Flight Capital as a Portfolio Choice

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1. Introduction

In this paper we estimate the stock of flight capital held abroad, and compare it with the stock of real (non-financial) capital held within a country. This is of interest for two reasons.

At the aggregate level, many of the problems commonly associated with capital flight are more closely associated with large proportions of real wealth held abroad than with the magnitude of annual outflows. First, there are large differences in the shares of wealth held abroad. In the regions with the most severe capital flight, the phenomenon has cumulatively accounted for a major reduction in the real capital stock per worker, with concomitant effects upon income. Second, the concern that capital flight erodes the domestic tax base is more specifically an argument that a large share of private wealth held abroad reduces the domestic tax base. Third, the potential for capital flight repatriation depends on the share of wealth held abroad and how changes in policies affect expectations of risk-adjusted returns such that desired portfolio allocations change.

At the level of the individual agent, wealth held abroad, like the decision to hold any other asset, reflects a portfolio choice. Typically, the decision as to how much of a particular asset to hold will be determined both by the relative attraction of the asset, and by the amount of wealth. Similarly, the amount of wealth held abroad will be determined both by the relative attractions of domestic and foreign assets, and by the overall endowment of wealth. To date, however, empirical studies of capital flight have usually not analysed it as reflecting the choice of a stock of foreign assets held as part of a stock of wealth. Instead, they have focused on the annual flow. This has not reflected a mistake of specification, but rather a lack of data on stocks, both of capital flight and of overall private wealth. The one exception is Cline (1995) who estimates the stock of flight capital for six Latin American countries and the Philippines, and then compares it with the stock of some liquid domestic financial assets. The innovation of this paper is to build estimates of the stock of private flight capital and the stock of total private real wealth for 51 countries. These stocks are combined to estimate the proportion of total real wealth which is held abroad. This portfolio choice then becomes the dependent variable which we explain in terms of national endowments and national policies.

Section 2 discusses the data and presents descriptive statistics on portfolio choices by region. Section 3 reviews the literature on capital flight and sets out a framework for analyzing flight capital as portfolio choice. In Section 4 we test the framework, using data for the period 1970-90, and establish the determinants of portfolio choice. In Section 5 we develop four applications. First, we investigate the impact of the deterioration in East Asian risk ratings following the recent currency crises, on East Asian portfolio choices. Secondly, we investigate whether there is evidence for spillovers, that is, whether as capital flight increases, the incentives for further flight also increase. Thirdly, we investigate the effect of the Heavily Indebted Poor Countries (HIPC) debt relief initiative on portfolio choices: to what extent will forgiveness of public debts induce private capital repatriation? Finally, we investigate why Africa has had so much capital flight relative to other continents. Section 6 concludes.

2. Portfolio Choices by Region

The estimation of portfolio choices requires comparable measures of the stock of flight capital and the stock of private wealth. We discuss these two measures in turn and then aggregate them at the regional level.

Measuring the Stock of Flight Capital

The measurement of capital flight as a flow involves a number of choices which have been well discussed in the literature (see, in particular, Claessens and Naude,(1993)).[1] The World Bank calculates capital flight using a variant of the residual method, in which outward capital flight occurs when sources of funds exceed uses of funds. Sources of funds include all net official inflows and the net flow of foreign direct investment, and uses of funds include the current-account deficit and additions to reserves.[2] In our estimation of stocks we take the World Bank estimate of flows as our starting point. However, this series estimates capital flight only from the capital account of the balance of payments and omits any capital flight through mis-invoicing of trade. We add trade-mis-invoicing to the World Bank figures. A second departure from the World Bank concept of capital flight is that we do not deduct private non-guaranteed debt. That is, our concept is of gross rather than net private assets. The rationale for this is that behaviorally, the existence of claims and offsetting liabilities is not equivalent to the absence of claims, partly because the claims and the liabilities will generally not refer to the same agents.

To convert these flows into stocks requires an assumption as to the rate of return. We apply the interest rate on US Treasury Bills. A second problem is that the net flow of apparent flight capital is sometimes negative. This can arise for two reasons. First, previous flight capital might be repatriated. Secondly, agents might borrow internationally. Clearly, this second phenomenon is conceptually distinct from capital repatriation and needs to be distinguished from it empirically. Following the World Bank methodology, we treat all the stocks of flight capital as being zero at the start of our period of observation, 1970. However, following Cline (1995) we count the stock of flight capital as becoming positive in the first year in which the flow of capital flight becomes positive. In effect, we treat early years of negative flows as the accumulation of debts which are not reduced by subsequent capital flight. Our flight capital stocks are thus gross of indebtedness. If flows subsequently turn negative we treat this as the repatriation of capital. In this we slightly depart from Cline, who assumes that only half of the flow is repatriation, the other half being foreign investment

[1] Claessens and Naude (1993) present estimates of capital flight using the four most common approaches: (1) the residual approach (used by the World Bank, Morgan Guaranty and Cline); (2) measuring the stock of unreported assets (Dooley's method); (3) hot money measures (Cuddington); (4) and measuring trade mis-invoicing. The flows we term World Bank estimates are the authors' variant of the World Bank measure. They show that although the Dooley and residual measures differ greatly in conceptual approach, a Dooley measure of the flow of capital flight can also be obtained using a residual method. In Section 5 we show that our results are robust to calculating our capital flight stocks using the different measures of capital flight.

[2] Most of the data comes from the balance-of-payments. For net official external borrowing, however, World Bank debt data is used, since it is likely to be more accurate.

(p.441). Since foreign investor capital inflows are separately, and generally fairly accurately, recorded in the balance of payments, this adjustment by Cline appears unwarranted. Although we thus count negative net capital outflows as capital repatriation, we do not allow the stock of flight capital to fall below zero, consistent with our distinction between capital repatriation and foreign borrowing. Hence, a country which had an annual net flow during the first five years of -3, -4, +3, -1, -5 would, on our measure, have a stock of flight capital in each of these years (before allowing for interest) of 0, 0, 3, 2, 0.

The flight capital stocks are converted to real 1985 US dollars in order to make the figures comparable to our private capital stock measures.

Measuring the Stock of Private Wealth

We measure the stock of private wealth as the sum of flight capital as measured above, the private real capital stock, and quasi-money. In order to measure the real private capital stock we first obtained a measure of the aggregate capital stock from the flows of past investment. For this we followed the method of King and Levine (1994). We estimated the initial capital stock for 1960 and used the perpetual inventory method to obtain annual values for the capital stock 1960-1990 (see data appendix).[3] We then disaggregated this total capital stock into its public and private components. The starting point is the public investment data from Easterly and Rebelo (1993) which we combine with World Bank data on gross domestic investment to calculate private investment. We adjust the public and private investment shares to be comparable to PWT data by using the ratio of gross domestic investment in domestic currency in 1985 to PPP-adjusted investment in 1985.

We work with two concepts of private wealth. The first is private real wealth, which is the sum of the private real capital stock and the stock of flight capital. At the aggregate level it is the allocation of private wealth between these two components which is important for income and growth. The second is private total wealth, which is the sum of private real wealth and quasi-money. Quasi-money is only one component of the financial wealth of private agents, however, it is the only one for which satisfactory data could be obtained for a reasonable sample of countries. It should be noted that important components are omitted, notably domestic bonds and pension claims.

Flight capital Portfolio Choices by Region

The descriptive statistics are summarised for each region in Table 1. Since the Table includes only 51 countries, no region is covered comprehensively. The most complete data is for Sub-Saharan Africa, for which 22 countries are included. For each region, the figures of capital (and real wealth) per worker are the sum of the capital (wealth) over the countries covered, divided by the sum of the workforce in the same countries. Similarly, the flight capital ratio is the sum of flight capital for the region, divided by the sum of private real wealth.

[3] Although there are some existing capital stock measures available, using the King and Levine method allowed us to calculate capital stocks for a larger number of countries and an extended time period.

The table shows four striking results. First, the differences between regions in private capital per worker are far larger than those in public capital. Secondly, by 1990 Africa was remarkably short of private capital, both absolutely, and relative to public capital. In absolute terms it had less than one half that of South Asia, the next most capital-scarce region. In relative terms, it was the only region which had more public capital per worker than private capital. Thirdly, and most remarkably, Africa had the highest incidence of capital flight. Despite its capital scarcity, it slightly exceeded even the Middle East in the high proportion of private wealth held abroad: 39% of private portfolios were held outside the continent. Were Africa able to attract back this component of private wealth, the private capital stock would increase by around 64%. Fourthly, East Asia had a very low proportion of private portfolios held abroad, despite having quite a high level of private wealth. In view of the recent capital flight from the region this is of some interest, suggesting that before the crisis East Asian wealth holders were unusual in the extent to which they retained their wealth domestically.

Table 1: Private Wealth and its Composition by Region, 1990 (1985 US$)

Region	Public capital per worker	Private wealth per worker	Private capital per worker	Capital flight per worker	Capital flight ratio
SS Africa	1,271	1,752	1,069	683	0.39
L.America	6,653	19,361	17,424	1,936	0.10
SouthAsia	2,135	2,500	2,425	75	0.03
East Asia	3,878	10,331	9,711	620	0.06
Middle-East	8,693	6,030	3,678	2,352	0.39

3. Modelling Capital Flight

Models of Capital Flight in the Literature

Although the view of capital flight as part of a portfolio allocation decision is implicit in much of the theoretical and empirical literature, it is not been investigated explicitly. Empirical models have analyzed the determinants of the flows of capital flight, not capital flight as a share of wealth. Based on portfolio considerations, however, the models often include interest differentials in explaining capital flight flows . Theories have focused on tax and tax-like distortions that lower returns and add risk to domestic financial and physical assets, leading to capital flight, and how often these risks are related to foreign borrowing. Our starting point is a standard portfolio model which Sheets (1995) presents as applicable to the capital flight decision (see Appendix A). Capital flight arises from portfolio diversification incentives, return differential incentives and relative risk incentives. Is capital flight explicable in the same manner as say, allocating a portfolio across domestic bonds and equities,

i.e. in terms of a standard portfolio model? It is likely that the standard model will need to be modified and broadened. We review theories of capital flight below in order to determine what special features would need to be added to a standard portfolio choice problem to reflect the particulars of allocating wealth to capital flight and domestic investment.

In one of the first theoretical models, Khan and Haque (1985) show that two-way capital flows, private capital flight occurring simultaneously with private foreign borrowing, can arise in a model where domestic and foreign investors face an asymmetric risk of expropriation.[4] Domestic investors face a higher risk of expropriation, so they invest abroad, and domestic investment is consequently financed with foreign funds. Dooley (1988) also focuses on the notion that domestic and foreign investors face asymmetric risk, but broadens the source of the risk to the wide range of implicit taxes, generated, by say a rapid inflation or exchange rate depreciation. A fiscal shock may lead the government to increased reliance on the inflation tax, which erodes the value of domestic financial assets and leads residents to acquire foreign assets. Foreign investors could be attracted by the fall in prices (increase in yields), as domestic residents liquidate their domestic securities. Foreigners face less risks because they are often able to get claims denominated in foreign currency, and these have explicit or implicit government guarantees.

The capital flight literature has built on these early theoretical models, extending them in essentially three directions. First, the risk of expropriation has been generalized to risks of high taxation and related to large foreign borrowing. In most of these models capital flight is subject to contagion[5]--as more capital flees, the expected per capita tax liability increases and heightens the incentives for further capital flight. Second, political economy models have endogenized the reasons why governments may levy punitively high and variable taxes on domestic assets. Third, public finance models have focused on the effects of capital income taxation that varies *de facto* by residence and source, explaining capital flight and domestic investment financed with foreign borrowing.

We will focus on the first category of models, since they have implications for empirical work, and briefly mention the other categories. In Eaton (1987), the expectation of increased tax obligations created by the potential nationalization of private debt generates capital flight. In his simplest model, private borrowers can invest their own and borrowed funds abroad, where they earn less than domestic investment projects. But the borrower escapes the obligation to repay the loan or pay taxes. Potential nationalization of private debt implies that the flight of the capital of any one borrower increases the tax obligations of remaining borrowers. In one equilibrium borrowers invest domestically and loans are repaid, while in another there is capital flight and default on foreign loans. Eaton and Gersovitz (1989) analyze a similar type of capital flight contagion generated by anticipated tax obligations when the government borrows abroad to finance public goods. In a macroeconomic

[4]Much of the literature has been concerned with explaining two-way capital flows, private capital flight occurring simultaneously with private or public foreign borrowing. This phenomenon is not easy to rationalize within standard theoretical models of optimal borrowing decisions. Although this issue is not important for our inquiry, we will be interested in the nature of the causal relationship between foreign borrowing and capital flight. The issue of rationalizing two-way capital flows is thus a prior question to causality, i.e. why do foreign borrowing and capital flight even occur at the same time?

[5] In our empirical application we will use the term spillovers rather than contagion, to avoid confusion with the usage of contagion to refer to cross-country effects.

model, Ize and Ortiz (1987) also show that when fiscal rigidities create difficulties for servicing foreign debt, private capital flight is encouraged by foreign borrowing since there is an expectation of higher domestic asset taxation in order to service future debt.

Capital flight in Schineller's (1993) model is subject to a similar type of contagion, but it is not related to foreign debt. Returns to the domestic asset are stochastic because of political risk. Government taxes domestic returns in order to finance a given expenditure requirement, and so the per capita tax rate is endogenous, and depends on the number of investors who do not flee to the foreign asset. When transactions costs to changing the investment position are added, there is a range of inaction where capital flight will not be repatriated, even though the expected domestic returns are favourable.

Another type of capital flight model has explored why domestic agents face high and uncertain risks of explicit and implicit taxation of domestic assets. Alesina and Tabellini (1989) consider a model in which different government types with conflicting distributional goals randomly alternate in office. The uncertainty over future fiscal policies leads simultaneously to capital flight, low domestic investment, and the occurrence of large external debts. The over-borrowing occurs since the current government does not fully internalize the future costs of servicing the debt. In Tornell and Velasco (1992), the government is the clearing house of interests of various groups, and confiscatory policies are the outcome of the interest group game. If different groups have the ability to extract transfers from government each groups effectively has common access to the others capital stocks. Capital flight offers an asset that may have a lower return, but its return can be privately appropriated. Finally, examples of capital flight models that focus on the different tax treatments for resident and nonresident holders of domestic assets include Dooley and Kletzer (1994) and Razin (1991).

The nature of the foreign debt-capital flight relationship has been controversial both in the literature and for international lenders and country governments. In the models discussed above, two different types of causal linkages have been considered. In Eaton's model, the inflow of foreign resources provides both the resources and a possible motive for capital flight. Boyce (1992) calls this debt-fueled capital flight, as distinguished from debt-motivated capital flight that was the focus of some other models. The models above that considered debt-motivated capital flight focused on the channel through which high levels of foreign debt created expectations of heavy future asset taxation. It is also possible that there is no causal relationship between foreign debt and capital flight, but rather an indirect linkage. In Alesina and Tabellini, for example, uncertainty about the type of future government generates capital flight, large foreign debts and low domestic investment.[6]

Finally, it may be that the causality runs in the other direction, from capital flight to foreign debt. Boyce distinguishes flight-driven external borrowing from flight-fueled external borrowing. In the former, the drain of domestic resources lowers investment and generates demand for replacement funds from the government and private sectors, which external creditors may be willing to supply given the lower risks of heavy asset taxation they face. When external borrowing is fueled by capital flight, residents deposit capital abroad, and the depositor obtains a loan from the same bank. This "round-tripping" allows the domestic investor to arbitrage the yield and risk differential between

[6] Another example of an indirect linkage is Blejer and Ize (1989). uncertainty over adjustment efforts leads to both capital flight, low investment, and the sudden withdrawal of new foreign financing that accompanied the debt crisis.

resident and external capital. [7]

Implications for an Empirical Portfolio Model of Flight Capital

To determine what special features relevant to the allocation of wealth to capital flight and domestic investment should be added to a standard portfolio model, we will consider the theoretical models together with the general empirical patterns of capital flight experienced largely in the 1970s and 1980s.

The general empirical evidence on country-by-country macroeconomic policy and capital flight patterns suggests that pronounced capital flight occurs when a country experiences severe macroeconomic imbalances (Schineller, (1997)) and the risks of punitive domestic asset taxation increase rapidly. Many countries experienced episodes of large sudden changes in capital flows which seem related to indications that policies were unsustainable. These very large increases in capital flight suggest that standard return differentials based on equilibrium relationships will not account for the size of the capital movements, since asset returns will not adequately reflect the large increase in policy oriented risks.

The standard portfolio model suggests two key incentives for capital flight, after tax domestic returns adjusted for expected depreciation that are lower than after tax foreign returns, and domestic returns that have higher volatility or risk than foreign returns. Our first modification to the standard model is the idea that the expected risk-adjusted relative returns will not be well captured by interest differentials, actual tax rates, and expected depreciation based on actual depreciation of the official exchange rate, as well as differential return volatilities. The theoretical models point out that one of the most important determinants of the expected future asset tax rate is the level of foreign debt. Expected depreciation may be better related to the degree of overvaluation of the real exchange rate. Historical return volatilities may not be a good guide to expected riskiness of domestic assets during periods of severe policy and structural imbalances as well as political uncertainty. Below we discuss empirical proxies that represent risk-adjusted return differentials in this broader fashion.

Second, the models above have pointed to the importance of contagion or spillovers in capital flight. Empirically, these models imply that in the portfolio decision of an individual investor, the expected after-tax returns on domestic investment would depend on the expected aggregate level of capital flight (or alternatively the available domestic capital base subject to taxation). One implication for aggregate capital flight portfolio shares is that the determinants of capital flight may have different effects when the capital flight share is small compared to when it is large. For example, a particular expected tax rate may have only small effects on the incentive for capital flight when the share of capital flight in aggregate portfolios is small. However, as capital flight increases, the same expected tax rate could imply a much higher per capita expected tax liability given the lower domestic asset tax base, and thus have a larger influence on capital flight. This reflects the spillover notion that as capital flight increases, the incentives for further flight increase.

[7] For the Philippines Boyce (1992) finds evidence for both debt-fueled capital flight and flight-fueled external borrowing. Ajayi (1997) states the no relation between debt and capital flight was found for a sample of sub-Saharan African countries, although the methodology and results are not reported.

Third, foreign assets are much more liquid than domestic physical capital or claims on domestic physical capital. A model that considered the liquidity of alternative assets would imply that return differentials should be augmented by a liquidity premium. In addition, if domestic investment is more irreversible, then continuing to hold foreign assets even when domestic returns have become more favourable can be optimal due to the "option to wait" for future news about domestic returns.

Determinants of Flight Capital Portfolio Shares

In Section 2 we developed measures of private portfolio choice as of 1990 for 51 countries and showed that at the regional level there were striking differences in choices. In Section 4 we will attempt to explain these differences. In order to do so we first develop a framework for analysing the choice between holding assets domestically and abroad. While such a framework may potentially involve many considerations, our purpose is to test our approach through measurable proxies for the theoretical concepts. We therefore limit the analysis to those factors which are amenable to measurement and include a discussion of empirical proxies for each concept. We consider factors that influence our broad concept of rates of return and the risks associated with each asset.

The rate of return on foreign assets can be assumed to be the same for all asset holders, and so relative returns differ only because of differences in domestic rates of return. The domestic private rate of return upon capital, r, is assumed to be determined by four factors: the endowment capital relative to labor, k, the rate of taxation of capital, t, anticipated changes in the real exchange rate, e, and the policy environment, p, which determines the productivity of capital for a given capital-to-labor ratio:

$$r = r(k, t, e, p) \qquad (1)$$

Although there are circumstances in which the return on capital will not decline in response to a rise in the aggregate capital-labor ratio, it is nevertheless reasonable to assume that conditional upon the policy environment it will do so. Recall from Table 1 that there are very large differences in the total capital stock (public plus private) per worker, between regions. We would expect that, ceteris paribus, this would imply that the rate of return on capital would be higher in the capital scarce regions. Of course, the lack of capital in a region may be partly or wholly the result of other differences. In a world of fully mobile capital without risk, the rate of return on capital would be equalized, and so differences in capital/labor ratios would be a reflection of underlying differences in production functions (or other endowments). However, the fully mobile capital model still utilizes the assumption of diminishing returns to capital: capital is withdrawn from unproductive regions and invested in productive regions until returns are equalized as a result of diminishing returns. To reduce the problem of endogeneity, we will measure the capital-labor ratio for each country as of 1980, using it to predict the portfolio choice in 1990. Most capital flight has occurred post-1980.

While the capital-labor ratio affects the overall return on capital, private portfolio decisions reflect only private returns. The main divergence between social and private rates of return is due to taxation. Because capital once installed is largely irreversible, owners of capital will be concerned not just with current rates of taxation but with expected future tax liabilities. A good measure of these

an important part of these liabilities is the foreign indebtedness of the economy. We proxy this by the ratio of foreign debt to GNP.

Domestic and foreign assets are denominated in different currencies. Hence, to the extent that changes in the real exchange rate can be anticipated, the overall anticipated rate of return on foreign assets will include currency appreciation or depreciation. Although in competitively determined currency markets information may be used efficiently, so that exchange rate changes cannot systematically be predicted, in many developing countries official exchange rates have for periods been considerably misaligned. During periods when the real exchange rate is overvalued private agents have an incentive to move assets abroad, because they can anticipate depreciation in some future period. We proxy this by the Dollar index of real exchange rate distortion (Dollar, 1992). The Dollar index also proxies differences in the policy environment, since it seeks to measure not only the extent to which the real exchange rate is misaligned, but the extent to which it is distorted by the effects of trade policy restrictions. A high level of policy distortions will lower the return on domestic investment through various routes. Hence, any effect of the index on portfolio choice should be interpreted as a composite of the effect of anticipated changes in the exchange rate, and of the effect of trade policy on the rate of return on investment. Similarly, the ratio of foreign debt to GNP will also partially proxy the policy environment. A high level of foreign debt to GNP is likely to reflect a history of poor use of public resources: the ratio is high because of a lack of growth

In addition to the expected rate of return on an asset, wealth-holders must consider its implications for portfolio risk, which is determined by the individual riskiness of the asset and its co-variance with the rest of the portfolio. Foreign assets can be regarded as a relatively safe asset, the absolute degree of risk being similar for all asset holders, while the co-variance with domestic assets is usually low. Thus, the proportion of the portfolio held abroad, *f*, will depend upon both the return on domestic assets relative to foreign assets, *r*, and on their riskiness relative to foreign assets, *v*:

$$f = f(r, v) \qquad (2)$$

A composite measure of the relative riskiness of domestic investment is the *Institutional Investor* risk rating for a country. This is generated by a poll of informed banking opinion twice a year, and is scaled 0-100 (0 being highest risk). Although the risk rating is a broad measure of country risk geared toward foreign investment and sovereign lending, many of the factors considered influence the climate for domestic investment. One factor which influences the risk ratings is indebtedness. The *Institutional Investor* ratings and the ratio of debt to GNP have a correlation coefficient of 0.42. An indicator which is sometimes discussed as an indicator of asset riskiness is corruption. A high incidence of corruption may make legitimate assets vulnerable, and also corruptly acquired wealth may be more secure outside the country. We use the International Country Risk Guide measure of corruption, averaged for the 1980s.

We have introduced the five observable explanatory variables, the capital-labor ratio, foreign debt, the Dollar distortion index, the Institutional Investor risk rating, and the corruption index as individually proxying the underlying analytic explanatory variables. However, the observable variables are more properly interpreted as collectively proxying the risk-corrected rate of return on domestic investment, rather than as individually proxying its components.

4. Results

Throughout we use two dependent variables, the proportion of private total wealth held abroad , and the proportion of private real wealth held abroad. Both variables are measured as of 1990, this being the most recent date for which all data is available. In principle, since private agents make their portfolio choices by considering all their components of wealth, the dependent variable which most closely approximates the decision problem of the private agent is flight capital as a proportion of private total wealth. However, there are three reasons why the alternative measure of flight capital as a proportion of private real wealth might be preferred. First, the only component of private financial wealth which can be measured on a comparable basis for a reasonable sample of countries is quasi-money. The addition of this single component of financial wealth might result in an inferior estimate of total private wealth than using the complete data on real private wealth as a proxy. Secondly, demand for the two relatively illiquid assets, domestic real capital and flight capital, might be more closely related than that for quasi-money. Thirdly, at the aggregate level of the real economy, domestic private financial assets either directly net out or are claims on the government which can only meet them by future taxation of the private sector. The only allocative decision at the aggregate level is between domestic real capital and flight capital.

Full data on explanatory variables are available for 43 of the 51 countries for which we have data on the dependent variables. The first explanatory variable is the endowment of capital per worker (private plus public) as of 1980. Since most capital flight is post-1980, this considerably reduces potential endogeneity. The other explanatory variables are the Dollar distortion index, the *Institutional Investor* risk ratings, and the ratio of debt to GNP. For each of these we use the annual average of the variable for the period 1980-89. One rationale for using the average over the decade instead of the end-period value is that, because the costs of reversing investments are sometimes high, the portfolio composition at any one time will reflect past decisions. Further, we argued above that theoretical models point to the potential endogeniety of the foreign debt ratio, and that the endogeneity of the real exchange rate distortion index should also be considered. By utilizing previous period averages we reduce this problem of endogeneity.

The *Institutional Investor* risk ratings and the Debt/GNP ratio are more highly correlated than any other variables. We therefore present regressions in which they are included separately as well as jointly. When both are included only one is significant, but which of the two is dominant depends upon the measure of the dependent variable.

For twelve of the countries in the sample the measured stock of capital flight as of 1990 is zero. We therefore utilised tobit models. We investigated non-linear relationships through the introduction of squared terms and allowed for regional effects through dummies.[8] The results are reported for flight

[8] Only that for Latin America was significant and other regional dummies were dropped. We also dropped the corruption index which was never significant. Based on our discussion of how liquidity considerations could affect portfolio allocation, we also investigated whether financial depth, measured as the ratio of M2/GDP was a determinant of the capital flight share. The variable was not significant in any of the specifications and was dropped.

capital as a proportion of private real wealth in Table 2A, and for flight capital as a proportion of private total wealth in Table 2B. Overall, the two dependent variables reveal a very similar story, although the fit is usually better for flight capital as a proportion of private real wealth. The addition of quasi-money increases the importance of exchange rate over-valuation relative to investor risk, which may reflect the greater liquidity of quasi-money. In the following discussion we focus upon Table 2A. We regard our real wealth measure as a better proxy for total private wealth than that generated by the inclusion of quasi-money, and further, our subsequent applications in Section 5 rely upon the aggregate choice between domestic real private investment and flight capital. Overall, all variables are usually significant with the expected sign and credibly sized coefficients, and the fit of the regression is good.

The capital to labor ratio is significant at 2%. However, its effect is not very large. An addition of $10,000 per worker, which is a very large increase by the standards of developing countries, increases the proportion of private wealth held abroad by only 8 percentage points.

The Dollar distortion index is significant at 1% and has a large effect. The index is constructed so that a value of 100 represents a normal set of relative prices. We investigated whether values of the index below this level had different effects from values above 100, but found no difference. Further, the effect is best captured by the square of the index, suggesting that it is extreme over-valuations which are most damaging. For example, a change in the index from 100 to 200 increases the proportion of the portfolio held abroad by a massive 26 percentage points. A value of 200 is high but by no means the peak of the index: over the 150 countries for which the index has been measured, the peak value is 406.

The *Institutional Investor* rating is significant at the 10% level in regression 1 but loses significance once foreign debt is included. This may reflect the importance of debt in assessments of country risk, or that both debt and the risk ratings are measuring similar underlying country characteristics, such as government behavior. In regression 1, a ten-point improvement in the index reduces the proportion of the portfolio held abroad by 4.4 percentage points. A ten-point difference in the risk ratings is within the feasible policy range for many countries. For example, it is approximately the gap between Sub-Saharan Africa and the Middle East. A strongly reforming country such as Uganda

Table 2A: The Determinants of Flight Capital/Private Real Wealth

	Baseline regressions				Robustness checks							
					Based on Cline capital flight measure				Based on Dooley capital flight measure			
	Regression 1		Regression 2		Regression 1		Regression 2		Regression 1		Regression 2	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Capital/worker 1980	0.000889	2.56	0.000866	2.68	0.0011	2.196	0.00102	2.27	0.00062	1.659	0.0006	1.69
Dollar Index squared	0.000878	3.87	0.000881	4.16	0.00103	3.398	0.00102	3.77	0.00084	3.469	0.00084	3.63
Institutional Investor	-0.497	-1.99	-0.286	-1.14	-0.76065	-2.004	-0.423	-1.17	-0.711	-2.582	-0.548	-1.93
Debt/GNP squared			0.000374	2.20			0.00046	2.15			0.00027	1.45
Latin America	-26.701	-3.38	-26.184	-3.55	-24.49	-2.149	-23.7	-2.3	-20.08	-2.406	-19.8	-2.48
Constant	15.026	1.57	5.487	0.55	1.33	0.100	-10.87	0.137	20.97	2.043	-.13.86	1.255
Log-likelihood	-2.89		-0.60		-12.58		-10.46		-6.632		-5.612	
N	43		43		43		43		43		43	

Table 2B: The Determinants of Flight Capital/Total Wealth

	Baseline regressions				Robustness checks							
					Based on Cline capital flight measure				Based on Dooley capital flight measure			
	Regression 1		Regression 2		Regression 1		Regression 2		Regression 1		Regression 2	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Capital/worker 1980	0.000863	2.96	0.000850	2.99	0.0010	2.33	0.00099	2.34	0.000617	1.91	0.000611	1.90
Dollar Index squared	0.000983	4.99	0.000946	4.88	0.0012	4.23	0.0011	4.16	0.000938	4.31	0.000919	4.22
Institutional Investor	-0.321	-1.47	-0.249	-1.12	-0.451	-1.33	-0.355	-1.04	-0.529	-2.12	-0.488	-1.91
Debt/GNP squared			0.000226	1.25			0.00241	0.98			0.000121	0.60
Latin America	-21.21	-3.25	-22.38	-3.41	-18.52	-1.86	-19.50	-1.99	-16.25	2.22	-16.64	-3.28
Constant	5.37	0.61	2.38	0.27	-10.93	-0.04	-13.99	-1.06	11.59	1.19	9.95	0.99
Log-likelihood	-2.19		-2.96		-9.49		-9.02		-2.92		-2.744	
N	42		42		42		42		42		42	

was able to improve its risk rating by four points just during 1997. Were Africa to improve its risk rating by ten points the change in portfolio choice would raise the private capital stock by 7.2%.

The ratio of foreign debt to GNP is significant at the 5% level. However, the variable fits best as a square of the ratio, and becomes economically important only at very high levels of indebtedness. For example, at the level of indebtedness agreed by the European Union for its 'convergence criterion', namely 60 %, debt only reduces the proportion of wealth held domestically by 1.4 percentage points compared with a debt-free economy. By contrast, moving from the highest indebtedness found in the sample, 297%, to the level of 60%, would reduce the proportion of wealth held abroad by 32 percentage points.

We now consider the robustness of the results to two different measures of capital flight. Specifically, we use the Cline method, which like our own uses a residual approach but with different assumptions, and the Dooley method, which seeks to measure the stock of privately held foreign assets that do not generate income reported to the authorities. As shown in Table 2A, we obtain similar results using these measures as we did with the World Bank estimates. On the Cline measure the *Institutional Investor* ratings, while significant when the debt ratio is excluded, are dominated by the debt ratio; on the Dooley measure, the ratings dominate the debt ratio. Recall that the ratings and the debt ratio are highly correlated.

We now develop four applications of the regressions: the effect of the East Asian crisis on capital flight; whether capital flight is subject to spillovers; the effect of the HIPC debt initiative on capital repatriation; and why Africa has had so much capital flight.

5. Four Applications

The East Asian Crisis

Although capital outflows have obviously played a central role in the East Asian crisis, the focus to date has been on the repatriation of short term foreign capital. Here we consider the response of domestic portfolios. We show that in steady-state, the domestic adjustment is likely to be larger than the foreign adjustment.

The East Asian crisis has resulted in a sharp fall in investor confidence in some countries in the region. We utilize the observed decline in the *Institutional Investor* risk ratings first between March 1997 and March 1998, and then between March and September 1998, to estimate the impact on the reallocation of East Asian portfolios into capital flight. As with the HIPC effect, we are here using a coefficient derived from a cross-section analysis to derive the consequence of an event. Since the cross-section result tells us nothing about dynamics it can at best suggest the long-run effect of an event. The results should therefore be interpreted cautiously, as showing how portfolios might eventually adjust were the changes in the risk ratings persistent.

Table 3 shows the estimated increase in capital flight for the four most severely affected East Asian countries: Thailand, Korea, Malaysia and Indonesia. The first five rows show the deterioration in the *Institutional Investor* risk ratings. The main deterioration in the risk ratings occurred in the six

months subsequent to March 1998. The sixth row shows our estimate of private real wealth as of 1996, the most recent year for which an estimate is currently feasible. The final two rows show our prediction of the increase in the capital flight component of portfolios. Between them the four countries are predicted to experience a capital outflow of almost $250bn .

Table 3: Capital Flight in Response to the East Asian Crisis

	Thailand	Korea	Malaysia	Indonesia
Risk Rating				
March 1997	61.1	71.4	67.5	51.6
March 1998	52.3	64.4	64.5	49.9
September 1998	47.5	53.6	59.0	32.9
Change Mar.97-Mar.98	-8.8	-7.0	-3.0	-1.7
Change Mar.97-Sept.98	-13.6	-17.8	-8.5	-18.7
Private real wealth in 1996 ($bn at current prices)	639.4	1,093.3	357.6	993.8
Predicted change in portfolios: In $bn. At current prices:				
Mar.97.Mar.98	-28.0	-38.0	-5.3	-8.4
Mar.97-Sept.98	-43.2	-96.7	-15.1	-92.3
As % of 1996 GNP:				
Mar.97-Mar.98	-15.5	-7.9	-5.6	-3.9
Mar.97-Sept.98	-23.9	-20.1	-16.0	-42.9

Notes: Private wealth in our underlying data set is calculated as discussed in Section 2 for 1990 and is measured at 1985 prices. As in Table 5, we first convert this to 1990 prices by multiplying by 1.214, the increase in the US CPI over the period. We then assume that the ratio of private wealth to GNP was the same in 1996 as in 1990, and so scale up the 1990 private wealth figure by GNP in 1996/GNP in 1990. The effect on private portfolios is then calculated as the change in the risk rating, multiplied by 0.00497 (the coefficient on the risk rating in regression 1) multiplied by private wealth in 1996.

Note that this is quite distinct from any flight of foreign-owned assets from the four countries. As a proportion of GNP the largest loss would be borne by Indonesia, capital flight exceeding 40% of GNP.

The predicted steady-state domestic capital outflow of $250bn can be compared with the actual reversal to date in total private capital flows, domestic plus foreign, which can be observed from changes in the balance of payments. Between 1996 and 1998 what had been a large net foreign private capital inflow turned into a large net outflow, reflecting both capital repatriation by non-East Asians, and capital outflows by East Asians. The total of this to date is around $100bn. Since we only estimate capital outflows by East Asians, we are only predicting one component of the observed total. However, the full $250bn predicted domestic portfolio adjustment might only take place over several years.

Spillovers

One implication of contagion or spillovers in capital flight is that the determinants of capital flight may have different effects when the predicted capital flight share is small compared to when it is large. This hypotheses reflects the spillover notion that as capital flight increases, the incentives for further capital flight increase. We can explore this notion using a quantile regression approach. By calculating regressions for different quantiles, it is possible to examine the shape of the conditional distribution of capital flight shares. Our particular interest is whether there are differences in the determinants of capital flight at the low and high end of the conditional distribution of capital flight shares. Quantile regressions are defined by minimizing the absolute sum of the errors, rather than, as in least squares, by minimizing the sum of their squares. It is thus also known as the LAD (Least Absolute Deviations) estimator. Censored regression models such as the tobits we have been using create additional complexities for estimating quantile regressions. We use Powell's (1984) censored LAD estimator as implemented in Deaton (1997) and Buchinsky (1994). Standard errors are estimated using a bootstrap method.

Table 4 presents estimates of regression 1 at the 0.33 and 0.67 quantiles. Each of the coefficients is larger in magnitude at the 0.67 quantile. In addition, the Dollar distortion index of the real exchange rate and the risk rating are not significant in the 0.33 quantile regression. These results provide some support for the spillovers hypothesis. At low quantiles in the conditional distribution of capital flight shares, some proxies for risk-adjusted returns have either small or insignificant effects. However, at a high quantile in the conditional distribution, these same factors have larger and significant effects. Factors that influence the expected risk and return on domestic assets have greater impact when capital flight is high. This could be explained by spillovers in the sense of general bandwagon effects as well as by spillovers induced by increasing expected per capita liabilities as capital flight increases.

Table 4: Quantile Regressions using Powell's censored LAD estimator

Regression 1	.33 Quantile Coefficient	t-statistic	.67 Quantile Coefficient	t-statistic
Capital/worker 1980	0.000873	1.91	0.000934	3.87
Dollar Index squared	0.000563	0.96	0.00125	2.50
Institutional Investor	-0.602	-.95	-0.717	-2.79
Latin America	-19.67	-2.67	-34.76	-3.71
Constant	13.72	0.46	26.11	2.01
Pseudo R^2	0.34		0.42	
N	32		39	

The HIPC Initiative

The new debt relief initiative of the IMF and the World Bank, the Heavily Indebted Poor Countries arrangement, has the effect of lowering the foreign debt/GNP ratio for those countries which are eligible. Currently, Uganda, Cote d'Ivoire, Burkina Faso, Guyana, Mozambique and Bolivia have passed the `decision point', at which it is determined that the country has met the eligibility criteria, although only Uganda has passed the `completion point', at which debt is actually reduced. The debt/GNP ratio will decline for these countries, although by widely varying amounts. Table 5 shows the effect upon private portfolios, applying the debt coefficient from Table 2A. We convert this into an estimated dollar amount commensurate with the 1996 debt and GNP figures used by assuming that the ratio of private wealth/GNP observed for 1990 also applied in 1996. Thus, for example, for Guyana, debt forgiveness under HIPC is estimated to reduce indebtedness by 25%. We estimate that the effect of this would be to reduce the proportion of Guyanese private wealth held abroad by 10.1 percentage points. On these assumptions, Guyanese private wealth holders would repatriate $610.1m. Since the NPV of the debt reduction is only $253m, in this instance each dollar of public funds is augmented by $2.41 of repatriated private funds. Debt relief to Guyana has such a high gearing because Guyana is very highly indebted, while the marginal efficiency of debt relief increases with indebtedness, and because it has a high level of private wealth relative to GDP. By contrast, Burkina Faso and Uganda have far lower gearing because both the above factors work against them.

Table 5: The Effect of the HIPC Debt Relief Initiative on Portfolio Choice

	1996 Debt/GNP	HIPC Reduction (% points)	Portfolio Change (% points)	($m)	NPV of debt reduction ($m)	Gearing
Uganda	60.5	12.1	0.50	29.0	347	0.08
Burkina Faso	51.2	7.2	0.26	7.9	115	0.07
Guyana	246.0	61.5	10.10	610.1	253	2.41
Cote d'Ivoire	201.3	12.1	1.80	297.3	345	0.86
Mozambique	378.6	215.8	44.40	3,103.8	1,442	2.15
Bolivia	80.9	9.4	0.54	-	448	-

Notes: Debt/GDP for 1996 from *Global Development Finance*, World Bank, Table A1.4. The HIPC Reduction is the percentage reduce in the net present value of debt at the 'completion point' after full use of traditional debt relief mechanisms, as estimated by the IMF. Because HIPC meets a flow of debt service obligations, its impact on indebtedness is best calculated by the reduction in the NPV of debt rather than as a face value. The Portfolio Change in percentage points is 0.00087 [column 1 squared – ((column 1 – column 2) squared). Note that we thus assume that the (notional) nominal indebtedness declines proportionately with the NPV of debt. The dollar value of the portfolio change is calculated as the change in percentage points times estimated private wealth in 1996. The latter is the 1990 value at 1985 prices, estimated as in Table 1, multiplied by 1.214 (the increase in the US CPI) to convert into 1990 prices, multiplied by 1 + the growth in nominal dollar GNP, 1990-96, from *Global Development Finance, 1998*. Bolivia is not part of our data set for Table 1 and so the dollar value of the portfolio change cannot be estimated.

Why has Africa had so much capital flight?

The most remarkable result of the study is that Africa has such a high level of private capital held abroad, namely 39%. We now utilize the regression results to explain this phenomenon. First, when an Africa dummy variable is introduced into the regression it is neither large nor significant. Hence, between then the variables included in the regressions fully account for this exodus of private capital. In Table 6 we decompose African capital flight into its causes by explaining the difference between African and East Asian portfolio choices: why have East Asians placed a much smaller proportion of their wealth abroad than Africans?

Table 6: Africa and East Asia Compared

Variable	Africa Mean	E. Asia Mean	--------Coefficients-------- Regression 1	Regression 2	Differences (Africa minus E. Asia)	
Capital/worker 1980	4338	7614	0.00082	0.0008	-2.69	-2.62
Dollar Index squared	23189.9	6990.9	0.00087	0.00087	14.093	14.093
Institutional Investor	22.4	51.5	-0.44	-0.23	12.804	6.693
Debt/GNP squared	13989.7	2818.7		0.00038		4.245
Capital flight share	42.0	6.1				
Total explained difference					24.2	22.4
Actual difference					35.9	35.9
Residual					11.7	13.5
Total explained difference as a % of actual difference					67.4%	62.4%

Note: The means used in Table 6 are for the regression sample which, as reported in the appendix, is smaller than that used for Table 1. Means of capital per worker and capital flight are calculated on the same basis as in Table 1.

The first explanatory variable, the endowment of capital per worker, actually deepens the puzzle. As shown in Table 1, Africa has a far lower capital endowment than East Asia and the regressions find that, other things equal, capital scarcity reduces capital flight. East Asia has had little capital flight despite being relatively well-endowed with capital, whereas Africa has had massive capital flight despite being poorly endowed. Both regressions imply that the difference in capital endowments would have induced Africans to hold domestically three more percentage points of their portfolios than East Asians. Hence, that Africa has such a high proportion of its wealth abroad despite being capital-scarce, is an indicator of how much effect the other variables have had.

African real exchange rates have been substantially over-valued relative to East Asian exchange rates. The average value of the Dollar index in the African sample was 140 as against 83 for the East Asian sample. Recall that the effect of exchange rate over-valuation is non-linear, being determined by the square of the index rather than by its level. Hence, the mean values of 140 and 83 convert into squared values of 19,572 against 6,885. However, even this understates the effect on portfolio choice because some African countries have had extremely overvalued exchange rates. As a result, the difference between the means of the squares of the index, which is what matters for the regression, is even greater than that between the square of the means. The mean of the squares of the index was 3.32 times greater in Africa than Asia, whereas the square of the mean is only 2.84 times greater. Both regressions imply that this large difference would have induced Africans to hold domestically fourteen less percentage points of their portfolios than East Asians.

Africa has been rated by international investors as the riskiest continent. The average value of the *Institutional Investor* index was only 22 for Africa versus 52 for East Asia. Recent events in East Asia suggest that these ratings might not have been accurate predictors of actual risks. Haque et al. (1999) show that although the ratings are explicable on economic fundamentals, there is a large and significant Africa dummy: Africa is regarded as more risky than is warranted by the fundamentals. The effect of this difference in risk ratings between Africa and East Asia on portfolio choice has been substantial. The regressions imply that they have increased African capital flight relative to East Asian by between 6 and 12 percentage points of private portfolios.

Africa has been much more heavily indebted than East Asia: on average, debt/GNP was 95% in the African sample and only 51% in East Asia. However, as with exchange rate over-valuation, even this difference understates the effect upon portfolio choice because it is the square rather than the level of the variable which is important. While the average African country has been heavily indebted, some countries have been extremely heavily indebted. Hence, the mean of the squares is 4.96 times greater than East Asia, whereas the square of the mean is only 3.45 times greater. The regression with debt included implies that this has increased African capital flight relative to East Asian by four percentage points of private portfolios.

6. Conclusion

In this paper we have attempted to set flight capital in the context of a portfolio choice, focusing on the proportion of private wealth which is held abroad. For 51 countries as of 1990 we were able to construct estimates of private domestically held capital on a comparable basis, and estimates of the stock of capital flight. The sum of these two stocks yields private real wealth, of which the stock of flight capital is then expressed as a proportion. We found that there were large regional variations in the proportion of the portfolio held abroad, with the highest proportion being for Sub-Saharan Africa, where 39% of private wealth was abroad. By contrast, East Asia had only 6% of its private wealth abroad.

Next, we attempted to explain these differences. We first set out a simple framework for portfolio choice based upon the rate of return on domestic assets and their riskiness relative to foreign assets. We then proposed measurable proxies for the variables used in the theory and tested it on the data set. Other things equal, the higher is the endowment of capital per worker the higher is capital flight. Exchange rate over-valuation, foreign indebtedness, and investor risk all increase the proportion of the portfolio held abroad. Next, we applied the results to four questions. First, we used the estimated effect of the risk ratings to calculate the effect of their deterioration in response to the East Asian crisis on East Asian portfolios. We estimated that the four most severely effected East Asian countries would eventually lose around $250bn of domestic wealth as a result of the deterioration in risk between March 1997 and September 1998. Second, we considered whether the results were consistent with a spillover model and found some support for it. Thirdly, we used the estimated effect of foreign debt to calculate the effect of the HIPC debt relief initiative on capital repatriation. We find that the effect will vary massively between HIPC-eligible countries. Finally, we considered why Africa has had so much capital flight. Since Africa has by far the lowest capital per worker, this makes its high capital flight all the more distinctive. However, an African dummy added to the regression is insignificant. Three variables explained African capital flight: exchange rate over-valuation, adverse

investor risk ratings, and high indebtedness. We decomposed the large difference in capital flight between Africa and East Asia into these components.

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Appendix A: Simple Portfolio Model of Capital Flight from Sheets (1995)

Consider and agent who maximizes a constant relative risk aversion (CRRA) utility function $U(\overline{W}_t, \sigma_p^2)$. The agent invests a share of wealth a in the domestic asset which has expected return $\bar{r}$ and variance σ^2, and share (1-a) in the foreign asset which has expected return $\bar{r}_f$ and variance σ_f^2. Covariance between the two assets is σ_{12}.

End of period wealth is:

$$\overline{W}_t = (\alpha(1+\bar{r}) + (1-\alpha)(1+\bar{r}_f))W_t$$

The variance of the portfolio is:

$$\sigma_p^2 = (\alpha^2\sigma^2 + (1-\alpha)^2\sigma_f^2 + 2\alpha(1-\alpha)\sigma_{12})$$

The agent's optimization problem can be solved to yield the demand function for the domestic asset:

$$D_{1t} = \left(\frac{\sigma_f^2 - \sigma_{12}}{\sigma_p^2} + \frac{\bar{r} - \bar{r}_f}{\theta\sigma_p^2} \right) W_t ,$$

where ? is the coefficient of relative risk aversion. Demand for the home asset increases linearly with wealth, decreases with risk aversion, and increases as with the differential between the domestic interest and world interest rate.

If the expected return and variance of the domestic asset were equal to that of the foreign asset, the agent would diversify her portfolio, and hold half of wealth in each asset, $\overline{D}_t$. When the expected returns and variances of the assets differ, we can express the home asset as follows (using a first-order Taylor expansion around the foreign expected return and variance):

$$D_{1t} \approx \overline{D}_t \left(1 + \frac{1}{\sigma_f^2 - \sigma_{12}} \left(\frac{(\bar{r} - \bar{r}_f)}{\theta} - \frac{1}{2}(\sigma^2 - \sigma_f^2) \right) \right)$$

This expression highlights two channels which reduce demand for the home asset and increase demand for the foreign asset. These are the types of factors that lead to capital flight. First, in the text we discuss how conditions of macroeconomic and political instability increase the riskiness of investing domestically relative to holding foreign assets. In the expression above, these effects operate through the third term. Secondly, we discuss the explicit and implicit asset taxes imposed by governments that lower the expected domestic return relative to the foreign return. These effects operate through the second term.

Data Appendix

Sample for Table 1:

SSA	LAC	SASIA	EASIA	MENA
Benin	Costa Rica	Bangladesh	Indonesia	Egypt
Burkina Faso	Dominican Rep	India	S Korea	Tunisia
Burundi	El Salvador	Pakistan	Malaysia	Syria
Cameroon	Guatemala	Sri Lanka	Philippines	
Congo	Honduras		Thailand	
Gabon	Jamaica			
Gambia	Mexico			
Ghana	Nicaragua			
Ivory Coast	Argentina			
Kenya	Brazil			
Mali	Chile			
Mauritania	Colombia			
Mauritius	Ecuador			
Mozambique	Guyana			
Nigeria	Paraguay			
Rwanda	Peru			
Senegal	Venezuela			
Seychelles				
Togo				
Uganda				
Zambia				
Zimbabwe				

Sample for Table 2 (Regressions):

SSA	LAC	SASIA	EASIA	MENA	other
Cameroon	Costa Rica	Bangladesh	Indonesia	Egypt	Portugal
Congo	Domin. Rep	India	South Korea	Tunisia	Turkey
Gabon	El Salvador	Pakistan	Malaysia	Syria	
Ivory Coast	Guatemala	Sri Lanka	Philippines		
Kenya	Honduras		Thailand		
Mauritius	Jamaica				
Mozamb.	Mexico				
Nigeria	Nicaragua				
Seychelles	Argentina				
Senegal	Brazil				
Uganda	Chile				
Zambia	Colombia				
Zimbabwe	Ecuador				
	Paraguay				
	Peru				
	Venezuela				

Capital Stock Measure

Following King and Levine (1994) we estimate an initial capital stock and use the perpetual inventory method to compute our capital stock measure.

Based on a neo-classical growth model we compute estimates for the initial capital stock. The capital stock, K, changes due to gross investment, I, and depreciation

$$dK_t = I_t - dK_t \qquad \text{(i)}$$

where d is the depreciation rate. Assuming that the economy is in steady-state the capital-output ratio, ?=K/Y, is constant and output, Y, and capital grow at the same rate, $?_t$.

$$\frac{dK_t}{K_t} = \frac{dY_t}{Y_t} = g^*_t \qquad \text{(ii)}$$

Dividing (i) by K_t we can write

$$g^*_t = \frac{I_t}{K_t} - d$$

Denoting the investment rate, I/Y, by i we can write the steady-state capital output ratio for country j as

$$k^*_j = \frac{i^*_j}{(d + g^*_j)}$$

The initial capital stock for country j is given by

$$K_0 = k^*_j Y_0$$

We estimate the initial capital stock by assuming that the depreciation rate, d, is constant across countries and time. Like King and Levine (1994) we assume that the capital stock depreciates by seven percent per year. The country's steady state growth rate, $?^*_j$, is a weighted average of the country's and the world's growth rates

$$g^*_j = \lambda g_j + (1 - \lambda) g_w$$

where ? equals 0.25. Choosing 1960 as the initial year, $?_j$ is country j's average growth rate from 1960-69 and $?_w$ is the world growth rate over the last thirty years ($?_w$=0.04). Using PWT 5.6 data we calculate the average investment ratio 1960-69, i^*_j , and given $?_j$ and d we can compute the capital-output ratio, $?^*_j$. Taking the average of the PWT 5.6 output data over 1960-62 we estimate the initial output and calculate the initial capital stock.

Annual values for the capital stocks are obtained by applying the perpetual inventory method:

$$K_{t+1} = \sum_{k=0} (1 - d)^k I_{t-k} + (1 - d)^t K_0$$

Investment as well as workforce data from PWT 5.6 were used to obtain the capital stock per worker estimates.

Independent Variables

Dollar's (1992) Distortion Index

Dollar constructs a distortion index which measures to which extent the real exchange rate is distorted from its free-trade level. The distortion index is constructed in three steps. First, using data from PWT 5.6 the index of a country's relative price level (RPL) is determined

$$RPL = 100 \cdot e \frac{P_i}{P_{US}}$$

where e is the nominal exchange rate and P_i is the consumption price index for country i. The United States' price level, P_{US}, is used as the benchmark. RPL is similar to the usual measure of the real exchange rate, except that here the price indices employed have the same weights in each country.

The second step is the correction of RPL for different endowments across countries. The main proxy for endowments is GDP per capita and RPL is regressed on GDP per capita. The partial correlation between RPL and GDP is positive and significant, this result is robust to different specifications. To obtain the index of price distortion, actual and fitted values are compared. Actual values for Sub-Saharan Africa and for Latin America tend to be higher than the fitted values, i.e. their price levels are higher than predicted by their GDP. Thus, these countries have had higher prices due to trade restrictions. A number of South East Asian countries on the other hand have price levels which are below their predicted price level.

Finally, the index of real exchange rate distortion is obtained by dividing the actual price level by the predicted price level (and multiplied by 100).

Institutional Investor Risk Rating

The Institutional Investor risk ratings are based on evaluations from the staff of approximately the largest 100 commercial banks. The banks rate countries on a scale of 0 to 100, with 0 representing the highest risk. The Institutional Investor ratings for particular countries are obtained by weighting

the bank responses giving more weight to banks with larger international risk exposure and more sophisticated risk-analysis system. While primarily designed to evaluate sovereign risk, a poor sovereign risk environment is likely to be very highly correlated with a risky environment for domestic investment.

Debt/GNP

Debt/GNP ratio was obtained from World Bank World Data CD ROM 1994. It is the ratio of total external debt to GNP. Both components are measured in current US Dollars.

Capital/Labor Ratio

The capital stock per worker was obtained by dividing our capital stock measure (compiled following King and Levine, 1994) by the number of workers which we obtained from PWT 5.6.