prediction but not statistically significant, the corresponding coefficient in the financial capital outflow regression is not consistent with the theory.

If financial capital flows into country i, the condition (13) becomes

$$\lambda^j\left[1 + F_k^{'}(1, K^j/L^j)\right] - \lambda^i\left[1 + F_k^{'}(1, K^i/L^i)\right] = \rho^j - \rho^i - \tau^{ji}\left(-K^{iF}\right) \tag{19}$$

If FDI flows out of country i, the condition (14) becomes

$$\lambda^j\left[1 + F_k^{'}(1, K^j/L^j)\right] - \lambda^i\left[1 + F_k^{'}(1, K^i/L^i)\right] = \eta^{ij}\left(K^{iD}\right) \tag{20}$$

In the case that both financial capital and FDI flow out of (into) country i, or the case that financial capital flows in but FDI flows out, we all obtain that $\frac{dK^{iF}}{d\rho^i} > 0, \frac{dK^{iD}}{d\rho^i} < 0, \frac{dK^{iF}}{d\lambda^i} < 0, \frac{dK^{iD}}{d\lambda^i} < 0, \frac{dK^{iF}}{dk^{i0}} > 0$, and $\frac{dK^{iD}}{dk^{i0}} > 0$ by a similar analysis. We can summarize the results by the following proposition:

Proposition 1 *An improvement in financial institutions (through either a lower c or a lower b) and an improvement in property rights protection have different effects on the patterns of cross-border capital flows. For a typical developing country, an improvement in financial institutions tends to reduce both financial capital outflow and FDI inflow. An improvement in property rights protection, on the other hand, tends to raise FDI inflow but reduce financial capital outflow. A reduction in capital endowment tends to raise FDI inflow and reduce financial capital outflow.*

The general relationship between institutions and capital flows is summarized by Figure 1. For a given property rights protection λ^i and initial factor endowment k^{i0}, the patterns of capital flows are determined by ρ^i. K^{iF} and K^{iD} are represented on the vertical axis, while ρ^i is represented on the horizontal axis. The $K^F K^F$ curve represents the effect of a change in ρ^i on country i's financial capital outflow, and is upward sloping (as proved in Proposition 1). The $K^D K^D$ curve represents the effect of a change in ρ^i on FDI outflow, and is downward sloping.

For a capital abundant country, when its collective quality of financial institution and corporate governance is sufficiently high ($\rho^i \leq \underline{\rho_1^i}$), it imports financial capital ($K^{iF} < 0$), but exports FDI ($K^{iD} > 0$). On the other hand, when its collective quality of institutions is sufficiently poor ($\rho^i \geq \overline{\rho}_1^i$), the reverse pattern emerges ($K^{iF} > 0$ and $K^{iD} < 0$). In the intermediate case when $\underline{\rho_1^i} < \rho^i < \overline{\rho}_1^i$, it exports both financial capital and FDI.

If the country becomes capital scarce (k^{i0} decreases), or the property rights protection improves (λ^i increases), both $K^F K^F$ and $K^D K^D$ curves shift down to $K^{F'} K^{F'}$ and $K^{D'} K^{D'}$. Now if $\rho^i \leq \underline{\rho_2^i}$, the financial capital flows in but FDI flows out. On the other hand, if $\rho^i \geq \overline{\rho}_2^i$, the pattern is opposite. However, for the intermediate levels of financial institutions, $\underline{\rho_2^i} < \rho^i < \overline{\rho}_2^i$, both financial capital and FDI flow into the country.

Note that the model can be extended to a multiple-country world in a tractable way. If we assume that the costs of capital flows from country i to country n, $\tau^{in}(K^{iF})$ and $\eta^{in}(K^{iD})$, are increasing in the volume of capital flows, the returns to capital flows (for either FDI or financial capital) to all other countries must be equal in equilibrium. We can solve a system similar to (13) and (14) for the world equilibrium.

4.4   Capital Flows with No Frictions

The previous analysis assumes an increasing and convex cost for capital flows. If instead the cost of capital flows is zero or linear, the determinant of the 2×2 matrix on the left hand side of equations (17) and (18), $|a|$, equals zero (see Appendix 2 for a calculation). In this case, we are required to analyze a corner solution. But this turns out to be an interesting case.

Let $\tau^{ij}\left(K^{iF}\right) = \eta^{ji}\left(-K^{iD}\right) = 0$, that is, capital flows are frictionless.[10] The equilibrium conditions for the two types of capital flows become:

$$\lambda^{j}\left[1 + F_{k}^{'}(1, K^{j}/L^{j})\right] - \lambda^{i}\left[1 + F_{k}^{'}(1, K^{i}/L^{i})\right] = \rho^{j} - \rho^{i} \tag{21}$$

$$\lambda^{j}\left[1 + F_{k}^{'}(1, K^{j}/L^{j})\right] - \lambda^{i}\left[1 + F_{k}^{'}(1, K^{i}/L^{i})\right] = 0 \tag{22}$$

Let $k^{i} = K^{i}/L^{i}$, which is represented by the horizontal axis in Figure 2, while k^{j} is represented by the vertical axis. The FCF curve represents condition (21). We assume that $F_{k}^{'}(1,0) = \infty$. Curve FCF starts from the origin and is upward sloping. The position of curve FCF is determined by the value of λ^{i}, λ^{j}, and $\rho^{j} - \rho^{i}$. When $\rho^{j} - \rho^{i}$ becomes smaller, or when λ^{i}/λ^{j} becomes smaller, curve FCF shifts to the left. A point in the space, (k^{i}, k^{j}), represents capital-labor ratios in two countries. For any point to the right of the FCF curve, country i has a lower financial interest rate ($r^{i} < r^{j}$) so that financial capital flows out of country i. On the other hand, financial capital flows out of country j for any point to the left of the FCF curve. Condition (22) is indicated by curve FDI. The expected marginal return to capital is lower in country i for any point to the right side of the FDI curve ($\lambda^{j}R^{j} > \lambda^{i}R^{i}$), so that FDI flows out of country i. The opposite is true for any point to the left of the FDI curve.

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, curve FCF must be above curve FDI. The area between curves FCF and FDI in Figure 2 represents a zone of two-way capital flows where $\rho^{j} - \rho^{i} < \lambda^{j}R^{j} - \lambda^{i}R^{i} < 0$. Within the area the expected marginal product of capital in country i is higher than the other country, but its financial interest rate is lower. Thus, country i exports financial capital, and imports FDI (and country j does the reverse).

The two types of capital flows have a reinforcing effect. Let the capital/labor ratio of the two countries before capital flows, (k^{i0}, k^{j0}), be between curves FCF and FDI, as indicated by point C in Figure 2. 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 further reduces the interest rate and therefore results in more outflow of financial capital from i to j. That is, FDI inflow and financial capital outflow *reinforce each other* so that in equilibrium a corner solution must occur. The *two-way*

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[10]　　The analysis under linear costs is similar. See Ju and Wei (2007a) for details.

capital flows will continue 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 the FCF curve (and the FDI curve), as indicated by point A in Figure 2 FDI will flow into i from j until FCF is reached. Although A is also to the left of the FCF curve, expecting that the flow of FDI from j to i would eventually bring (k^i, k^j) to the right side of the 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 the 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 the FDI curve (and the FCF curve), as indicated by point B in Figure 2, 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 flows 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, K^{jD}, 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 (22). That is,

$$\lambda^j \left[1 + F_k'(1, \frac{K^{i0} + K^{j0} - K^{jD}}{L^j}) \right] - \lambda^i \left[1 + F_k'(1, \frac{K^{jD}}{L^i}) \right] = 0 \qquad (23)$$

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

The net overall capital flow in country i equals $K^{in} = K^{iF} - K^{jD} = K^{i0} - K^{jD}$, 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 2. That is,

$$\lambda^j \left[1 + F_k^{'}\left(1, k^{j0}\right)\right] > \lambda^i \left[1 + F_k^{'}\left(1, k^{i0}\right)\right] \tag{24}$$

We define country i as effectively capital abundant if condition (24) 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 2 *(A) In a frictionless world capital market, the unique equilibrium of capital flows features a complete bypass: all capital originally in the country with lower quality of financial institutions 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.*

The discussion assumes an exogenous capital endowment. This is not crucial for our story. In Appendix 4, we present an overlapping-generations (OLS) model in which the capital stock in a period is the result of an endogenous savings decision in the previous period. We show that the boundary conditions for financial capital flows (21) and for FDI (22) still hold. Therefore, our complete bypass results hold in the steady state. The steady state wage rate in country i, w_t^i, is now determined by the amount of FDI flowing into the country, K_t^{jD}. Using proposition 2, the wage rate in an open economy is higher than that in a autarky if and only if the country is a net importer of capital (i.e., when it is effectively labor abundant).

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.[11] 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,

$$W = \left[\lambda wL + \frac{cK}{\theta} + (1 + r)fN\right] + (1 + r)N + (1 + r)(K - N)$$

$$= \lambda wL + \left[\frac{c}{\theta} + \beta + (1 + r)\right]K = \lambda wL + \lambda RK = \lambda F(L, K) + \lambda K \qquad (25)$$

where we have used the result that $\beta = (1 + r)f/z$, and equations (2) and (12), 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 $\lambda^i\left[F(L^i, K^{i0}) + K^{i0}\right] + \lambda^j\left[F(L^j, K^{j0}) + K^{j0}\right]$. A social planner of the world will choose capital stocks, K^i and K^j, to maximize the expected world total output. That is,

$$\max_{K^i, K^j} W^* = \lambda^i\left[F(L^i, K^i) + K^i\right] + \lambda^j\left[F(L^j, K^j) + K^j\right] \qquad (26)$$

$$\text{s.t.} \ K^i + K^j = K^{i0} + K^{j0}$$

One can see that the first order condition of the above optimization problem is exactly the same as (23). Therefore, K^{i*} determined by condition (23) maximizes the expected world aggregate income. One can also check that the world aggregate 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.

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[11]　As in a 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.

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 is to benefit from financial globalization.

To see the intuition, recall from the *capital revenue sharing rule* (12) 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 of 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

The expected aggregate income in country i in financial autarky is:

$$W^{i0} = \lambda^i \big[F\big(L^i, K^{i0}\big) + K^{i0} \big] \tag{27}$$

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, $\big(1 + r^{j1}\big) + \rho^j = \lambda^j R^{j1} = \lambda^i R^{i1} = \lambda^i \big[1 + F_k'(L^i, K^{i*})\big]$ from (23). The expected aggregate income in country i under free capital flows becomes:

$$W^{i1} = \lambda^i w^{i1} L^i + \big(1 + r^{i1}\big) K^{i0} = \lambda^i w^{i1} L^i + \big[\big(1 + r^{i1}\big) + \rho^j\big] K^{i0} - \rho^j K^{i0}$$

$$= \lambda^i w^{i1} L^i + \lambda^i \left[1 + F_k^{'}(L^i, K^{i*}) \right] K^{i0} - \rho^j K^{i0} \tag{28}$$

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

$$= \left[\lambda^i w^{i1} L^i + \lambda^i F_k^{'}(L^i, K^{i*}) K^{i0} - \lambda^i F(L^i, K^{i0}) \right] - \rho^j K^{i0}$$
$$= A - \rho^j K^{i0} = A - B \tag{29}$$

The first term in the squared bracket in (29), denoted by A, represents the standard triangle gain from free capital flows in the neoclassical theory. More precisely,

$$A = \lambda^i \left[w^{i1} L^i + F_k^{'}(L^i, K^{i*}) K^{i*} - F(L^i, K^{i0}) + F_k^{'}(L^i, K^{i*}) (K^{i0} - K^{i*}) \right]$$
$$= \lambda^i \left[F(L^i, K^{i*}) - F(L^i, K^{i0}) + F_k^{'}(L^i, K^{i*}) (K^{i0} - K^{i*}) \right]$$
$$= \lambda^i \left[\int_{K^{i0}}^{K^{i*}} F_k^{'}(L^i, K^i) dK^i + F_k^{'}(L^i, K^{i*}) (K^{i0} - K^{i*}) \right] \tag{30}$$

The second term on the right hand side of equality (29), denoted by B, represents country i's revenue loss from a complete bypass.

The welfare effect can be illustrated graphically. In Figure 3, the vertical axis represents the expected marginal product of capital, while the horizontal axis represents the amount of capital. Expression (30) is depicted by the triangle below the curve $F_k^{'}(.)$ if $K^{i*} > K^{i0}$, or the triangle above the curve $F_k^{'}(.)$ if $K^{i*} < K^{i0}$. In either case, it is always positive. The term $\rho^j K^{i0}$ 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 $K^{i0} = K^{i*}$ so that the net capital flows happen to be zero with financial globalization (but the gross capital flows could be massive), then $A = 0$ and $B = \rho^j K^{i0}$. In this example, free capital mobility is guaranteed to reduce the welfare of country i.

As indicated in Figure 3, 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 (23), we can show that $K^{i*} - K^{i0}$ becomes larger when λ^i (property rights protection) is larger. Therefore, the country with a weak financial system is more likely to benefit from free capital mobility if its property rights protection is stronger.

5.2.2   The Country with a Strong Financial Sector

We turn now to country j - the one with a strong financial system. Similar to the above analysis, $W^{j0} = \lambda^j \left[F(L^j, K^{j0}) + K^{j0} \right]$, while

$$W^{j1} = \lambda^j w^{j1} L^j + \left(1 + r^{j1}\right) K^{j0} + \rho^j \left(K^{i0} + K^{j0}\right)$$
$$= \lambda^j \left[F(L^j, K^{j1}) + K^{j0} \right] + \lambda^j F_k'(L^j, K^{j1}) \left(K^{j0} - K^{j1}\right) + \rho^j K^{i0}$$

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 $\left(1 + r^{j1} + \rho^j\right) K^{j0} = \lambda^j \left[1 + F_k'(L^j, K^{j1})\right] K^{j0}$ to derive the above expression. Thus we have

$$W^{j1} - W^{j0} = \lambda^j \left[\int_{K^{j0}}^{K^{j1}} F_k'(L^j, K^j) dK^j + F_k'(L^j, K^{j1}) \left(K^{j0} - K^{j1}\right) \right] + \rho^j K^{i0} \qquad (31)$$

The first term in the right hand side of (31) is again the triangle gain from capital flows, which is always positive. The second term is 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 3 *(A) The country with a strong financial institution and corporate governance gains unambiguously from global capital mobility. (B) 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.*

We assume that capital flows are costless in the above analysis. When there are convex costs of capital flows, the bypass effect would be incomplete. A smaller amount of financial capital would flow out of country i, and financial investors in country i would gain less from the higher foreign interest rate. The amount of FDI from j to i would also be smaller; correspondingly, managers of FDI in country j would gain less from the lower labor cost abroad. Thus, the classic triangular gains from capital flows would be smaller but still positive. On the other hand, as financial capital leaves country i, the revenue transfer from country i to j still takes place, albeit on a reduced scale. Thus, country j would still gain

unambiguously from capital account openness, while country i could lose. Therefore, the central conclusion in the proposition still holds qualitatively.

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 and 2010), 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 financial capital outflows.

6.   Conclusions

Financial capital and FDI, on net, often go in the 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. Emerging market economies 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 bypassed by two-way capital flows. In a sense, financial globalization is a substitute for domestic financial reforms as capital can be put to the most efficient use in this case even without domestic 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 property rights protection.

Unlike the neoclassical theory that equates the expected marginal product of capital to the 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, the optimal sequence of capital market liberalization could be studied. Fifth, 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. 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 (average within the group)	Per Capita Net Financial Capital Outflows (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

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

Table 2. Institutional Quality and Patterns of Capital Flows

Country Groupings	Quality of Financial System and Corporate Governance	Quality of Property Rights Protection	Net FDI Outflows relative to population	Net Financial Outflows (a) relative to population
Good Financial Institutions, Good Property Rights # countries: 32; Examples: USA, UK, and Finland	5.41	4.57	7.4	-20.5
Bad Financial Institutions, Intermediate Property Rights # countries: 33; Examples: China, Vietnam, and Mexico	4.28	3.83	-6.8	7.4
Bad Financial Institutions, Bad Property Rights # countries: 32; Examples: Haiti, Angola, Ukraine	3.58	2.76	-2.6	-2.2

Notes: For variable definitions and data sources, see Appendix 3.

Table 3. Capital Flows and Institutional Quality

	(1) Net Financial Outflows (a) relative to population	(2) Net FDI Outflows relative to population
Quality of Property Rights Institutions	34.26*	-5.07
	(14.31)	(5.38)
Collective Quality of Financial System and	-41.03*	11.37*
Corporate Governance	(14.08)	(5.32)
Observations	98	97
R-squared	0.08	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 Appendix 3.

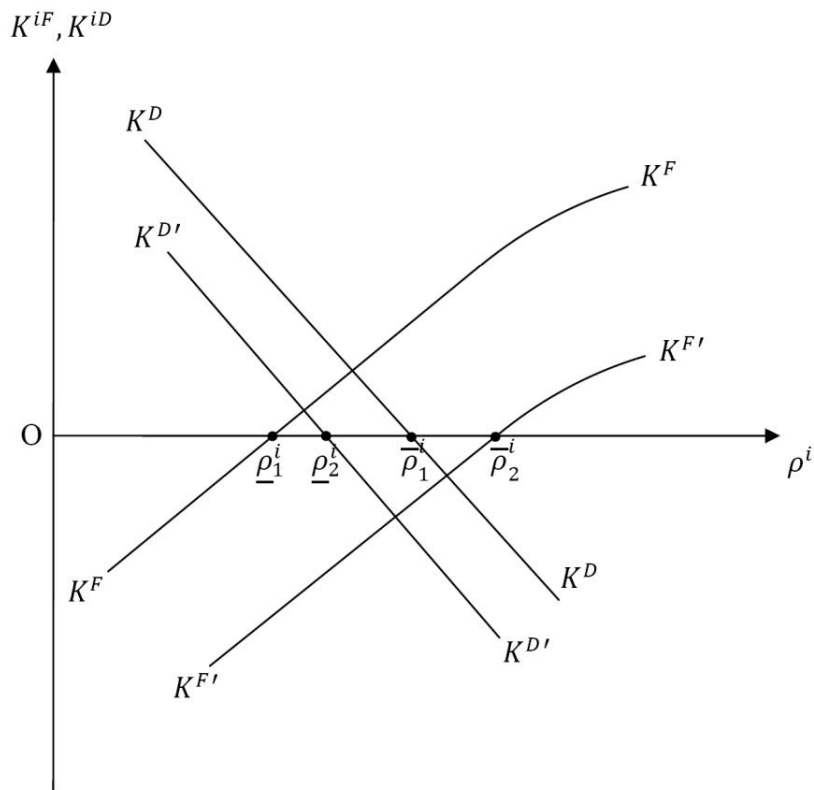**Figure 1. Comparative Statics and Patterns of Capital Flows**

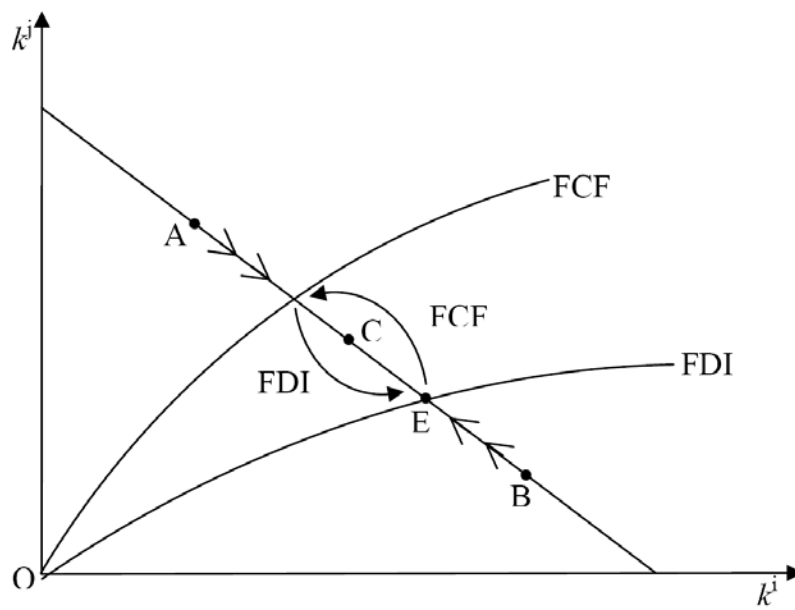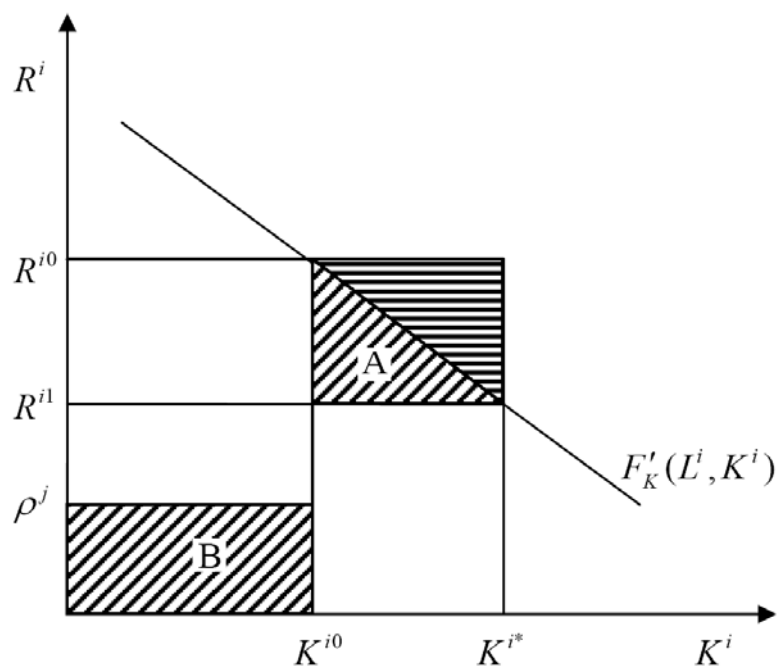**Figure 2. Boundary Conditions for Capital Flows**

Figure 3. Welfare Effect of Financial Globalization

Appendix 1. Local Finance by FDI Firms

In this appendix, we allow an FDI firm to raise external financing from both the host and the home countries. To simplify the discussion, we assume that the entrepreneur's optimization problem can be broken down to two stages. First, she decides a division of the external financing between the two sources (i.e., α fraction in the host country and the $1 - \alpha$ fraction in the home country). Second, in each market, she solves an optimization problem akin to the modified Holmstrom-Tirole problem in Section 3. Of course, α is chosen to maximize the sum of the returns from the two funding sources.

The entrepreneur from country j uses α $(0 \leq \alpha \leq 1)$ units of her own capital to raise the external fund in host country i. The gross return to one unit of capital equals $\lambda^i R^i - \eta^{ji} (-K^{iD})$, as the FDI project is operated in country i and there is an additional cost, $\eta^{ji} (-K^{iD})$, per unit of FDI investment. The entrepreneur chooses an amount of external capital financed by investors in country i, x^{ji}, total investment of the project through local finance, z^{ji}, and the marginal pay to entrepreneur's effort, R^{Eji}, to solve the following program:

$$\max_{x^{ji}, z^{ji}, R^{Eji}} U^{Dji} = z^{ji} \lambda^i R^{Eji} \tag{32}$$

subject to

$$z^{ji} \leq x^{ji} + \alpha \tag{33}$$

$$\left[\lambda^i \left(R^i - R^{Eji}\right) - \eta^{ji} \left(-K^{iD}\right) - c/\theta^i\right] z^{ji} \geq \left(1 + r^i\right) x^{ji} \tag{34}$$

$$\lambda^i R^{Eji} \geq b^i \tag{35}$$

The objective function (32) represents the payoff to the entrepreneur who uses the financing intermediated by the financial system in country i. Inequality (33) requires that the total investment from this funding source does not exceed the sum of internal and external capitals. Inequality (34) is the participation constraint for the financial investors in country i, and inequality (35) is the entrepreneur's incentive compatibility constraint.

All constraints must be binding in equilibrium. The binding incentive compatibility constraint (35) gives $\lambda^i R^{Eji} = b^i$. Substituting (33) and (35) into (34) gives the amount of investment intermediated by the financial sector in country i, z^{ji}. Correspondingly,

$$U^{Dji} = \frac{\alpha(1+r^i)b^i}{(1+r^i) + b^i + \frac{c}{\theta^i} - [\lambda^i R^i - \eta^{ji}(-K^{iD})]} \tag{36}$$

The entrepreneur also uses $1 - \alpha$ fraction of her endowment to raise additional funding at home. The moral hazard problem is the same as the one discussed in Section 3 in the text, except that now her own endowment becomes $1 - \alpha$ and the gross return to one unit of capital equals $\lambda^i R^i - \eta^{ji}(-K^{iD})$. Her expected income through financing at home is

$$U^{Djj} = \frac{(1-\alpha)(1+r^j)b^j}{(1+r^j) + b^j + \frac{c}{\theta^j} - [\lambda^i R^i - \eta^{ji}(-K^{iD})]} \tag{37}$$

The entrepreneur then chooses α to maximize her total expected income in the FDI project from the two funding sources, $U^{Dj} = U^{Dji} + U^{Djj}$. The first order condition indicates that $\frac{\partial U^{Dji}}{\partial \alpha} + \frac{\partial U^{Djj}}{\partial \alpha} = 0$. Using that condition, we obtain

$$U^{Dj} = \frac{(1+r^j)b^j}{(1+r^j) + b^j + \frac{c}{\theta^j} - [\lambda^i R^i - \eta^{ji}(-K^{iD})]} \tag{38}$$

If $\frac{\partial U^{Dji}}{\partial \alpha} > -\frac{\partial U^{Djj}}{\partial \alpha}$, the entrepreneur finances the entire project in the host country ($\alpha = 1$), while if $\frac{\partial U^{Dji}}{\partial \alpha} < -\frac{\partial U^{Djj}}{\partial \alpha}$, the entrepreneur finances the entire project at home ($\alpha = 0$). To make the discussion interesting, we rule out the case of $\alpha = 1$ (by imposing some conditions on the parameters). In other words, at least some financing is raised at home.

If the entrepreneur operates at home, her expected income

$$U^j = \frac{(1+r^j)b^j}{(1+r^j) + b^j + \frac{c}{\theta^j} - \lambda^j R^j} \tag{39}$$

In an equilibrium with interior solution, $U^{Dj} = U^j$, which holds if and only if

$$\lambda^j R^j - \lambda^i R^i = -\eta^{ji}(-K^{iD}) \tag{40}$$

That gives condition (14) in the text.

Appendix 2. Comparative Statics

This appendix shows that, with convex costs of capital flows, the solution to the equilibrium conditions, $\left(K^{iF}, K^{iD}\right)$, exists and is unique. It then reports the effects of a change in ρ^i, λ^i, and k^{i0}, respectively.

Totally differentiating equations (13) and (14) with respect to K^{iF} and K^{iD}, we have

$$a_{F1}dK^{iF} + a_{F2}dK^{iD} = -d\rho^i + R^i d\lambda^i + \lambda^i F_{kk}^i dk^{i0}$$

$$a_{D1}dK^{iF} + a_{D2}dK^{iD} = R^i d\lambda^i + \lambda^i F_{kk}^i dk^{i0}$$

where $a_{F1} = A - \dfrac{\partial \tau^{ij}(K^{iF})}{\partial K^{iF}}$, $a_{F2} = A$, $a_{D1} = A$, $a_{D2} = A - \dfrac{\partial \eta^{ji}(-K^{iD})}{\partial(-K^{iD})}$, and $A = \dfrac{\lambda^j F_{kk}^{''}(1, K^j/L^j)}{L^j} + \dfrac{\lambda^i F_{kk}^{''}(1, K^i/L^i)}{L^i} < 0$. Let $|a|$ denote the determinant of the 2×2 matrix on the left hand side of the above system. We can show that

$$|a| = -A\left[\frac{\partial \tau^{ij}(K^{iF})}{\partial K^{iF}} + \frac{\partial \eta^{ji}(-K^{iD})}{\partial(-K^{iD})}\right] + \frac{\partial \tau^{ij}(K^{iF})}{\partial K^{iF}}\frac{\partial \eta^{ji}(-K^{iD})}{\partial(-K^{iD})} > 0 \qquad (41)$$

Inequality (41) ensures that in the space of $\left(K^{iF}, K^{iD}\right)$, the curve representing equation (13) is always steeper than the curve representing equation (14). Therefore, there exists a unique solution of $\left(K^{iF}, K^{iD}\right)$ to the system. It is then straightforward to show that $\dfrac{dK^{iF}}{d\rho^i} > 0$, $\dfrac{dK^{iD}}{d\rho^i} < 0$, $\dfrac{dK^{iF}}{d\lambda^i} < 0$, $\dfrac{dK^{iD}}{d\lambda^i} < 0$, $\dfrac{dK^{iF}}{dk^{i0}} > 0$, and $\dfrac{dK^{iD}}{dk^{i0}} > 0$. In words, as a (developing) country's financial institutions improves (ρ^i decreases), it tends to experience both less financial capital outflows and less FDI inflows. As a country's property rights institutions strengthen (λ^i increases), it tends to experience less financial capital outflows but more FDI inflows. Finally, as a country's capital-to-labor ratio increases, it tends to export more of both financial capital and FDI.

Note that the existence of the interior solution relies on the assumption of convex costs of capital flows. If the costs of capital flows are linear (or zero), $|a|$ equals zero and a corner solution occurs.

Appendix 3. Variable Definitions and Data Sources in Table 2

1.   Measures of institutional quality (higher numbers = better quality). Numbers in each cell are average within each group.

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.

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 the remaining 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 of the remaining 2/3 of the 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 value of the remaining 2/3 of the countries. Haiti, Angola, and Ukraine are examples of countries in this third bin.

2.   Capital Flows

Sources: We extract the stock of foreign assets and liabilities (in millions US dollars) in 2003 from *"the Wealth of Nations, Mark II"* , by Lane and Milesi-Ferreti (2006). The data on population (in millions) come from the IMF's International Financial Statistics.

To minimize possible bias induced by the disparity in population counts across countries, 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)/$[\ln(Population) \times 1000]$

- **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)]/$[\ln(Population) \times 1000]$

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

Appendix 4. Endogenous Capital in an OLG Model

We endogenize capital stock by making it the result of agents' savings decision in an overlapping-generations model. We show that the main results in the text are still valid in this dynamic setting. For simplicity, we focus on the case of frictionless capital flows. The case of convex costs for capital flows can be similarly analyzed.

Let $L_t = L$ denote the number of identical individuals born in each period. Each individual lives for two periods, young and old. When she is young, she supplies one unit of labor inelastically and divides her labor income between consumption and savings. When she is old, she consumes the gross investment returns from her savings. The twist that we add to the standard OLG model is on how the representative agent manages her savings. We assume that at the end of an agent's first period, she can become either a passive financial investor (and a passive retiree), giving her savings to a financial institution, or an entrepreneur, setting up a firm using her own savings plus the external funds raised from a financial institution. Of course, in equilibrium, she is indifferent between the two, and her second-period consumption is unaffected by the choice.

The consumption side of the model is standard. Let C_t^y and C_t^o represent the level of consumption for the young and the old in period t, respectively. The lifetime utility of a representative individual born at t, U_t, is defined as

$$U_t = u\left(C_t^y\right) + \beta u(C_{t+1}^o), 0 < \beta < 1 \tag{42}$$

where β is a discount factor. Let w_t be the wage rate per unit of labor in period t, and r_{t+1} the interest rate from period t to $t+1$. She maximizes utility (42) subject to the following intertemporal budget constraint:

$$C_t^y + \frac{C_{t+1}^o}{1 + r_{t+1}} = w_t \tag{43}$$

The first order condition is:

$$\frac{\beta u^{'}\left(C_{t+1}^o\right)}{u^{'}\left(C_t^y\right)} = \frac{1}{1 + r_{t+1}} \tag{44}$$

which is a standard intertemporal Euler equation. (43) and (44) together solve for C_t^y and C_{t+1}^o as functions of (w_t, r_{t+1}, β). An individual's savings at the end of period t is $s(w_t, r_{t+1}, \beta) = w_t - C_t^y(w_t, r_{t+1}, \beta)$. Thus, the economy-wide total savings in period t (or the capital endowment in $t+1$) is given by

$$S_t(w_t, r_{t+1}, \beta, L) = \left[w_t - C_t^y(w_t, r_{t+1}, \beta) \right] L \tag{45}$$

Since $C_t^y(w_t, r_{t+1}, \beta)$ decreases as r_{t+1} increases, $S_t(w_t, r_{t+1}, \beta, L_t)$ is an increasing function of r_{t+1}.

1.   Capital Flows

We now consider capital flows in period $t+1$ and start with a closed economy. The capital endowment in period $t+1$, K_{t+1}, equals savings from the previous period $S_t(w_t, r_{t+1}, \beta, L)$. The gross return to one unit of capital is given by $R_{t+1} = 1 + F_k'(1, K_{t+1}/L)$, which is the same as equation (1). For the agent who chooses to become an entrepreneur at the end of period t, she invests her capital endowment, $k_{t+1} = s_t(w_t, r_{t+1}, \beta, L) = K_{t+1}/L$, together with external funds she raised for the project in period $t+1$. Solving the same moral hazard problem as in Section 3, we can easily show that each entrepreneur manages zk_{t+1} amount of capital, and all the analysis in Section 3 still goes through. In particular, *capital revenue sharing rule* (12) still holds so that $\lambda R_{t+1} = (1 + r_{t+1}) + \rho$. Since demand for capital is equal to the supply, combining the *CRSR* and the saving function (45), we have the following two equations,

$$K_{t+1} = S_t = \left[w_t - C_t^y(w_t, r_{t+1}, \beta) \right] L \tag{46}$$

$$\lambda[1 + F_k'(1, K_{t+1}/L)] = (1 + r_{t+1}) + \rho \tag{47}$$

which solves (r_{t+1}, K_{t+1}), the interest rate and capital stock in period $t+1$.

In an open economy, investors in country i invest in country j if and only if $r_{t+1}^i < r_{t+1}^j$; an entrepreneur in country i produces abroad if and only if $\lambda^j R_{t+1}^j > \lambda^i R_{t+1}^i$. Thus, equations (21) and (22) still define the boundary conditions for financial capital flows and FDI, respectively. Similar to section 4.4, the inferior financial system in country i is completely bypassed. In other words, all financial investors in country i

send their savings to the financial system in country j. Capital reenters country i in the form of FDI. The equilibrium conditions in the world market are:

$$K_{t+1}^{i0} = S_t = \left[w_t^i - C_t^y (w_t^i, r_{t+1}, \beta) \right] L^i \tag{48}$$

$$K_{t+1}^{j0} = S_t = \left[w_t^j - C_t^y (w_t^j, r_{t+1}, \beta) \right] L^j \tag{49}$$

$$\lambda^i \left[1 + F_k' (1, \frac{K_{t+1}^{jD}}{L^i}) \right] = (1 + r_{t+1}) + \rho^j \tag{50}$$

$$\lambda^i \left[1 + F_k' (1, \frac{K_{t+1}^{jD}}{L^i}) \right] = \lambda^j \left[1 + F_k' \left(1, \frac{K_{t+1}^{i0} + K_{t+1}^{j0} - K_{t+1}^{jD}}{L^j} \right) \right] \tag{51}$$

$$w_{t+1}^i = \lambda^i F_L' \left(L^i, K_{t+1}^{jD} \right) \tag{52}$$

$$w_{t+1}^j = \lambda^j F_L' \left(L^j, K_{t+1}^{i0} + K_{t+1}^{j0} - K_{t+1}^{jD} \right) \tag{53}$$

We now use K_{t+1}^{i0} and K_{t+1}^{j0} to denote capital owned by countries i and j, respectively. Conditions (48) and (49) state that the savings in period t are equal to the capital owned by countries in period $t+1$. Equation (50) is the capital revenue sharing rule (12) in country i. (Note that the financial system in country j also serves the financial investors in country i.) Equation (51) represents the equilibrium FDI condition similar to (23); as investors in both countries are served by the same financial system, the expected marginal products of capital in two countries are equalized. Finally, equations (52) and (53) determine the wage rates in countries i and j, respectively. These six equations solve for six endogenous variables, K_{t+1}^{i0}, K_{t+1}^{j0}, K_{t+1}^{jD}, r_{t+1}, w_{t+1}^i, and w_{t+1}^j. Two results are worth noting: First, the complete bypass result still holds in the steady state. Second, the steady state level of wage rate in country i, w_{t+1}^i, is determined by the amount of FDI flowing into the country, K_{t+1}^{jD}. Using proposition 2, the wage rate in the open economy is higher than that in the autarky if and only if the country is a net importer of capital (i.e., it is effectively labor abundant).