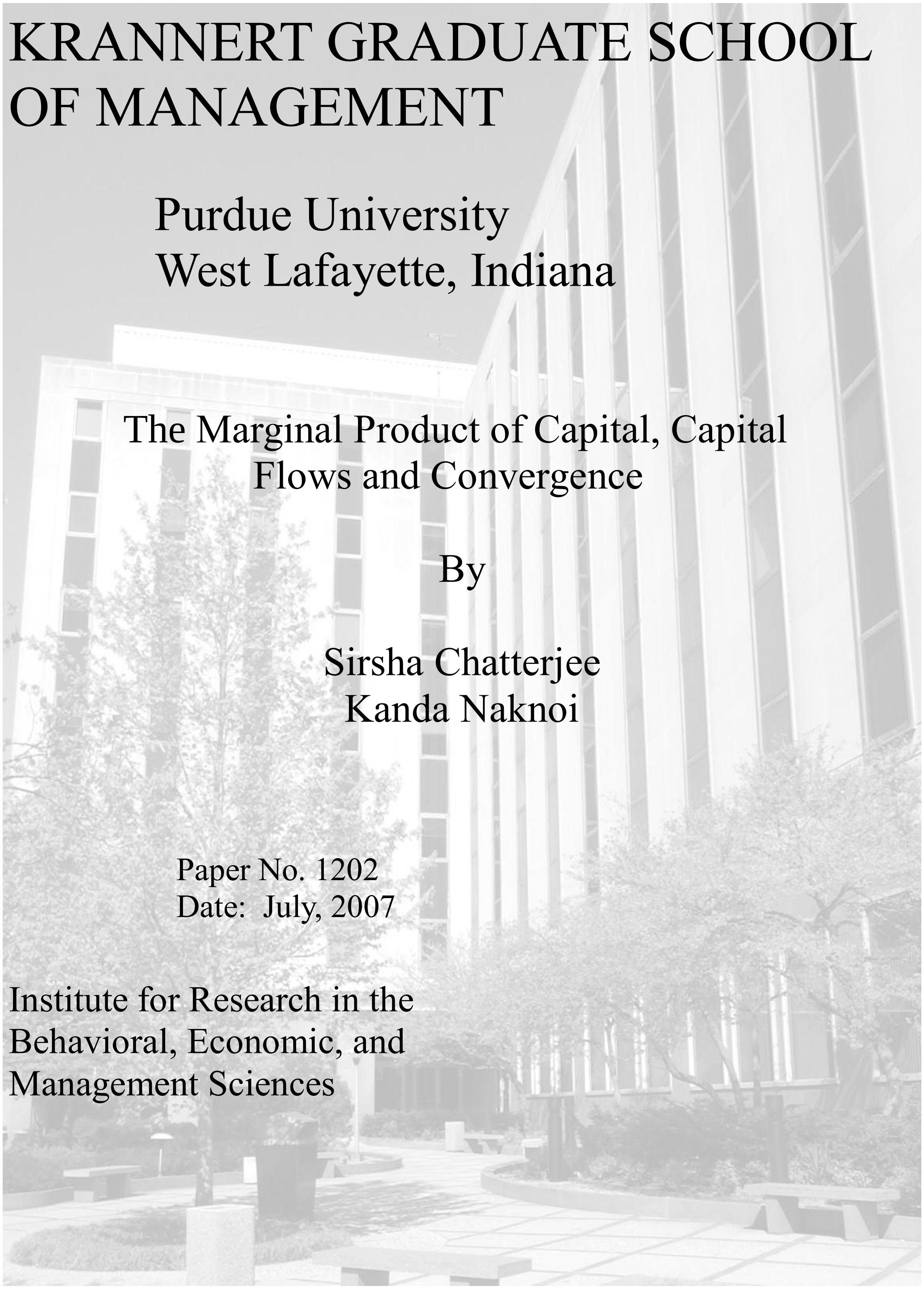

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The Marginal Product of Capital, Capital Flows and Convergence

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The Marginal Product of Capital, Capital Flows and Convergence

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Abstract

The neoclassical theory of economic growth suggests that capital inflows raise the speed of convergence because foreign financial capital is transformed into physical capital. We propose a new methodology to quantify the size of capital inflows which are transformed into physical capital. We use the predicted scale to calculate the output gains from capital flows. Our methodology takes into account cross-country differences and fluctuations in the price of investment goods relative to output. The theory predicts that inefficiency in producing investment goods reduces the gains from capital inflows. A sizable fraction of capital inflows is found to be transformed into physical capital in only a few countries. However, the gains are found to be extremely small.

Keywords: marginal product of capital, capital flows, convergence
JEL Classifications: F21, F43, O47

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1 Introduction

In the world of free capital mobility, capital flows from low-return to high-return locations. In theory, capital inflows are transformed to physical capital and then contribute to convergence toward the long run equilibrium. In the empirical literature, the effects of capital inflows on economic growth have been extensively investigated using cross-country growth regressions. However, these studies have been silent about the scale of capital inflows actually being transformed into physical capital.

This study proposes a new methodology to quantify the scale of capital flows being transformed into physical capital and the benefits from capital inflows. We derive the estimation equation from a multi-country neoclassical growth model, which takes into account cross-country differences and fluctuations in the price of investment goods relative to output. Consistent with the findings in Hsieh and Klenow (2007), differences in the price of investment goods are assumed to be driven by efficiency in producing investment goods, not trade costs. The return on capital is then adjusted by the price of investment goods, as in the cross-country study by Caselli and Feyrer (2007).

The model gives three novel predictions. First, the gains from capital inflows through the convergence channel are not limited to countries that start out from low capital stocks. A fall in the price of investment goods relative to output increases the marginal product of capital and investment. This effect implies a negative correlation between the price of investment good and capital flows. This mechanism allows high-income countries to attract capital inflows and benefit as recipients, not the source of funds. Thus, an improvement in productivity in the investment-good sector can offer an explanation why capital flows to high-income countries as in Lucas (1990).

Second, the size of capital flows toward the countries which have low efficiency in producing capital goods are highly sensitive to the domestic and foreign return differentials. This is because such countries have to import a large volume of financial capital, to produce a given level of domestic investment goods. This volume effect produces a positive correlation between the price of investment good and capital flows. Overall, the correlation between the price of investment good and capital flows depend on the two competing effects.

Finally, the volume effect has an implication for the gains from capital inflows. Specifically, for a given level of capital inflows, the gains in terms of output per worker are low for the countries producing capital goods inefficiently. The reason is that, like domestic financial capital, foreign financial capital is subject to the domestic technology in the investment-good sector before producing final output.

In the empirical part, we employ data of 96 countries from 1970 to 2003 to construct time series of country returns and world returns. The adjustment for price of investment goods roughly doubles the standard deviation of returns. That allows us to exploit the volatility of return to estimate the correlation between net capital flows and the world and domestic return differentials. Finally, we use the calculated scale of capital inflows transformed into physical capital to compute the output gains from capital inflows. We do so because the theory suggests that capital inflows increase output when the domestic and foreign returns are different. Thus, capital flows which are not induced by the return differentials do not contribute to convergence.

The fraction of capital inflows that get transformed into physical capital is found to range from 14 to 89 percent in a few countries. For most countries the model does not predict statistically significant scale. For several countries capital flows significantly respond to the price of investment good, and there are both the volume and investment effects in the data. This finding confirms the new insight of our model, that fluctuations in price of investment goods can attract flow of funds from the rest of the world, regardless of the level of capital stock. However, the U.S. is the only country that statistically significantly benefits from capital inflows, although the scale is small. Capital inflows, bank flows in particular, raise output per worker in the U.S. by only 0.03 percent per annum, or 1 percent over 34 years. We do not find strong evidence for gains in other countries.

Our study does not take into account potential gains through other channels such as risk-sharing in Obstfeld (1994) and Athanasoulis and van Wincoop (2000). In this aspect, ours is closely related to the work by Gourinchas and Jeanne (2006), who theoretically investigate the role of capital inflows in convergence of a small open economy. However, their model is abstract from fluctuations in the price of investment goods and determination of the world return.

The paper is organized as follows. The model is in the next section. Section 3 discusses the empirical methodology and results. Section 4 concludes.

2 Model

We model a multi-country world with two-sector growth model. The setup is similar to the Ramsey-Cass-Koopmans model. There are two goods: consumption and investment goods. The difference here is that the efficiency in transforming financial capital into physical capital is different across countries, and across time. For this reason, the MPK is adjusted by the price of investment good. The return on capital is also influenced by fluctuations in the price of investment good. Henceforth we refer to the the price of investment good simply as price, because it is the only price variable in our model.

2.1 Closed economy

The world is consisted of N countries. In Country j, the production function is given by

$$Y_{j,t} = F(K_{j,t}, A_{j,t}L_{j,t}) = K_{j,t}^{\alpha_j}(A_{j,t}L_{j,t})^{1-\alpha_j}.$$

K is the reproducible capital stock, A is the total factor productivity (TFP) and L is the labor input.

The households in Country j maximize their expected lifetime utility,

$$E_0 U = \sum_{t=0}^{\infty} \beta^t \frac{C_{j,t}^{1-\gamma}}{1-\gamma}.$$

The households are also producers of the investment good. The investment good is produced from $1/\lambda_{j,t}$ units of the consumption good.

$$I_{j,t} = \lambda_{j,t}(Y_{j,t} - C_{j,t})$$

With perfect competition in the investment-good market, the price of investment good relative to consumption is $P_{j,t} = 1/\lambda_{j,t}$. Hence, the production function of the investment good also defines the budget constraint for the households in which the numeraire is the consumption good. Capital accumulation is given by: $K_{j,t+1} = (1-\delta)K_{j,t} + I_{j,t}$.With perfect foresight, the real interest rate and the return on capital are equal.

$$R_{j,t+1} = \alpha_j \frac{y_{j,t+1}}{k_{j,t+1}P_{j,t}} + (1-\delta)\frac{P_{j,t+1}}{P_{j,t}}, \tag{1}$$

where $R_{j,t+1} = u_c(C_{j,t})/(\beta u_c(C_{j,t+1}))$.

The return on capital is the sum between the MPK and the capital gain. The MPK is adjusted by the price, as in Caselli and Feyrer (2007). Define capital per effective unit of labor as $k_{j,t} = K_{j,t}/(A_{j,t}L_{j,t})$. Then output per effective unit of labor is a function of capital per effective unit of labor, $y_{j,t} = k_{j,t}^{\alpha_j}$. Thus, the capital-output ratio $k_{j,t}/y_{j,t} = k_{j,t}^{1-\alpha_j}$. The first-order condition gives the optimal level of future capital stock.

$$k_{t+1} = \left[\frac{\alpha_j}{R_{j,t+1}P_{j,t} - (1-\delta)P_{j,t+1}}\right]^{\frac{1}{1-\alpha_j}} \tag{2}$$

(2) and the capital accumulation give the investment per effect unit of labor, $i_{j,t} = gnk_{j,t+1} - (1-\delta)k_{j,t}$. The investment function has the following properties.

$$\frac{\partial i_{j,t}}{\partial R_{j,t+1}} = \frac{\partial i_{j,t}}{\partial k_{j,t+1}}\frac{\partial k_{j,t+1}}{\partial R_{j,t+1}} = -gn\left(\frac{k_{j,t+1}^{2-\alpha_j}P_{j,t}}{\alpha_j(1-\alpha_j)}\right) \equiv \beta_{j,t}^{R} < 0 \tag{3}$$

$$\frac{\partial i_{j,t}}{\partial P_{j,t}} = \frac{\partial i_{j,t}}{\partial k_{j,t+1}}\frac{\partial k_{j,t+1}}{\partial P_{j,t}} = -gn\left(\frac{k_{j,t+1}^{2-\alpha_j}R_{j,t+1}}{\alpha_j(1-\alpha_j)}\right) < 0 \tag{4}$$

The investment is decreasing in the rental rate of capital and the price. The role of rental rate is the same as the standard models with investment. The new insight here is about the effect of price. This is because high price reduces the MPK and thus shifts the investment demand downward. We can also understand this from its impact on the cost of capital. To rent one unit of capital, the user of capital effectively demands one unit of investment good or $P_{j,t}$ units of consumption good. Therefore the effective cost per unit of capital is $R_{j,t+1}P_{j,t}$. As a result, an increase in the price raises the effective cost of capital. Thus, the price has the same effect on the investment demand as that of the rental rate.

The other new insight is that the sensitivity of investment demand to changes in the rental rate is increasing in the price. Again, this results from the multiplicative effect of price of investment good on the rental rate. When the rental rate rises, its increase gets magnified by the price.

In the long run, the return on capital is determined by the growth rate of consumption. Suppose that the TFP grows at the gross rate g and the population grows at the gross rate n in all countries. In the steady state, output and capital stock per effective unit of labor are constant. Thus, output, capital stock and consumption must grow at the rate gn. The Euler equation then gives the steady-state gross real interest rate, $R_T = (gn)^\gamma/\beta$, where the subscript T denote the steady state.

Assume that productivity in the investment-good sector follows a stationary AR(1) process, $ln(\lambda_{j,t}/\lambda_{j,T}) = \rho ln(\lambda_{j,t-1}/\lambda_{j,T})] + v_{j,t}$, where $v_{j,t}$ is identically independently distributed (i.i.d.) across time. Then (2) gives the steady-state capital stock per effective unit of labor, $k_{j,T} = [\alpha_j \lambda_{j,T}/(R_T - 1 + \delta)]^{1/(1-\alpha_j)}$. Although the long-run return is common, differences in the capital share and in efficiency in producing the investment good create differences in the capital stock. The countries producing the investment goods efficiently have higher income per capital, all else equal.

The output market clearing condition implies that the saving rate is the same as the investment rate.

2.2 Open economy

Assume that output in all countries is homogeneous. There are a large number of perfectly competitive international banks. The banks serve as the world financial intermediaries. They take deposit and lend at the rate $R^\star_{t+1}$. There are country-specific financial frictions τ_j $(0 < \tau_j < 1)$. When residents in Country j lend to the banks, they receive the interest rate $(1 - \tau_j)R^\star_{t+1}$. When residents in Country j borrow from the banks, they pay the interest rate $(1 + \tau_j)R^\star_{t+1}$. Define the set of lenders as L_t and that of borrowers as B_t. Let $f_{j,t}$ be the net capital inflows per unit of effective labor, and its negative value represents net outflows. Denote savings per effective unit of labor by $s_{j,t}$. The output market clearing condition for all countries is as follows.

$$f_{j,t} = i_{j,t} P_{j,t} - s_{j,t} \tag{5}$$

The world output market clearing condition is as follows.

$$\sum_{j=1}^{N} f_{j,t} A_{j,t} L_{j,t} = 0 \tag{6}$$

The market clearing condition (6) implicitly define the world interest rate.

Assume that all countries participate in the international banking. We approximate the capital flows with the deviations of investment demand from its closed-economy level. Thus, capital flows depend on the responsiveness of investment to the foreign and domestic return differentials.

$$f_{j,t} = \beta^R_{j,t} P_{j,t}[(1-\tau_j)R^\star_{t+1} - R_{t+1}], \qquad \forall j \in L_t \tag{7}$$

$$f_{j,t} = \beta^R_{j,t} P_{j,t}[(1+\tau_j)R^\star_{t+1} - R_{t+1}], \qquad \forall j \in B_t \tag{8}$$

We derive the equilibrium capital flows by substituting $\beta^R_{j,t}$ in (3) into the capital flows equations (7) and (8).

$$f_{j,t} = -\frac{gn(1-\delta)}{\alpha_j(1-\alpha_j)} k^{2-\alpha_j}_{j,t+1} P^2_{j,t}[\phi_j R^\star_{j,t+1} - R^\star_{t+1}] \tag{9}$$

where $\phi_j = 1 - \tau_j$ for lenders and $1 + \tau_j$ for borrowers. The negative sign on the right hand side of (9) indicates that countries in which the return is higher than the world return adjusted by financial frictions receive inflows, an vice versa.

There are two effects of price summarized by $P^2_{j,t}$ in the (9). One is the volume effect, which requires $P_{j,t}$ units of foreign output to produce every unit of investment good. For borrowers ($f_{j,t} > 0$), high price or low efficiency implies that they must import large volume of foreign output for a given level of investment. For lenders ($f_{j,t} < 0$), for a given level of investment high price reduces the supply of output for lending to the rest of the world. For this reason, the volume effect predicts a positive correlation between price and inflows.

The other effect is the sensitiveness of the investment curve. As we show in (3) and (4), the investment demand is decreasing in the price. A rise in the price raises the rental rate per unit of investment good and reduces the investment demand. Therefore a rise in the price causes the borrowers to decrease their borrowing. In contrast, a rise in the price will cause the lenders to decrease their lending. For this reason, the investment demand effect produces a negative correlation between the price and inflows.

Overall, the effect of price on capital flows is unclear because of the two competing effects. If the investment demand effect dominates the volume effect, a fall in the price in high-income countries can create an investment boom and attracts capital inflows. Theoretically, this mechanism may explain why capital flows to high-income countries, as pointed out by Lucas (1990).

In the long run, the return depends on the common growth rate of consumption, and $lim_{t\to\infty} R^{\star}_{t+1} = R_T$. We obtain the same world interest rate if we assume perfect capital mobility, $\tau_{j,t} = 0$. Thus, the degree of capital mobility changes the dynamic path without influencing the long run equilibrium.

2.3 Capital flows and convergence

To obtain an implication for convergence, we normalize capital flows by output per effective unit labor. With $k_{j,t}/y_{j,t} = k_{j,t}^{1-\alpha_j}$,

$$\left(\frac{f}{y}\right)_{j,t} = -\frac{gn(1-\delta)}{\alpha_j(1-\alpha_j)} \left(\frac{k}{y}\right)_{j,t}^{\frac{-\alpha_j}{1-\alpha_j}} \left(\frac{k}{y}\right)_{j,t+1}^{\frac{2-\alpha_j}{1-\alpha_j}} P_{j,t}^2[\phi_j R^{\star}_{t+1} - R_{j,t+1}] \tag{10}$$

Capital flows now depend on the distance between the current and future capital stock. If the economy is distant from its desired level of capital-output ratio, it receive large volume of inflows. Such an economy has high returns on investment and become attractive locations for foreign investments. As it approaches the long run, it relies less on foreign funds but more on domestic funds, given the level of price. This prediction is consistent with the conditional convergence in the growth literature.

The impact of capital inflows on the rate of convergence can be computed as$\eta_{j,t}$ from (10).

$$\eta_{j,t} = -\frac{\partial\Delta(k/y)_{j,t+1}}{\partial(f/y)_{j,t}}\frac{\partial(f/y)_{j,t}}{\partial(k/y)_{j,t}} = \frac{(f/y)_{j,t}}{gnP_{j,t}(k/y)_{j,t}}\left(\frac{\alpha_j}{1-\alpha_j}\right) \tag{11}$$

The first ratio in (11) is the percentage change in the capital-output ratio caused by capital inflows. The second ratio is the elasticity of output per worker with respect to capital-output ratio.[1] Consequently, $\eta_{j,t}$ measures the growth rate of output per worker caused by capital inflows. The output growth rate depends negatively on price of the investment good, because foreign financial capital is subject to the same domestic technology in the investment-good sector as domestic financial capital. Thus, we have to adjust the gains from capital inflows by the price of investment good. The gains from capital flows also depend on the current level of capital stock. Countries reap large benefits when their capital-output ratio is low, due to diminishing returns.

Admittedly, our one-final-good model ignores the potential benefits from cross-country differences in the return on capital at the industry level. In a multi-sector world, countries can specialize in different set of goods and reap gains from cross-investing in each other. However, we do not have the industry-level data on capital flows and capital shares. So we construct a model which has implications for aggregate flows.

2.4 Estimating equation

Our goal is to estimate the scale of capital flows which respond to the world and domestic return differentials, in order to be able to calculate the gains in (11).

Since the capital flow-output ratio is positively correlated with the distance between current and future capital-output ratios, we proxy the stock variables in (10) with the

[1] $\Delta ln(\frac{Y}{L})_{j,t} = \Delta lnA_{j,t} + \frac{\alpha_j}{1-\alpha_j}\Delta ln\left(\frac{k}{y}\right)_{j,t}$

investment-output ratio $(i/y)_{j,t}$. As a result,

$$\left(\frac{f}{iP_{j,t}}\right)_{j,t} \approx -\frac{gn(1-\delta)}{\alpha_j(1-\alpha_j)} P_{j,t}[\phi_j R^{\star}_{t+1} - R_{j,t+1}], \tag{12}$$

where $f/(iP)$ is the share of capital inflows in investment. It gives the following estimating equation.

$$\left(\frac{f}{iP}\right)_{j,t} = \gamma_{1,j} P_{j,t} + \gamma_{2,j} R^{\star}_{t+1} + \gamma_{3,j} R_{j,t+1} + \varepsilon_{j,t} \tag{13}$$

where the sign of $\gamma_{1,j}$ is ambiguous because of the competing effects of price. $\gamma_{2,j} < 0$ and $\gamma_{3,j} > 0$.

We cannot estimate the structural parameters, because we proxy some variables in the equilibrium condition. However, the proxy is theoretically positively correlated with the replaced variables. Therefore the proxy contains useful information about the response of capital flows to the return differentials and the price, which are predicted to drive capital flows in our model. We need information about the predicted flows, not the structural parameters, in order to calculate the gains in (11).

3 Empirics

3.1 Data

To calculate time series of return, we follow Equation (1). We employ data of 48 countries from 1970 to 2003. Our sample is limited by the availability of the capital share data from Caselli and Feyrer (2007). They correct for the use of natural capital by using the labor share data in Bernanke and Gurkaynak (2001) and the data on natural capital from the World Bank. The labor share computed uses the methodology in Gollin(2002). Since the capital share data are available only for 1996, we assume constant capital shares over time. Although Jones (2003) argues that the capital shares are not constant, his data are not publicly available.

The capital stock is computed from the investment data in the Penn World Table (PWT)

Version 6.2 with perpetual inventory method at the 6-percent depreciation rate. The measure for output is the PPP dollar output in the PWT. The investment data we thus compute is measured in PPP dollars in terms of the output. The price of investment goods is the ratio between the domestic price of investment goods and that of output in the PWT.

Note that we do not observe the world return in (13). For this reason, we rely on the model to derive the equilibrium world return from observables.

3.2 Construction of world return

We normalize the world output market clearing condition (6) with the world effective unit of labor $\sum_{i=1}^{N} f_{j,t}\omega_{j,t} = 0$, where the weight $\omega_{j,t} = A_{j,t}L_{j,t}/\sum_j A_{j,t}L_{j,t}$ and $\sum \omega_{j,t} = 1$. $\omega_{j,t}$ is the share of effective workforce of Country j in the world effective workforce. Since we do not observe effective labor units, we proxy for $\omega_{j,t}$ using the share of a country's income in world income, $Y_{j,t}/\Sigma_{j=1}^{48} Y_{j,t}$

$$\sum_{i=1}^{N} f_{j,t}\omega_{j,t} = 0. \tag{14}$$

We substitute (7) and (8) into (14) to obtain the equilibrium world return.

$$R^{\star}_{t+1} = \frac{\overline{\omega_t \beta_t^R P_t R_{t+1}}}{\overline{\omega_t \beta_t^R P_t} + \frac{1}{N}\left[\sum_{j\in B_t} \beta_{j,t}^R \omega_{j,t}\tau_j P_{j,t} - \sum_{j\in L_t} \beta_{j,t}^R \omega_{j,t}\tau_j P_{j,t}\right]},$$

where $\overline{X_t Y_t}$ denotes the cross-country average of $X_{j,t}Y_{j,t}$. Assume that $\sum_{i\in B_t} \beta_{j,t}^R \omega_j \tau_j P_{j,t} = \sum_{i\in L_t} \beta_{j,t}^R \omega_j \tau_j P_{j,t}$, that is, the aggregate financial frictions for lenders and borrowers are symmetric. Then,

$$R^{\star}_{t+1} = \frac{\overline{\omega_t \beta_t^R P_t R_{t+1}}}{\overline{\omega_t \beta_t^R P_t}}. \tag{15}$$

The world return is a weighted average of the country-specific returns. The weight depends on the country size adjusted by the price of investment good and the sensitivity of investment with respect to the price of investment good. Specifically, large countries, countries with low efficiency in producing the investment good, and countries which have high demand for investment occupy large weights. The weight is intuitive, since such countries are major participants in the international capital market. We substitute the sensitivity of investment with respect to price in (3) to obtain the world return as a function of observables. Let $m_{j,t} = (\alpha_j(1-\alpha_j))^{-1}(k/y)_{j,t}^{(2-\alpha_j)/(1-\alpha_j)} P_{j,t}^2$. Then,

$$R^{\star}_{t+1} = \frac{\overline{\omega_t m_t R_{t+1}}}{\overline{\omega_t m_t}}. \tag{16}$$

Since the world return is derived from the "world" capital market, we define the universe of countries based on the capital flows data in the International Financial Statistics (IFS) and the World Development Indicators (WDI). The two databases produce 170 countries. It turns out the total of private net inflows in the universe is much higher than the total in our limited sample of 48 countries. This implies that the weighted average return from the limited sample contains a sizable downward bias.

To correct the bias, we have to take into account the returns in the remaining countries. Although the PWT provides data for 96 countries, the total net private flow of these 96 countries is almost 100 percent of the total of 170 countries. For this reason, we construct a proxy of returns in the unobserved 48 countries to correct the bias. We have complete data on capital-output ratio for 96 countries while our data for the capital share is limited to only 48 countries from Caselli and Feyrer's (2007) dataset. The correlation between the capital-output ratio and capital share within the observed countries is moderately high at 48 percent. Therefore we use information on the capital-output ratio to construct the capital share for the remaining sample as follows.[2]

We conduct ANOVA tests of equality of variance of the capital-output ratio within the two groups. We find that the observed-countries sample is right skewed. That implies that we possibly have data for countries with high capital share. The ANOVA tests indicate that the average capital-output ratio is different between both these two samples but the variation is identical. Therefore we use the cross-country variation of capital-output ratio in 1996, which

[2] We try other proxies such as income per worker and capital-labor ratio, but the capital-output ratio has the highest within-sample correlation with the income share of capital.

is the year in Caselli and Feyrer's dataset, to re-construct the missing capital shares. To do this, we assign the average capital share of the percentile to the missing countries, which fall within the same percentile as the observed countries in terms of capital-output ratio. This methodology maintains the variation of capital-output ratio and the correlation in the observed sample within the capital share series.

Finally, we correct the series of world return for the public capital flows. We assume that public flows are not driven by the return differentials, and add total public flows to the left hand side of the market clearing condition (14). Let $f_{j,t}^{g}$ denote the country-specific net public inflows per effective unit of labor. Then $f_{j,t}^{g} = (F/K_{j,t}(k/y)_{j,t}^{1/(1-\alpha_j)}$, where $(F/K)_{j,t}$ is the ratio of total inflows and total capital stock. Then (14) and (16) gives the following public-flows corrected return.

$$R_{t+1}^{f\star} = \frac{\overline{\omega_t m_t R_{t+1}} - \overline{\omega_t (F/K)_t (k/y)_t^{\frac{1}{1-\alpha_j}}}}{\overline{\omega_t m_t}},$$

where $\omega_{j,t} = Y_{j,t}/\Sigma_{j=1}^{96} Y_{j,t}$. Note that $\omega_{j,t}$ is now the share of income in the world of 96 not 48 countries.

3.3 Empirical strategy

We realize that there may be cross-sectional dependence in the errors of our estimating equation. Yet, we do not exploit this information because, although that would affect the efficiency of our estimates, the estimates are nevertheless consistently estimated. We thus estimate Equation (13) with ordinary least square (OLS) as a baseline estimation. To exploit the time series variations within a country, both dependent and independent variable must be stationary. Therefore we subject the dependent and independent variables to the Augmented Dickey Fuller(ADF) Tests. All variables have unit roots. However, the first-differenced series of dependent variable of 42 countries are found to be stationary. The first-differenced series of dependent variable of the remaining 6 countries have a unit root and cannot be estimated by OLS. We leave them for future studies. The first-differenced series of dependent variables of all 42 countries are also stationary. The first-differenced version of (13) is as follows.

$$\Delta\left(\frac{f}{iP}\right)_{j,t} = \gamma_{1,j}\Delta P_{j,t} + \gamma_{2,j}\Delta R^{\star}_{t+1} + \gamma_{3,j}\Delta R_{j,t+1} + \varepsilon_{j,t} \tag{17}$$

However, because the dependent variable contains price which is also an independent variable. The regression equation above suffers with simultaneity problem. For this reason we drop $P_{j,t}$ from the dependent variable. Also, the returns are subject to uncertainty in the data, unlike the model of perfect foresight. We use the last-period change in returns to forecast expectations of returns. This is equivalent to assume that the change in returns follow a stationary AR(1) process. Eventually we estimate the following equation.

$$\Delta\left(\frac{f}{i}\right)_{j,t} = \gamma_{0,j} + \gamma_{1,j}\Delta P_{j,t} + \gamma_{2,j}\Delta R^{\star}_{t} + \gamma_{3,j}\Delta R_{j,t} + \varepsilon_{j,t} \tag{18}$$

Since the regression equation does not predict the level of the ratio of capital flows and investment, but its change, we back out the level in Period t by summing up past changes. Given the estimate $\widehat{\Delta(f/i)}_{j,t}$, we can compute the gains from capital flows as follows.

$$\hat{\eta}_{j,t} = \frac{1}{(1 + (lnY_{j,2003} - lnY_{j,1970})/34)P_{j,t}}\left(\frac{\alpha_j}{1-\alpha_j}\right)\left(\frac{i}{k}\right)_{j,t}\sum_{s=1970}^{t}\widehat{\Delta\left(\frac{f}{i}\right)}_{j,s} \tag{19}$$

We can calculate the ratio of predicted and actual capital inflows as follows.

$$\xi_{j,t} = \frac{\sum_{s=1970}^{t}\widehat{\Delta\left(\frac{f}{i}\right)}_{j,s}}{\sum_{s=1970}^{t}\Delta\left(\frac{f}{i}\right)_{j,s}} \tag{20}$$

This ratio tells us the fraction of actual capital inflows predicted by the model. In theory, it is the scale of capital inflows which respond to fluctuations in the return differentials. For this reason, it also measures the fraction of capital inflows that get transformed to physical capital.

The simple OLS estimation shows that the errors are serially correlated. We therefore re-estimate the model using a GLS transformation of the data to correct for the serial correlation. Thus our estimates are the Prais-Winsten estimates, obtained through iterative Cochrane-Orcutt procedure.

To proxy changes in the degree of integration of the international capital markets, we employ two dummy variables. One is to capture the breakdown of the Bretton Woods system. It is defined as one in 1973 for the major advanced countries which did not officially implement financial liberalization policy afterward, and zero otherwise. The other is the stock market liberalization dummy. We rely on the data on the official dates of stock market liberalization by Bekeart and Harvey (2000). However, Henry (2000) argues that country funds emerged earlier than the official date in some countries. He also finds that stock prices are influenced by the anticipation of liberalization several months before the actual liberalization. Thus, we create a dummy variable which is one in the year prior to the minimum year in Bekeart and Harvey (2000) and Henry (2000).

3.4 Calculated returns

We display the summary statistics of net returns of 42 countries in Table 1. Each column displays the 34-years average, standard deviation, minimum, maximum and the contribution of capital gain into the overall variance of return, respectively.[3] There are three main characteristics of returns in the Table. First, returns in developing countries are much more volatile than those in developed countries. The pattern is consistent with previous studies of real interest rate using data on financial return and expected inflation such as Neumeyer and Perri (2005). Second, the volatility of returns are predominantly driven by fluctuations in the price of investment goods for all countries except for Korea.

Finally, the U.S. average return is 5.5 percent and not necessarily much higher than the rest of the world. It is in fact below the median return, and lower than the highest return (Morocco) by 5.2 percent. Even among developed countries, the U.S. returns rank the 15th out of 19 countries. In this aspect, our finding is similar to that in Curcuru, Dvorak and Warnock (2007) rather than Gourinchas and Rey (2005).

Table 2 reports the summary statistics for the equilibrium world return. Columns 1 and 2 are those of $R_t^\star$ and $R_t^{f\star}$, respectively. Recall that $R_t^\star$ and $R_t^{f\star}$ are computed using the weights

[3]The contribution of capital gain is calculated as $var((1-\delta)P_{j,t}/P_{j,t-1})/var(R_{j,t}) + cov((1-\delta)P_{j,t+1}/P_{j,t}, MPK)/var(R_{j,t})$.

as the investment demand elasticity, the GDP share-weights of the price-adjusted rate of return. We also report the statistics of alternative world returns. Column 3 corresponds to the world return $R1^{\star}_t =$ "$R^{\star}_t$ with $P_{j,t} = 1$". The last column corresponds to the world return $R1^{f\star}_t =$ "$R^{f\star}_t$ with $P_{j,t} = 1$". For these the average is computed using only the GDP share-weights. Evidently, the correction for the relative price of investment goods matter and reduces the average world return by half a percent, and doubles the volatility. However, the correction for public flows barely change the distribution of world return.

We plot the time series of the world return in Figure (1). We contrast that with the return without price adjustment. Panel A plots $R^{f\star}_t$ and $R1^{f\star}$, which is denoted by "without price. Panel B plots $R2^{f\star}$ and $R3^{f\star}$, where

$$R2^{\star}_{t+1} = \frac{\overline{\omega_t R_{t+1}} - \overline{\omega_t (F/K)_t (k/y)_t^{\frac{1}{1-\alpha_j}}}}{\overline{\omega_t}}$$

and $R3^{f\star} =$ "$R2^{f\star}$ with $P_{i,j} = 1$," and it is denoted "without price."

We subject the series $R^{f\star}_t$, $R1^{f\star}$, $R2^{f\star}_t$ and $R3^{f\star}$ to ADF tests. We find that all four return series are trend stationary. The price adjustments raise the standard deviation of the world return by 70 percent in Panel A, and 60 percent in Panel B.

Figure (2) displays the 34-years average of change in the ratio of private inflows and investment and the domestic-world returns differential. The top-left diagram displays the aggregate flows; the top-right one displays the FDI flows; the bottom-left one displays the portfolio flows; and the bottom-right one displays the bank flows. It is hard to discern from the diagram whether there is a positive correlation between changes in the inflows measure and the return differentials.

3.5 Estimation results

We use the public-flows corrected series $R^{f\star}_t$ as the measure of the world return. Table 3 shows the Prais-Winsten/GLS coefficient estimates, the estimated convergence gain and the fraction of capital inflows predicted by the model. The model predicts that the coefficient estimate $\gamma_{1,j}$ is negative if the investment demand effect of price dominates the volume effect, and positive otherwise. When the two effects cancel out, $\gamma_{1,j}$ is zero and becomes observationally equivalent to statistical non-significance. $\gamma_{2,j}$ should be at least positive and $\gamma_{3,j}$ should be at least negative since they measure the distance between domestic and world returns.

Columns 1-5 summarize the regression coefficients. The asterisk denotes the statistically significant coefficients with the sign predicted by the model. The x mark denotes the statistically significant coefficients with the opposite sign. The coefficient of price is significant for 5 countries. The positive one in Egypt and Panama indicates the volume effect of price. On the other hand, the negative one in Mexico, Netherlands and Philippines indicates the investment demand effect. The coefficient of world return is significant with predicted sign for Italy and Morocco. None of the coefficient of the domestic return are significant.

On the contrary, the stock market liberalization enters significantly for 10 countries. We do not have prior about the sign, since the effects of stock market liberalization on capital flows are not clearcut. Market volatility can triggers outflows as well as inflows. We find that 3 out of 10 statistically significant cases imply that the share of capital inflows in the domestic investment drops following the stock market liberalization.

This finding at first appears contradictory to the previous studies that find a positive correlation between capital inflows and measures of financial liberalization such as Alfaro, Kalemli-Ozcan and Vadym Volosovych (2007). However, that is not necessarily the case because capital flows are adjusted by the investment in our regression. A negative coefficient of the liberalization is plausible when both the capital flows to GDP ratio and the investment rate increase after liberalization, and the rise in the investment rate is higher. However, the negative coefficient of the Bretton Woods dummies. for the U.S. is largely driven by capital outflows.

The 34-years average of the estimated gains from capital inflows are in Column 6. The underlined numbers are considered "consistent" with the model, as the sign of average actual flows in Column 7 and that of the average predicted-actual flow ratio ($\xi_{j,t}$) in Column 8 are positive, and the predicted-actual flows ratio is less than one. From Equation (19), the gains can appear positive in spite of outflows because the regression coefficients may incorrectly predict inflows. Thus we need information about the direction of actual and predicted flows to infer whether the computed numbers are conceptually the gains from inflows. Also, since we can interpret the predicted-actual flow ratio as the fraction of capital inflows contributing to capital accumulation, it is sensible to focus on the case in which the ratio is below one.

With these criteria, only two countries reap gains from capital inflows, namely Spain and Sri Lanka. The gains are 0.22 and 0.05 percent, respectively. They are from 32 and 14 percent of capital flows on average. Over 34 years, the total gains are 1.7-7.8 percent. However, the gains are not statistically significant since the coefficients of these countries are not statistically significant. The last column indicates that our model does not fit the data well. The predicted flows substantially deviate from the actual flows in most cases.

It is plausible that our model does not perform well because different types of flows may respond differently to the domestic and return differentials. So we re-estimate the regression equation separately with banking flows, FDI flows and portfolio flows. We include the stock market liberalization dummy into the regression of portfolio flows only.

The gains from inflows predicted by the estimated coefficients are in Table 4. The results are quite different from those with aggregate flows. With bank flows, the gains for the U.S. in terms of output per worker are now computed from statistically significant estimates. The number is, however, quite low at 0.03 percent. The fraction of bank inflows transformed into physical capital in the U.S. is 39 percent, respectively. Ireland is found to gain 0.10 percent in income per worker from 89 percent of capital inflows, although its coefficient estimates are not significant.

With FDI and portfolio flows, none of the countries are found to gain from capital flows. That our model does not find substantial gains from FDI inflows is largely because our methodology exploits year-on-year variations in the price data. That tends to remove potential from FDI inflows, which are found by other studies to stimulate growth in developing countries. Unlike bank flows or portfolio flows, FDI flows tend to fluctuate at lower frequencies. The limitation of our estimation is its short time span. For this reason, we cannot explore the relation between FDI and the return differentials at lower frequencies, such as 3-to-5-year changes. Re-estimating the model with cross-sectional dependence will allow us to exploit also cross-country variations in a panel of countries.

We also estimate with two different measures for world returns. One is $R2^{f\star}$, which uses the country share of GDP in the world GDP as the weight. The other is the U.S. return. The results are tabulated in Table (5). The coefficients estimates are not substantially different from the baseline. Thus, that our model does not perform well for most countries are not caused by our measure of world return.

Overall, we find evidence that capital flows respond to the price of investment goods, and for some also respond to the world return. Both the volume and investment demand effects of price are present in the data. our model performs better with bank flows than FDI and portfolio flows. The results come at no surprise since we model the lending market in which interest rate differentials play a crucial role. To the contrary, FDI are subject to sunk cost and lumpiness of investment and do not fluctuate at the same frequency as the interest rate or goods price.

Our estimates of gains are much smaller than those in the literature. In the calibration exercise by Jeanne and Gourinchas (2006), capital inflows raises output per worker by 1-4 percent per year, assuming that takes 5 years to converges to the long run. That implies 5-20 percent increase in output over the transition periods. Alfaro and Hammel (2007) find that financial liberalization increases imports of investment goods and raises the TFP and output per worker by 0.22 percent. Henry (2003) finds that output per worker rises by 2.3 percent over 5 years after the stock market liberalization.

The main difference in our estimate of gains is that they are accrued over the entire sample period. This implies that the U.S. output per worker has been increased by 1 percent by capital inflows over 34 years, which is extremely small. Nonetheless, the U.S. is the only country that statistically significantly benefits from capital inflows. Our findings are in line with the study by Caselli and Feyrer (2007) who find virtually no gains from reallocating capital to equalize return across countries when the MPK is adjusted by price.

4 Concluding remarks

Our study sheds light on a classic question on what drives capital flows, and whether capital flows are beneficial. We confirm the new insight in our model with the empirical evidence, that fluctuations in the price of investment goods allow both high- and low-income countries to benefit from capital inflows. The U.S. is found to be the only statistically significant beneficiary from bank inflows.

That raises a question why bank flows do not benefit other countries. Even gain for the U.S. is extremely small. Based on our model and the studies by Jones (1994), Hsieh and Klenow (2007), the answer is in the price of investment goods. While Jones (1994) view high prices of investment goods in developing countries as a result of frictions in capital market, Hsieh and Klenow (2007) view them as a result of efficiency in the investment-good sector.

Since our study exploits time series variations in the price of investment goods, our methodology and results support the efficiency view. It is rather implausible that frictions in the capital market fluctuate at annual frequency. Another factor, which is outside our model, in the role of market structure in markup variations in the investment-good sector.

The level of financial development is likely to play a role. For instance, Mendoza, Quadrini and Rios-Rull (2007), argue that asymmetry in financial development can influence composition of assets demanded and leave developing countries worse off after financial liberalization. Although our model cannot identify the channel in their study, due to the absence of financial assets, our results seem to support their notion that developing countries do not necessarily reap gains from capital inflows.

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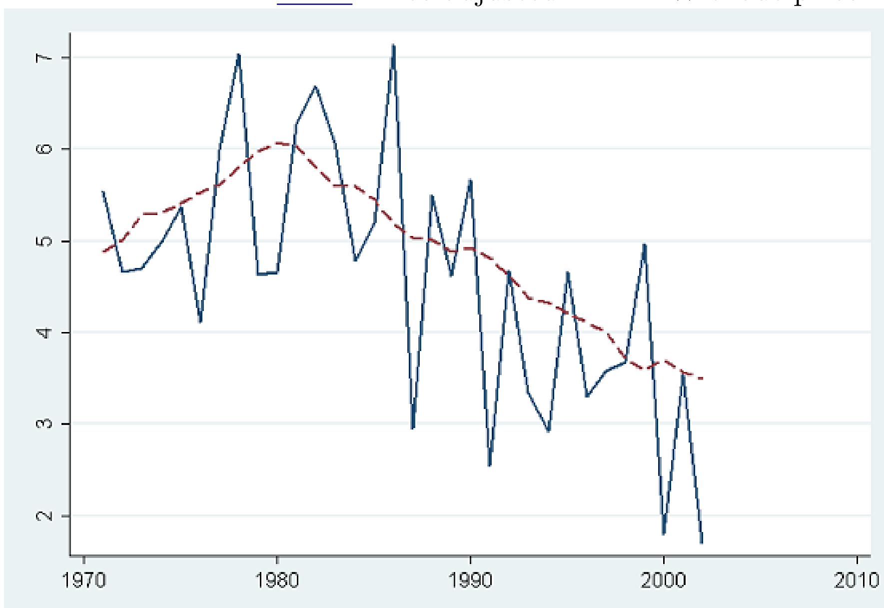
Figure 1: World average net return

1.A. Weighted by country size and capital-output ratio

_____ Price adjusted – – – Without price



1.B. Weighted by country size

_____ Price adjusted – – – Without price

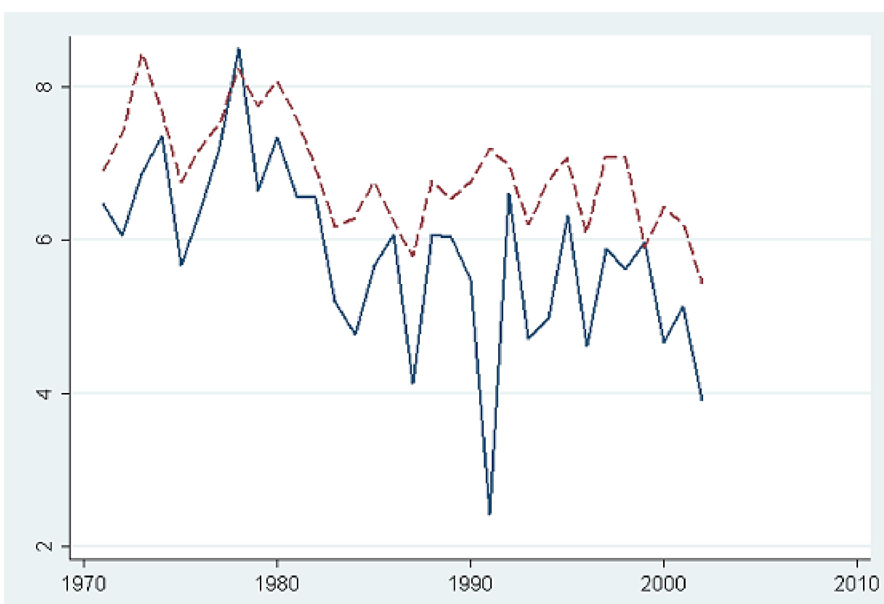


Figure 2: Change in the share of net private flows in investment and the domestic-world returns differential (percent)

Table 1: Summary statistics of net returns, 1970-2003 (percent)

Countries	Mean	Std dev	Min	Max	Contribution of price change in Var(R)
Developed countries					
Australia	2.48	1.71	-0.54	7.02	87.97
Austria	5.04	1.93	-0.03	8.09	68.70
Belgium	4.85	2.56	-2.55	9.98	83.11
Canada	2.80	1.78	-0.22	8.60	86.39
Denmark	4.98	2.17	-0.08	9.95	93.21
Finland	3.30	2.95	-4.64	7.65	96.55
France	4.26	1.51	-0.37	6.70	83.55
Ireland	5.85	2.25	2.09	11.55	94.16
Israel	7.00	2.79	1.57	14.59	90.42
Italy	5.05	2.16	2.27	9.30	94.85
Japan	5.00	2.29	-0.47	9.76	44.38
Korea	8.96	4.27	0.32	18.02	6.07
Netherlands	6.82	2.12	1.20	11.59	75.21
New Zealand	-0.52	3.18	-6.69	10.65	98.38
Norway	3.59	1.67	-0.94	6.28	78.63
Portugal	4.16	4.03	-2.86	17.42	93.52
Singapore	10.00	3.37	4.54	18.11	87.23
Spain	7.19	1.71	2.20	10.94	46.87
Sweden	2.47	2.02	-2.82	6.02	90.43
United Kingdom	5.17	2.26	-2.56	7.93	89.96
United States	5.50	1.44	1.98	9.95	79.43
Developing countries					
Algeria	0.18	8.06	-24.15	20.84	98.80
Burundi	-0.54	20.53	-46.59	49.22	99.62
Chile	4.54	12.62	-27.08	51.03	98.69
Congo	1.49	5.51	-22.31	15.40	96.41
Costa Rica	3.55	14.11	-23.04	72.38	97.54
Cote D'Ivore	8.11	47.23	-77.27	184.64	99.90
Egypt	3.20	13.65	-23.67	41.28	99.45
Jamaica	6.80	6.30	-2.42	26.75	93.54
Jordan	8.33	5.34	-3.14	19.80	23.35
Malaysia	4.26	4.80	-4.50	17.58	62.28
Mexico	8.52	8.53	-4.07	38.11	92.62
Morocco	10.76	10.14	-5.00	46.46	74.12
Panama	4.00	7.24	-14.04	22.23	96.62
Paraguay	7.09	6.61	-3.77	28.88	65.31
Philippines	5.29	2.81	0.19	10.85	88.68
South Africa	6.32	3.42	-2.47	14.30	94.97
Sri Lanka	5.01	12.70	-20.32	66.19	93.43
Trinidad	-1.92	9.15	-22.13	19.18	98.52
Uruguay	6.32	7.51	-12.43	23.42	92.31
Venezuela	1.05	6.50	-15.86	19.19	99.24
Zambia	5.76	38.55	-78.63	137.02	99.85

Table 2: Summary statistics of the world average net return, 1970-2003 (percent)

	Price-adjusted return		Simple return	
	All flows	Private flows	All flows	Private flows
Average	4.57	4.57	5.08	5.07
Median	4.91	4.93	5.23	5.21
Standard deviation	1.64	1.63	0.85	0.83
Minimum	0.17	0.19	3.32	3.35
Maximum	7.31	7.28	6.26	6.27

Table 3: Estimation results, 1970-2003

Country	Price	World return	Domestic return	Stock Market	Bretton Woods	Gains	Actual F/I	Predicted/ /Actual
Australia	0.30	1.09 x	-1.23 x		-0.12 *	0.0012	-0.0365	-0.2495
Austria	-0.27	0.41	-0.10		-0.06 *	0.0003	-0.0109	-0.8636
Burundi	-0.15	-1.81	0.67			0.0000	0.5484	0.0468
Canada	0.59	-0.53	-1.02		-0.10 *	-0.0016	-0.0851	0.5004
Chile	-1.00	1.11	0.71	0.47 *		-0.0049	0.0596	10.6848
Cote d'Ivoire	1.63	-82.12	-8.04	1.68		-0.0036	0.5994	33.4541
Colombia	-0.52	-5.28	1.02	-0.46		0.0025	0.0118	11.6267
Costa Rica	0.03	-1.66	0.14			0.0004	0.1037	-1.0617
Denmark	-1.07	0.19	-0.55			0.0021	-0.0006	-0.7224
Algeria	0.11	-2.13	-0.47			-0.0013	-0.2541	0.6309
Egypt	1.17 *	29.17 x	-1.16	5.72 *		-0.0026	2.0351	-1.1829
Spain	0.62	-1.92 x	-1.21	-0.06 *		<u>0.0022</u>	0.0309	0.3190
Finland	-0.19	-0.14	-0.37			-0.0055	-0.0874	-3.6344
France	1.62	-0.18	-1.09			-0.0032	-0.0001	-3.7568
U.K.	1.04	-2.89	0.17		-0.01	0.0018	-0.1318	-1.4911
Ireland	0.73	0.17	0.67			-0.0263	-0.2430	1.6708
Israel	0.86	1.53	-0.75 x	0.09 *		-0.0033	0.0004	-0.1309
Italy	0.59	-1.20 *	-0.62		-0.03	-0.0001	0.0182	0.3025
Jamaica	0.11	-0.24	-0.09	0.03		0.0019	0.1420	-2.3547
Jordan	1.52	-24.00	-3.74	-0.26		-0.0006	0.3120	-0.4131
Japan	2.69	-0.33	-1.45 x	-0.07 *		-0.0079	-0.0146	24.8575
Korea	0.35	-0.18	0.15	-0.02		-0.0023	-0.0011	-0.0902
Sri Lanka	0.09	-0.58	0.00	0.18 *		<u>0.0005</u>	0.1212	0.1424
Morocco	0.32	-3.28 *	-0.22	0.10		-0.0005	-0.0075	1.2137
Mexico	-1.15 *	-0.77	0.47	0.07		-0.0018	0.1267	0.9136
Malaysia	-0.48	0.70	0.71	-0.15		-0.0004	0.0264	-0.8348
Netherlands	-2.49 *	1.37	0.56		-0.10 *	0.0098	-0.0244	1.7640
Norway	2.46	1.10	0.44			-0.0057	-0.0968	3.2028
New Zealand	-0.59	1.66	0.49		-0.01	-0.0029	0.0183	0.4775
Panama	7.64 *	-3.87	-4.42		-0.48	0.0095	0.0040	3.3221
Philippines	-1.57 *	-2.23	-0.02	0.42 *		0.0003	0.2980	-2.5580
Portugal	1.27	-0.03	-0.37	0.11 *		0.0114	0.1012	-2.4810
Paraguay	0.66	-1.68	-0.51			0.0009	0.1319	1.2608
Singapore	0.54	-2.62	0.61			-0.0288	-0.1140	0.5679
Sweden	3.73	1.21	-2.98 x		-0.04	-0.0025	-0.0551	-0.0164
Trinidad	-1.13	-0.52	-0.25	-0.49 *		0.0056	0.3049	2.5387
Uruguay	-1.03	-1.82	1.50			-0.0121	-0.0017	2.6928
U.S.	-0.96	-0.60	0.57		-0.03 *	0.0029	0.0720	-0.0674
Venezuela	2.96	17.69	-0.89	5.72 *		-0.0291	0.1821	7.7643
South Africa	-0.62	8.96 x	1.16	0.09		-0.0029	0.0134	-0.8175
Zambia	-0.42	-4.33	0.01	-2.98		0.0052	0.2590	-2.3115

The underlined gains are consistent with the positive sign of predicted and actual inflows, and that the predicted flows are less than actual flows.

* : Regression coefficients are statistically significant at 10-percent level and have the expected sign.

x : Regression coefficients are statistically significant at 10-percent level but have the unexpected sign.

Table 4: Gains from different types of capital inflows, 1970-2003

	Bank		FDI		Portfolio	
Country	Gain	Predicted/ actual flows	Gain	Predicted/ actual flows	Gain	Predicted/ actual flows
Australia	0.0005	-0.89 x	0.0001	0.00	-0.0007	1.13 x
Austria	-0.0014	1.16	0.0021	0.85	-0.0015	1.07
Burundi	-0.0003	-1.07 *		0.0001	$-3.46(10)^{13}$ x	
Belgium					0.0072	$-2.47(10)^{20}$
Canada	-0.0002	-3.70	-0.0004	0.73	-0.0014	-3.64
Chile	-0.0014	-0.78 *	-0.0019	-16.71 *	0.0027	$7.32(10)^{16}$
Cote d'Ivoire	-0.0025	1.13	0.0004	-1.07	-0.0025	$-2.40(10)^{16}$ x
Colombia	-0.0010	-0.78 *	0.0014	14.53	0.0014	-1.04
Costa Rica	-0.0012	1.40 *	-0.0004	-0.70	0.0025	$-6.63(10)^{14}$ x
Denmark	-0.0026	0.50	-0.0015	0.80	-0.0005	0.48
Algeria	-0.0025	0.97	0.0000	$-4.03(10)^{6}$ *	0.0000	$-7.32(10)^{15}$
Egypt	0.0013	-8.33	0.0000	13.07	0.0007	$-1.58(10)^{18}$
Spain	-0.0006	2.04	-0.0003	-1.47	0.0012	-4.23
Finland	-0.0013	-0.43 x	-0.0041	-3.86	-0.0002	-3.58
France	-0.0028	0.10 x	-0.0005	0.88	0.0010	7.27
U.K.	0.0003	0.06	0.0023	0.81	-0.0007	0.13
Ireland	0.0010	0.89	-0.0237	-6.70	0.0059	-1.54 x
Israel	0.0027	-0.04 x	-0.0048	1.20	0.0005	2.24
Italy	-0.0004	0.23	-0.0010	-2.36 x	-0.0002	-4.66
Jamaica	-0.0014	-0.42	-0.0013	-5.33 x	0.0067	$-5.08(10)^{14}$
Jordan	0.0029	0.79	-0.0116	7.48	0.0066	1.89 x
Japan	0.0038	1.31	-0.0111	14.95 x	0.0004	1.46
Korea	-0.0015	-0.14 *	-0.0006	-9.55	-0.0006	0.80
Sri Lanka	0.0008	-0.01	-0.0001	$3.51(10)^{17}$	0.0012	$1.30(10)^{17}$
Morocco	-0.0022	1.21	0.0008	6.40	0.0012	$-6.06(10)^{16}$
Mexico	-0.0018	-0.12	-0.0022	-0.54	0.0031	$1.08(10)^{19}$ *
Malaysia	-0.0031	0.36	0.0010	2.82	0.0015	$-2.25(10)^{15}$
Netherlands	0.0061	10.07	0.0018	1.23 x	0.0005	-1.45
Norway	0.0033	-0.61	-0.0072	0.75	-0.0010	-0.45
New Zealand	-0.0003	0.51	0.0010	3.00	0.0001	0.11
Panama	-0.0103	-4.64 *	0.0277	0.48	0.0014	$-3.95(10)^{13}$
Philippines	0.0008	-1.27 *	0.0019	0.96	0.0020	$-1.36(10)^{17}$
Portugal	0.0123	1.59	0.0022	10.40	0.0001	-0.63
Paraguay	0.0022	1.57	0.0000	$-1.75(10)^{6}$	-0.0001	$7.75(10)^{12}$
Singapore	-0.0205	-2.81	-0.0136	1.29 x	0.0106	2.28
Sweden	0.0000	-1.08 x	-0.0034	2.37	0.0011	-0.67
Trinidad	0.0001	-0.07	0.0028	3.77	0.0043	$-4.45(10)^{14}$ *
Uruguay	-0.0200	-41.21 *	0.0026	0.96	0.0014	$2.87(10)^{17}$
U.S.	0.0003	0.39 *	0.0022	-0.24	0.0000	0.35
Venezuela	0.0001	0.02	-0.0378	-129.04	0.0004	-1.47
South Africa	-0.0076	-1.15	-0.0041	4.47	0.0081	3.02
Zambia	0.0000	0.89	0.0000	13.12	-0.0011	$-2.00(10)^{18}$

The underlined gains are consistent with the positive sign of predicted and actual inflows, and that the predicted flows are less than actual flows.

* : Regression coefficients are statistically significant at 10-percent level and have the expected sign.

x : At least one of the statistically significant variables has the unexpected sign.

Table 5: Estimates with different measure world returns, 1970-2003

	Price		World return		Domestic return		Stock market		Bretton Woods	
Country	$R2^{f\star}$	R_{US}	$R2^{f\star}$	R_{US}	$R2^{f\star}$	R_{US}	$R2^{f\star}$	R_{US}	$R2^{f\star}$	R_{US}
Australia	0.33	0.00	1.07	0.51	-1.47 x	-1.56 x	*	*	-0.12 *	-0.10 *
Austria	-0.29	-0.20	1.28	1.58 x	-0.30	-0.52	*	*	-0.07 *	-0.07 *
Burundi	-0.17	-0.18	-6.64	-2.29	0.72	0.71				
Canada	0.70	0.98	-1.24 *	0.16	-0.90	-1.18	*		-0.09 *	-0.11 *
Chile	-0.97	-1.02	6.81	4.66 x	0.64	0.74	0.51 *	0.49 *		
Cote d'Ivoire	1.71	1.79	-71.35	-99.79	-8.80	-9.63	1.30	0.08		
Colombia	-0.14	-0.06	1.01	6.49 x	0.80	0.26	-0.16	-0.04		
Costa Rica	0.01	0.02	-3.96	-0.84	0.20	0.22				
Denmark	-1.10	-0.11	0.69	-0.50	-0.74	-0.30				
Algeria	0.13	0.04	-0.64	-2.58	-0.62	-0.55				
Egypt	1.25 *	1.06 *	46.84 x	19.43	-1.56	-0.48	3.94 *	4.83 *		
Spain	-0.02	0.48	-3.26 *	-0.62	0.02	-0.34			-0.03	-0.04
Finland	-0.19	-0.21	-0.11	0.43	-0.37	-0.36				
France	1.58	1.15	-0.23	0.82	-1.04	-1.88 x				
U.K.	1.17	1.00	-4.12	-1.93	0.71	0.46			0.04	0.01
Ireland	0.88	0.46	-1.86	-1.60	1.10	1.02				
Israel	0.96	0.96	0.78	-1.27 *	-0.84 x	-0.58	0.08 *	0.11 *		
Italy	0.68	0.13	-1.00	0.39	-0.66	-0.37		-0.02	-0.03	
Jamaica	0.12	0.10	-0.02	1.32	-0.12	-0.08	0.03	0.07		
Jordan	0.33	-0.87	-38.33 *	-28.10	-2.20	0.75	-0.09	-0.54 *		
Japan	2.74	0.44	-0.17	0.20	-1.45	-1.63	-0.06 *	-0.03		
Korea	0.42	0.44	0.07	-0.24	0.11	0.06	-0.01	-0.01		
Sri Lanka	0.11	0.07	1.05	2.25 x	-0.03	0.05	0.20 *	0.23 *		
Morocco	0.27	0.26	-1.81	1.13	-0.24	-0.30	0.08	0.05		
Mexico	-1.18 *	-1.32 *	-6.37 *	-3.39 *	0.66	0.57	0.09	0.12		
Malaysia	-0.34	-0.23	-0.52	2.55	0.73	0.52	-0.19 *	-0.17 *		
Netherlands	-2.58 *	-0.40	0.96	0.76	0.19	0.72	*		-0.12	-0.03
Norway	2.28	1.65	1.69	1.55	0.04	-0.40				
New Zealand	-0.33	-0.28	2.34	1.24	0.15	0.02			-0.02	0.01
Panama	7.61 *	7.56*	5.32	0.42	-4.30	-4.28	-0.53	-0.47		
Philippines	-1.49 *	-1.37 *	-1.45	-0.26	-0.17	-0.31	0.40 *	0.41 *		
Portugal	1.17 *	1.44 *	-2.21	-2.50	-0.31	0.31	0.12 *	0.12 *		
Paraguay	0.66	0.69	-0.17	1.64	-0.44	-0.57				
Singapore	0.42	0.33	-1.81	-1.26	0.62	0.75				
Sweden	3.70	4.90 *	-0.43	-0.40	-2.44	-2.83 x			-0.04	-0.05 *
Trinidad	-1.16	-1.18	-1.58	-1.13	-0.20	-0.09	-0.48 *	-0.52 *		
Uruguay	-0.70	-0.91	3.87	-0.45	1.10	0.88				
U.S.	-1.21	-0.90	0.10		0.63	0.55	*		-0.03	-0.04 *
Venezuela	4.14	0.62	26.67	17.62	-1.64	0.06	6.58 *	6.36 *		
South Africa	-0.19	0.18	9.88 x	0.13	0.10	1.25	0.17	0.09		
Zambia	-0.47	-0.44	-8.14	-4.27	0.01	-0.07	-3.29	-3.08		

* : Regression coefficients are statistically significant at 10-percent level and have the expected sign.

x : At least one of the statistically significant variables has the unexpected sign.