ESSAYS ON THE ROLE OF TRADE AND COUNTRY RISK IN EMERGING MARKETS

by

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Abstract

The first two essays in this thesis are empirical studies of the role of risk in determining capital inflows into emerging markets. The final essay empirically investigates the role of trade openness in growth. Chapter 1 presents a brief introduction to the essays in this collection.

The first essay, titled *The Character of Sovereign Risk and the Nature of Contagion: Evidence from Brady Bonds*, investigates the composition of the country risk premium using a data set of Brady bonds. The collateral stripped yield spread over the benchmark rate is examined for correlation with a comprehensive set of variables which indicate default probability. The results from the panel data estimation are consistent with the characterization of sovereign risk proposed theories which emphasize the role of liquidity constraints in generating default risk. The results from the preceding sovereign risk regressions are then used to assess the nature of price contagion within Brady bond market in the aftermath of the December 1994 Mexican financial crisis. The analysis finds that intensified contagion does not explain the increased comovement in observed creditworthiness after December 1994; instead this increased comovement can be completely attributed to the behavior of fundamentals.

The second essay, titled *The Impact of Macroeconomic and Political Instability on Foreign Direct Investment*, analyses the impact of instability on foreign direct investment. The literature on irreversible investment under uncertainty suggests that increased uncertainty temporarily reduces investment by increasing the option value of waiting to invest. The empirical analysis shows that macroeconomic instability, and extreme political instability tend to reduce FDI. The empirical findings in this paper support the view that countries which implement policies which promote undistorted trade and macroeconomic stability experience higher inflows of FDI as a share of GDP than do countries which fail to pursue trade openness and macroeconomic stabilization.

This third essay, titled *Outward Orientation, Trade Distortions and Long Run Economic Growth: An Empirical Analysis*, empirically investigates the links between trade and growth using a set of newly constructed indicators of trade openness. These indicators provide an approximation for the degree of trade distortions which arise from import tariffs, inappropriate exchange rate regimes and export controls. The empirical analysis employs two distinct approaches to assess the partial correlation between openness and growth: (1) standard cross-country growth regression and (2) the regression analog of growth accounting, in which growth

is separated into factor accumulation and residual productivity. The results from this paper support the view that policies which promote undistorted trade lead to higher growth rates and improvements in economic well-being. The empirical analysis confirms the assertions made in models of trade and neoclassical growth which contend that trade distortions decrease the productivity of capital (and therefore weaken growth) by hindering access to the import of relatively more efficient inputs.

Thesis Supervisor: Rudiger Dornbusch
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The four years I have spent studying Economics at MIT have been the most intellectually enriching and academically challenging years of my life. These years have also been the most rewarding, in many respects which extend beyond the sheer exhilaration which followed the writing and production of this thesis. At the close of these four years I find myself gratefully changed intellectually, somewhat mystified at the speed with which these preparatory years have passed, and even more perplexed to find myself at yet another embarkation, though this time I cannot imagine myself to be more fully prepared than studying at MIT has made me now. I am tremendously indebted to the many people who enriched my intellectual apprenticeship, who rallied me along the way, and who made my experience at MIT quite simply extraordinary.

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To my husband, to my parents, and to the memory of my *lolos*

I dedicate this thesis.

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Chapter 1

INTRODUCTION

The 1990s has witnessed the re-emergence of developing countries as active borrowers in international financial markets. The range of financial instruments for developing country debt has quickly expanded beyond traditional issues, such as Brady bonds and rescheduled loans, to include corporate and sovereign Eurobonds, and increasingly, financial derivative products. Net private capital flows into these so-called "emerging markets" has risen six years in a row (beginning in 1990) to an estimated $244 billion dollars in 1996. Currently they constitute over 80% of long-term financial flows to developing countries; ever more developing countries are receiving increased private capital. This steady escalation has been accompanied by, and has in part reflected, macroeconomic stabilization programs, and financial and trade liberalizations undertaken in many of these developing countries. Such sweeping economic reform in the aftermath of the debt crisis, in conjunction with low returns in many industrialized nations, provided a powerful impetus for this resurgence in capital inflow into emerging markets. In theory we should witness a strong correspondence between economic reform and capital flows. In practice, however, asset prices and capital flows may be determined as much by speculative forces as by fundamentals. The response of markets for developing country debt to economic fundamentals and to the irrational exuberance (or disaffection) of investors serves as the original motivation for the essays contained in this thesis.

These essays have two principal objectives. The first objective is to examine the interplay between economic fundamentals and financial markets; from two alternative perspectives the first two essays each address this interconnection. The first essay investigates whether asset prices truly reflect the debtor's credit-worthiness; it extends the initial inquiry by

examining the role of contagion in determining asset prices. The second essay assesses whether foreign investment responds to macroeconomic uncertainty in the recipient (domestic) economy. The first essay can therefore be considered a decomposition of sovereign risk associated with developing country debt, while the second examines the impact of risk on long-term financial flows to developing countries. The second objective of this thesis is to assess the impact of economic fundamentals, and in particular openness to trade, on economic growth. This is undertaken by the third essay, which examines the impact of undistorted trade on growth in the long-run.

The first essay empirically investigates the composition of the country risk premium using Brady bonds. The collateral stripped yield spread over the benchmark rate is examined for correlation with a comprehensive set of variables which indicate default probability; these indicators approximate the debtor's ability to access liquid assets, the cost of exclusion from international financial and goods markets, and the benefit from default. The results from the panel data estimation are consistent with the characterization of sovereign risk proposed by the "ability to pay" literature on debt; this theory emphasizes the role of liquidity constraints in generating default risk.

The preceding decomposition of sovereign risk is then used to assess the nature of price contagion within Brady bond market in the aftermath of the December 1994 Mexican financial crisis. The analysis finds the existence of contagion between Mexican bonds and other Bradys (with the exception of the Philippines) during the entire sample period, as demonstrated by the statistically significant correlations between residual measures of creditworthiness. Contrary to the opinions of many practitioners in finance, intensified contagion does not explain the increased comovement in observed creditworthiness after December 1994; instead this increased comovement can be completely attributed to the similar response of different assets to a common shock: the sudden illiquidity of the Brady bond market.

The second essay empirically examines the relationship between foreign direct investment and macroeconomic and political stability. Theory predicts that both macroeconomic and political stability should be conducive to FDI by reducing the uncertainty associated with investment. The literature on irreversible investment under uncertainty suggests that increased uncertainty temporarily reduces investment by increasing the option value of waiting to invest.

In panel data estimation, indicators of macroeconomic and political stability are assessed for partial correlation with the ratio of FDI to GDP. The empirical analysis shows that macroeconomic instability and extreme political instability tend to reduce FDI. The empirical findings in this essay support the view that countries which implement policies which promote undistorted trade and macroeconomic stability (characterized by a framework of low inflation, low inflation variability, and a conservative fiscal stance) experience higher inflows of FDI as a share of GDP than do countries which fail to pursue trade openness and macroeconomic stabilization.

The final essay empirically investigates the links between trade and growth using a set of newly constructed indicators of trade openness. These indicators provide an approximation for the degree of trade distortions which arise from import tariffs, export controls, and overvalued real exchange rates which arise from fixed exchange rate regimes. The empirical analysis employs two distinct approaches to assess the partial correlation between openness and growth: (1) standard cross-country growth regression and (2) the regression analog of growth accounting, in which growth is separated into factor accumulation and residual productivity. The results from this essay support the view that policies which promote undistorted trade lead to higher growth rates and improvements in economic well-being. The empirical analysis confirms the assertions made in models of trade and neoclassical growth which contend that trade distortions decrease the productivity of capital (and therefore weaken growth) by hindering access to the import of relatively more efficient inputs. Moreover, the results imply that scale economies, as hypothesized by endogenous growth models, are critical to the transmission mechanism from trade openness to long-run growth.

Macroeconomic policy, inasmuch as it influences economic fundamentals, matters both for economic growth as well as for asset prices. The conclusions from the three essays in this collection are confident about the ability of economic reforms to generate growth. Trade liberalization promotes growth in the long-run. Furthermore, macroeconomic stabilization lowers premia on sovereign debt and increases foreign direct investment (among other benefits); either of these could translate in the long-run, directly or circuitously, into economic growth. The conclusions from these essays are also quite optimistic about the role of fundamentals in directing the flow of international capital; as investors gain greater access to more timely,

transparent, and reliable information about economic variables upon which to base their decisions, this optimism can only increase.

Chapter 2

THE CHARACTER OF SOVEREIGN RISK AND THE NATURE OF CONTAGION: EVIDENCE FROM BRADY BONDS

2.1 Introduction

The period from the late 1980s onwards has experienced the resurgence of foreign capital inflow into many developing countries throughout Latin America and Asia, and the re-entry of many of these countries into the international financial system. Financial liberalization undertaken in these so-called "emerging markets", as characterized by declining barriers to international capital mobility and by the dismantling of regulated interest rates, should hypothetically lead to a financial environment conducive to the equalization of returns on similar assets across borders, or more precisely, to the convergence of interest rates in these emerging markets (adjusted for exchange rate depreciation) to the world interest rate.[1] Similarly, arbitrage should compel returns on dollar-denominated bonds issued by these countries towards a benchmark dollar interest rate.

In practice, we observe instead persistent return differentials between the yield on these dollar bonds and the benchmark world rate of return. In the case of non-dollar bonds, we notice instead substantive differentials on nominal interest rates beyond the rate of actual exchange rate depreciation, frequently along the order of hundreds of basis points. Country risk, or the risk to a

[1] As proxied by the rate on short-term U.S. Treasury bills.

portfolio associated with a sovereign entity's repudiation of its contracted liabilities, dwells at the source of these considerable differentials in return. The existence of country risk, also known as sovereign or default risk,[2] has gained renewed relevance with the return of developing countries as active borrowers in international financial markets. This essay empirically explores two particular aspects of sovereign risk using a newly available data set of Brady bond yields.[3] First, it investigates the impact of market liquidity and the sovereign borrower's own potential illiquidity on the premium on sovereign debt. Secondly, it examines the impact of increased sovereign risk in one country on the perceived riskiness in other emerging markets.

With regard to the first inquiry, this essay examines whether in the short-run sovereign risk can be comprehensively described by a set of high-frequency fundamentals which suggest a country's default probability. This group comprises four categories of variables indicating (1) bond market liquidity, (2) a country's ability to access liquid assets, (3) the cost of exclusion from international financial and goods markets, and (4) the benefit from default. The results from a panel data estimation generally indicate that country risk, as measured by the Brady bonds' spread over benchmark US Treasuries, responds to changes in this set of chosen variables; specifically, market liquidity as well as factors indicating a country's ability to access liquid assets, are individually statistically significant. Separate regressions for individual countries yield divergent results, with the statistical significance on individual variables varying among countries; given the heterogeneity of countries in the sample, this is anticipated.

This essay proceeds to assess the impact of the December 1994 Mexican financial crisis on individual country risk in emerging markets by using the results from these individual regressions. Throughout the time period under consideration, statistically significant correlation exists between the Mexican Par bond spread and the respective spreads of the five other countries in the sample. This comovement is attributed to comovements in both the portion of the spreads predicted by fundamentals (the predicted spread) and the component of the spreads unaccounted for by fundamentals (the residual spread). The significant correlation of residual spreads implies that contagion exists in the market for Brady bonds throughout the entire sample period.

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[2] These three terms are used interchangeably throughout the chapter, as they all refer to the equivalent concept.

[3] Abdel-Motaal (1996) is the first study to use a sample of Brady bonds in an analysis of sovereign risk.

In the aftermath of the crisis, comovement in the spreads of emerging market bonds increases. Because these emerging markets are interconnected through goods and assets markets, a common shock may precipitate the general deterioration in fundamentals in individual countries, leading to an increased correlation in predicted spreads. A financial crisis may also intensify the contagion which already exists in the asset markets, resulting in an increased correlation of residual spreads. In the case of the Brady bond market, this essay finds that the increased comovement of perceived creditworthiness after the Mexican financial crisis can indeed be ascribed to an increased comovement in predicted spreads, rather than to increased information contagion in the bond market.

This chapter is organized as follows. The following section reviews the relevant literature for variables which may help account for sovereign risk, and describes the high-frequency fundamentals used in the analysis. The third section details the empirical estimation of sovereign risk on a data set of six countries, and summarizes the results from the panel data estimation as well as the individual country risk regressions. The fourth section presents empirical evidence for contagion in the Brady bond market throughout the entire sample period. It demonstrates that the general deterioration in creditworthiness in the aftermath of the Mexican crisis can be ascribed to the behavior of fundamentals. The fifth section concludes.

2.2 The Determinants of Sovereign Risk

The literature on sovereign debt offers two contending approaches to sovereign risk determination.[4] The first approach characterizes sovereign risk as emerging from an optimized strategy of debt repudiation, governed by the debtor country's assessment of the competing costs and benefits associated with non-repayment. This "willingness to pay" approach sets the tenor for much of the theoretical literature on debt and default during the period of the debt crisis.[5] In response to this approach the second dominant strand in the literature emphasizes the debtor country's inability to pay as the source of default risk.

[4] I defer to Appendix B the more formalized treatment of sovereign risk as emerging from a combination of default risk and liquidity risk in the bond market.

[5] See Sachs (1989), and Eaton, Gersovitz and Stiglitz (1986).

The "willingness to pay" approach suggests that the costs and benefits of debt repudiation affect the probability of default. The costs of default are the missed income opportunities, and the foreclosed access to sources of cheaper external financing, which result from creditor-imposed sanctions and penalties applied to induce repayment. These sanctions may include reductions in foreign aid, denial of access to international capital markets and the exclusion of participation in international trade. The probability of default, and consequently sovereign risk, decrease as the costs from these sanctions increase. In particular, if sanctions involve a disruption in trade, improvements in net exports and a higher terms of trade reduce sovereign risk.

The primary benefit from default, or the default "prize," is the savings a country gains from renouncing its obligations on its outstanding debt. Any components which increase a country's net foreign indebtedness increase the probability that a country chooses to renege on it obligations, thereby increasing sovereign risk. Increases in the default "prize" result either from growth in net domestic dissaving (e.g., growing budget deficits coupled by the inability to increase savings rates), or from an expansion of the trade deficit.

In the "inability to pay" approach to debt repudiation, default occurs when a borrower can not access liquid assets to finance its maturing liabilities. This implies the problem is due to a liquidity crisis, rather than a fundamental incapacity to repay. This situation may arise if a country experiences a large and sudden external shock which forces it to run down its reserves of foreign exchange; this unexpected decline in reserves diminishes the likelihood of repaying its contracted liabilities on schedule. A country's liquidity constraint, and its repayment potential, are central to an assessment of sovereign risk. Elements which increase a country's external liabilities relative to its liquid assets increase sovereign risk: these include the growth in international indebtedness, increases in the proportion of its short-term liabilities relative to overall liabilities, and an increase in the foreign liabilities of the central bank.

Increased access to liquid assets decreases sovereign risk. The government's ability to soften its liquidity constraint (by increasing revenue) depends on its capacity to harness both internal and external transfers; these in turn are contingent upon the political stability of the country and the country's net export earnings, respectively. Moreover, large stocks of foreign exchange reserves potentially buffer unexpected crises in liquidity.

Models fixed upon the premise of a country's "willingness to pay" its debt, and models which argue "inability to pay" based on liquidity constraints, point to a similar set of variables as likely indicators of default risk. For instance, the savings from default described in the "willingness to pay" literature are the same variables which indicate increasing repayment constraint by the "inability to pay" approach, and influence creditworthiness in the same direction. It is nevertheless still possible to differentiate one theory from the other since the empirical implications of both theories are quite different in one respect. While the "inability to pay" approach suggests that high levels of liquid assets should increase creditworthiness, the "willingness to pay" approach suggests quite the opposite, because liquid assets increase the default "prize." In the empirical estimation of sovereign risk, we can therefore distinguish the appropriateness of one theory over another by looking at the coefficient on the proxy for liquid assets.

The empirical estimation of sovereign risk undertaken in the next section uses monthly data, thereby restricting the set of variables to high-frequency fundamentals. Specifically, from a review of the theoretical literature on debt, variables which indicate either the ability to pay, or denote the benefits and costs to repayment, are considered possible determinants of sovereign risk. The following offers the rationale behind the variable selection; Appendix A.3 provides a detailed description of the data sources and the construction of the variables:

(1) *An index of political risk.* Political risk acts directly upon the revenue constraint, and leads indirectly to an increase in net external indebtedness. Political risk reduces the government's ability to generate revenue through taxation, thereby reducing the likelihood of repayment. Coupled with growing government expenditure, revenue constraints lead to ballooning fiscal deficits. In the absence of high domestic savings rates, large fiscal deficits lead to international borrowing, growing external deficits and debt buildup. In addition, these fiscal imbalances contribute to the external debt crisis by adding an internal transfer problem (i.e., the difficulty in mobilizing resources from the private sector to the public sector) which further constrains debt servicing capabilities.

This analysis employs the political risk index constructed by the Political Risk Services International Country Risk Guide (ICRG) as a proxy for political risk.[6] The overall political risk score falls between 0 (the highest risk) and 100 (the lowest risk); the correlation between the ICRG political risk index and default risk is therefore expected to be negative.

(2) *The ratio of foreign exchange reserves to imports.* This indicator measures the level of international liquidity held by a country, relative to the (flow) claims required by its imports. The "ability to pay" approach suggests that this ratio should be negatively related to default risk, since it indicates the assets available for debt service, as well as the ability of a country to weather a liquidity crisis from an external shock. However, according to the "willingness to pay" literature, a country interprets such high stocks of international reserves as potential savings gained in the event of a default; thus an increase in this ratio increases the default prize and reduces the creditworthiness of a country.[7]

(3) *Growth in the trade balance.* This variable indicates the net foreign exchange earnings from trade. Improvements in the trade balance imply a higher cost of default, and consequently enhanced creditworthiness. Improvements in the trade balance may also signify a reduction in the stock of debt, thereby reducing the default prize. For both these reasons, the correlation between growth in the trade balance and sovereign risk is expected to be negative.

(4) *The ratio of central bank foreign liabilities to exports.* This indicator measures the portion of the monetary authorities' portfolio attributed to its borrowing from foreigners, relative to the foreign exchange generated by exports. In the face of given levels of foreign exchange reserves, an increase in the ratio of foreign liabilities/exports may signal a possible liquidity constraint, and an accompanying increase in default probability. Increases in the ratio may also signal greater savings from default, resulting again in a higher default probability. The correlation

[6] This index is constructed monthly for individual countries. It encompasses thirteen separate political risk factors which are described in Appendix A.2.

[7] See Gersovitz (1985).

between the ratio of foreign liabilities/exports and sovereign risk is therefore expected to be positive.

(5) *Terms of trade.* This variable captures a country's net earnings prospects from trade. An improvement in the terms of trade heightens the cost of exclusion from international goods markets, and thus diminishes the likelihood of default. A negative shock to the terms of trade may force a country to increase its international indebtedness (and the attendant default prize), if it can not reduce its import bill. The correlation between the terms of trade and sovereign risk is consequently negative.

The following two variables are generally considered relevant to sovereign risk determination, but can also be described within the framework of the previously discussed literature.

(6) *Real exchange rate.* A sustained overvalued real exchange rate generally leads to overborrowing (as was the case for many LDCs in the 1980s, and more recently for Mexico). According to the "willingness to pay" literature this increase in net foreign indebtedness should reduce a country's creditworthiness. Moreover, sustained overvaluations lead investors to anticipate an eventual exchange rate devaluation, and/or a collapse in reserves which precipitates a depreciation. Thus an overvalued real exchange rate introduces the possibility and risk of a huge reserve loss. The contraction in foreign currency assets would tighten the liquidity constraint, and increase the probability of default.

(7) *Inflation rate.* High inflation may swiftly lead to overvalued real exchange rates, if the country maintains a fixed nominal exchange rate. We expect, therefore, a positive correlation between sovereign risk and the inflation rate.

(8) *Bid-ask spread.* In addition to the above variables related to default risk, I also include the bid-ask spread as a measure of bond market liquidity. This captures the cost associated with constraints on the free disposal and acquisition of bonds. This market illiquidity premium is

clearly operative when markets are relatively thin, such as the period when a bond has been newly introduced, or during periods in which bonds suffer a precipitous fall in demand relative to their supply.

2.3 Empirical Estimation of Sovereign Risk

The empirical estimation of sovereign risk is conducted on Brady bonds and international bonds issued by four Latin American and two Asian countries, from the date of their launch to early 1996, where data is available. Time series regressions, adjusted for serial correlation, are separately estimated for each bond issue. The sections which follow describe the measure of sovereign risk, briefly specify the methodology involved in estimation, and conclude with a discussion of the results.

2.3.1 A Measure of Sovereign Risk

Sovereign risk is estimated using the spread of the yield on Brady bonds over a corresponding benchmark rate, using adjusted bond prices which eliminate the collateralized component of the bond. Monthly data is used from the date of issue to the recently most available period. The sample consists of Par bonds from Argentina, Mexico, the Philippines, and Venezuela, Exit bonds from Brazil, and rescheduled consolidated loans from Morocco. While the Moroccan bonds are not technically Brady bonds, they trade similarly to bonds issued in the Brady series.

Par bonds are long maturity fixed rate US dollar denominated instruments, retaining the full face value of the rescheduled loans, but offering a concessionary fixed rate of interest. The bond amortizes through a "bullet" (single payment) maturity of 30 years. Principal is fully secured by a collateral of US zero-coupon bonds; in addition interest obligations are partially collateralized by a rolling guarantee of 9-12 months of interest paid into an escrow account to cover default on 3-4 coupon payments. This guarantee rolls over through time when no default occurs. While a diverse array of fixed income instruments comprise the Brady debt reduction packages, Par bonds stand as market benchmarks for cross-country comparisons of asset prices. Therefore, where data is sufficiently available, this analysis uses the stripped spread on Par bonds

as the most appropriate measure of sovereign risk. Appendix A.1 describes the characteristics of the bonds used in the sample; Figure 2-1 illustrates the spreads used in the analysis.

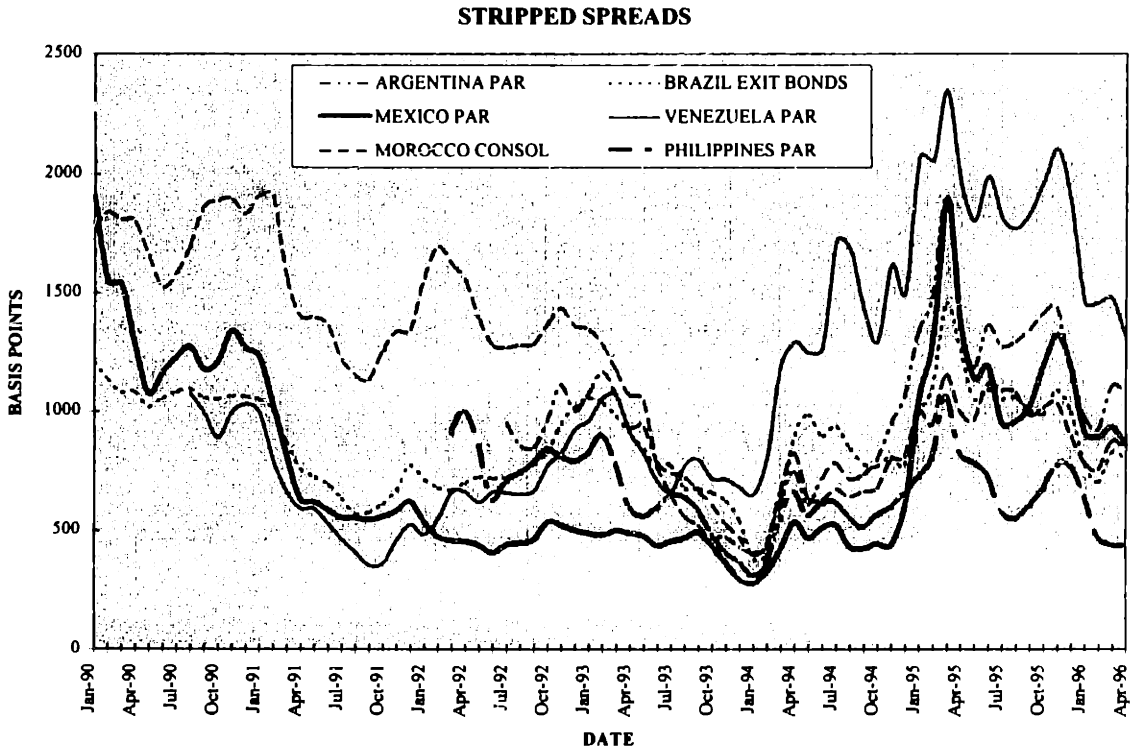

FIGURE 2-1. STRIPPED SPREADS ON A SAMPLE OF INTERNATIONAL BONDS

As Figure 2-1 reveals, the spreads are highly variable, and demonstrate visible comovement. While a declining trend characterizes stripped spreads until late 1993, the following year witnessed a pronounced cooling in investor confidence in emerging markets, and an accompanying increase in spreads, resulting partially from political instability in Mexico which fueled investor apprehension, and tighter monetary policy and increases in the long-term bond rate in the United States which made fixed-rate Par bonds less attractive. The surge in spreads culminated in the Mexican financial crisis in December 1994, with spreads over benchmark rates surpassing 1800 basis points for Mexico, Venezuela, and Argentina. Spreads have since settled to pre-crisis levels, with the dissipation of turmoil in emerging markets. Nevertheless, stripped spreads remain significantly different from zero, ranging in the first four months of 1996 from an average low of 497 basis points for the Philippines to an average high of 1429 basis points for Venezuela.

2.3.2 Sovereign Risk: Estimation and Results

The basic functional form I estimate for each individual bond issue in the sample is therefore:

$$\ln(\text{Stripped Spread})_t = \beta_0 + \beta_1 \ln(\text{Liquidity Risk})_t + \beta_2 \ln(\text{Political Risk Index})_t + \beta_3 \ln(\text{Foreign Exchange Reserves/Imports})_t + \beta_4 \text{Change in Net Exports}_t + \beta_5 \ln(\text{Foreign Liabilities/Exports})_t + \beta_6 \ln(\text{Terms of Trade})_t + \beta_7 \text{Inflation}_t + \beta_8 \ln(\text{Real Exchange Rate})_t + \beta_9 \text{Trend} + v_t, \quad (1)$$

where v_t is the stochastic error. I successively include additional variables predicted to enter into the risk calculation of investors; this is undertaken to assess whether variables conventionally believed to affect pricing of Brady bonds do indeed (1) significantly determine their risk premium, and (2) diminish the significance of variables in the core regression (the variables of interest in this analysis). Because of concern for limited degrees of freedom I constrain the data set for these additional variables to include a select few: an index for the real exchange rate, and the average rate of inflation over a 12 month period. To obtain an overview of the determinants of sovereign risk, I begin with two sets of panel data estimations. The first set of panel data regression employs data from all the countries in the sample, dropping the regressor, foreign liabilities/exports (which is missing for two of the six countries), in order to include all countries in the sample. The second set of panel data regressions includes foreign liabilities/exports on a panel data estimation over a correspondingly reduced set of countries. The results for both sets of regressions are presented in Tables 2.1 and 2.2.[8] For each set of panel data regressions, I run different specifications to account for problems with heteroskedasticity and serial correlation. The first, third, and fourth specifications, denoted by regressions 1 and 6, 3 and 8, and 4 and 9, respectively, adjust the standard errors to address the problem of serial correlation, while the second specification adjusts the standard errors to account for heteroskedasticity. Regressions 5 and 10 presents results corrected for both heteroskedasticity and serial correlation in errors. Comparing the results across specifications indicates that problems with serial correlation are

[8] All tables are found at the end of the text of this chapter, unless stated otherwise.

more tenacious than problems associated with heteroskedasticity across error terms; note, for instance, the striking similarity in results between the third estimation, which corrects only for serial correlation, and the fifth, which corrects for both serial correlation and heteroskedasticity. I use the fifth specification as the benchmark regression for the following analysis.

In both sets of panel data estimations, market liquidity risk and the ratio of foreign exchange reserves to imports are individually statistically significant. As expected, an increase in the bid-ask spread leads to an increase in the country risk premium. An increase in foreign exchange reserves, relative to imports, diminishes the country risk premium. This result corresponds to the hypothesized relationship between assets and default risk proposed by the "ability to pay" literature, and thus rejects the "willingness to pay" approach as an appropriate characterization of sovereign risk.

In the second set of panel data estimations summarized in Table 2.2, the coefficient on the ratio of foreign liabilities to exports is also statistically significant and of the expected direction: an increase in foreign liabilities, relative to exports, increases the country risk premium. The results from these panel data estimations underscore the importance of market liquidity, the degree of international indebtedness, and access to liquid assets as determinants of sovereign risk.

The other regressors are not individually statistically significant, though the majority do appear with coefficients characterized by the expected signs: an improvement in an index of political risk reduces sovereign risk, as do an increase in the terms of trade and growth in net exports. Inflation increases sovereign risk (perhaps by increasing the likelihood of a devaluation); in contrast, a concurrent real appreciation reduces, rather than increases, sovereign risk. This latter result may emerge from the fact that financial crises are accompanied by deteriorations in the real exchange rate as well as huge increases in sovereign risk premia: this may swamp the effect of real exchange rate appreciations on amplifying debt risk premia in the pre-crisis period.

The panel data estimation offers a preview of the results which emerge from individual country regressions. For each country in the sample, I estimate sovereign risk with a universe of regressors limited to those found significant in the panel data regressions; this culminates in the estimation of the functional form described by equation (1). Table 2.3 summarizes the results

from individual country estimations of equation (1). Tables C.1A-C.1F in Appendix C summarize the results for individual country estimations employing alternate subsets of regressors. Because of serial correlation in errors, the equation is estimated using a linear regression corrected for serially correlated residuals using two stage least squares, following Cochrane-Orcutt's iterative procedure.

The results of the separate estimations of equation (1) differ markedly across the countries in the sample. For Argentina, Mexico and Venezuela, the parsimonious specification describes 87%, 75% and 56%, respectively, of the variance on the risk premia on their Brady bonds; in contrast the same specification describes only 1%, 15%, and 13% of the variance in the risk premia for Brazil, Morocco and the Philippines, respectively. The statistical significance of any individual regressor is also characterized by wide variation across countries. The results are clearly polarized: in terms of the total explained variation and the high statistical significance of individual regressors, the specification is a good approximation of sovereign risk for Argentina, Brazil and Venezuela, and a less successful one for Brazil, the Philippines and Morocco. For these latter three countries, the risk premium may be driven by an alternative set of fundamentals, which are still consistent with the theory. These may include lower frequency variables which comment upon a country's solvency, such as the total stock of internal and external debt relative to GDP and the growth of debt relative to GDP, and alternative variables which denote a country's potential liquidity, such as the ratio of debt service to exports.[9] Since these data are available on an annual or, at best, semi-annual basis, I am forced to exclude them from individual country estimations due to data insufficiency.

The coefficients on most variables are of the expected sign. The elasticity of the risk premium with respect to market liquidity risk is positive for all countries; the highest values (found for Argentina, Mexico and the Philippines) are also those which are statistically significant. With the exception of the Philippines, an increase in political risk (represented by a decline in the political risk index variable) amplifies country risk; for Argentina, Mexico and Venezuela, this regressor is individually statistically significant. An increase in the ratio of foreign exchange reserves to imports reduces sovereign risk for all countries with the exception

[9] Abdel-Motaal (1996) estimates sovereign risk on a panel data set of Brady bonds using these variables as regressors.

of Morocco and the Philippines; the negative relationship with the risk premium is statistically significant for Argentina, Brazil and Venezuela. Foreign liabilities relative to exports increase the risk premium on debt for three of the four countries for which it is available; only for Mexico is it significant. An improvement in the terms of trade leads to a decline in the risk premium for Brazil and Morocco, and a statistically significant decline for Argentina and the Philippines. Inflation depresses bond prices, increasing the risk premium for all countries in the sample with the exception of Morocco; the coefficient on inflation is positive and significant for Argentina, Mexico and Venezuela. Finally, the coefficient on the real exchange rate enters positively for all countries except for Argentina, for which it is negative and statistically significant. It is also statistically significant for Mexico, and borderline significant for Brazil. There are no a priori reasons to expect a particular relationship between the real exchange rate and sovereign risk. A real exchange rate appreciation may accompany increases in perceived country risk if investors expect the country to devalue eventually. Alternatively, real exchange rate depreciation may characterize a country in the midst of financial crisis, and therefore accompany increases in perceived sovereign risk.

2.4 Empirical Evidence of Contagion

The results from country-specific sovereign risk regressions are subsequently examined for evidence of increased contagion in the Brady bond market in the aftermath of the December 1994 Mexican financial crisis. In the context of international financial markets, contagion in bond prices may either be informational or institutional (Valdes 6). Informational contagion occurs when the riskiness of a particular asset impacts investors' assessments of the riskiness of other (seemingly unrelated) assets. For instance, lack of country-specific information may induce investors to turn away from emerging markets as a group if a particular country within the group of emerging markets enters into financial crisis. Thus informational contagion is predicated upon investors holding imperfect information with regard to the fundamental value of their assets. In the case where this lack of perfect information is large, asset pricing bubbles in markets for different financial products can easily result from initial turbulence in one particular asset market.

Institutional contagion, in the context of interbank lending, refers to circumstances in which a bank in crisis withdraws its deposits from other banks in order to increase its own liquidity, consequently worsening the balance sheet positions of other banks. Valdes (1996) postulates a model which describes an analogous case, applicable to the Brady bond market. If fixed income assets are valued because they provide potential liquidity, then repayment problems in one country may force investors to search for liquidity elsewhere. Thus investors holding a portfolio of bonds respond to an increase in default probability in any single asset by selling off other assets. The attempt by investors to improve their liquidity position yields a general deterioration in the prices of bonds in their portfolio. Moreover, if emerging markets are generally illiquid, that is, if the withdrawal of a large number of investors in the short-run triggers a higher probability of sovereign debt repudiation, then the likelihood of repayment in one country is dependent on the likelihood of repayment in another.

Information and institutional contagion in asset markets can not simply be inferred from significant correlation in observable prices. Some determinants of sovereign risk are correlated across countries (e.g., bid-ask spread, terms of trade), and their comovement may be driving the correlation in prices. Rather, contagion is revealed empirically by an excess comovement of prices (or yields) beyond the comovement attributed to fundamentals; therefore, it is significant correlation in the innovations which signals contagion.

2.4.1 Contagion in the Brady Bond Market

This section seeks to examine whether there exists increased price contagion in the Brady bond market in the aftermath of the December 1994 financial crisis. Using the results from the preceding sovereign risk regressions, I examine the covariance of the stripped spread, stripped spread predicted by fundamentals, and the residual spread of individual Bradys with the corresponding measure for the Mexican Par bond. I include an interactive dummy variable which measures the extra comovement between yield measures in the aftermath of the crisis. The following equation describes the estimated regression:

$$Yield_{MEXt}=\beta_0 Yield_{BRADYt} + \beta_1 DUMMY_t + v_t, \qquad (2)$$

where $Yield_{MEXt}$ is either the stripped spread, the spread predicted by equation (1) or the residual difference of the two for Mexico, and $Yield_{BRADYt}$ represents the corresponding measure for the other Brady countries in the sample. $DUMMY_t$ takes on the value $1*Yield_{BRADYt}$ for a post-crisis window, and zero for all other observations. The regression is estimated for each country, using the three above-mentioned yield measures. I limit the analysis of comovements to the yields of different bonds with the Mexican Par bond yield since I am interested primarily in the direct impact of the Mexican crisis on non-Mexican bonds.

The results are presented separately for each country in Tables 2.4A-2.4E. The period for which the interactive dummy variable is nonzero is indicated by the first column in each table. The second through fourth columns (columns (b)-(d)) summarize the results for comovement between the stripped spreads, without controlling for fundamentals. The fifth through seventh columns (columns (e)-(g)) summarize the results for sovereign risk as predicted by the various technical and economic factors in equation (1). The last three columns (columns (h)-(j)) present the estimates of equation (2) using the (residual) component of sovereign risk unaccounted for by fundamentals.

Two observations emerge immediately from a cursory glance at the results. First, as the first row in each table illustrates, simple comovement in spreads of individual Bradys with that of Mexico are all highly significant: this is the case for the stripped spread, the spread predicted by market fundamentals, and the residual spread. Contagion in the Brady bond market is found to characterize the entire time period. Secondly, for all countries in the sample, the comovement of each country's respective stripped spread with that of the Mexican par bond increases after December 1994; this is evident from the statistically significant positive coefficient on the dummy variable (see column (c) in Tables 2.4A-2.4E).[10] With the exception of the Brazilian exit bond, the high significance of the coefficient on the dummy variable is insensitive to the window length for which the dummy variable is non-zero. For all countries with the exception of Morocco, the period of greatest comovement between spreads (derived by adding the coefficients β_0 and β_1 together for the relevant time period) appears to be the five months after the crisis.

[10] Calvo and Reinhart (1996) also find evidence for increased correlation in Brady bond prices after December 1994. However, they do not control for the effect of fundamentals.

Can this increased comovement be attributed to an increased comovement in fundamentals (and therefore of the predictable portion of the spreads), or to intensified contagion? With the exception of the Philippines the results are remarkably similar across all countries: β_1 (column (f) in the Tables 2.4A-2.4E) is positive and statistically significant in the second set of regressions using predicted values. The increased correlation in the spreads in 1995 can be ascribed to an increased comovement in both the technical factors underlying the Brady bond market (i.e., bid-ask spreads) and the economic fundamentals which theoretically gauge the fundamental value of sovereign risk; in combination economic and market characteristics increase the comovement in the predicted component of sovereign risk. However, the increased correlation in stripped spreads in the post-Mexican crisis period can not be attributed to increased contagion. We do not observe an increased covariance between residual spreads; the value of β_1 (column (i) in Tables 2.4A-2.4E), with the exception of the Philippines, is never statistically different from zero in the set of regressions which estimates the comovement of residuals, and regularly negative (as in the case of Argentina and the Philippines).

2.5 Concluding Remarks

This chapter shows that sovereign risk can be described by a set of high-frequency fundamentals which comment upon (1) bond market liquidity, (2) a country's ability to access liquid assets, (3) the cost of exclusion from international financial and goods markets, and (4) the benefit from default. The results from a panel data estimation on a set of Brady bonds are consistent with the characterization of sovereign risk proposed by the "ability to pay" literature on debt; this theory emphasizes the role of liquidity constraints in generating default risk. Specifically, the panel data estimations find country risk, as approximated by the Brady bonds' spread over U.S. Treasuries, to be significantly correlated with bond market liquidity as well as with factors indicating a country's ability to access liquid assets.

Sovereign risk regressions are estimated separately for each country, yielding divergent results in terms of the explanatory power of the specification and the statistical significance on individual variables. The regressions explain a high proportion of the variation in the risk premia for Bradys from Mexico, Argentina and Venezuela, but fare less well for those from Brazil, the

Philippines and Morocco. The poor performance of the regressions with respect to these latter three countries may be due to incorrect specification or to gross mispricing of the bonds away from fundamental value (as predicted by this particular set of regressors).

The analysis also finds the existence of contagion between Mexican bonds and other Bradys (with the exception of the Philippines) during the entire sample period, as demonstrated by the statistically significant comovement between residual measures of creditworthiness. However, intensified contagion does not explain the increased comovement in observed creditworthiness after December 1994; instead this increased comovement can be completely attributed to the behavior of fundamentals.

Even though the crisis did not precipitate increased contagion in the Brady bond market (as measured by increased comovement in innovations), it led instead to a general deterioration in factors which influence investors' calculations of risk. Specifically, a sharp decline in bond market liquidity for all Brady bonds accompanied the surge in default risk. To the extent that investor sentiment relies upon imperfect information and can influence the technical factors used in predicting sovereign risk (e.g., the bid-ask spread), intensified informational and institutional contagion may also be captured by increased correlation in the components of creditworthiness predicted by the sovereign risk regressions in this chapter. We would explore the possibility of contagion in technical factors in the following way. We would re-estimate sovereign risk without the technical factors which form part of the original group of sovereign risk determinants, then use the residuals from these estimates to examine whether increased contagion occurs in the aftermath of the Mexican crisis. If increased contagion is observable, then technical factors (i.e., the regressors dropped from the original set of determinants) drive the increased correlations in the residual component of bond prices. Additionally, another extension of the original empirical analysis would be to expand the universe of international bonds to examine if there are contagious effects to bonds beyond the Brady group. These are further empirical analyses we expect to include in future work.

The existence of contagion, as well as the spillover effects captured by fundamentals, are powerful arguments in favor of the supervision of countries by international institutions, such as the International Monetary Fund. Contagion is unavoidable if it is institutional; as such, the behavior of countries which influence their perceived creditworthiness influences the actual

ability to pay of other countries. This is intensified in times of financial crisis, as reflected by the increased comovement in perceived creditworthiness. Close supervision of a country's balance of payments position, the composition of its capital inflows, and its international liquidity position may help prevent financial crisis from occurring. Contagion is also predicated upon asymmetric information. Therefore, the provision of timely and transparent information regarding the individual creditworthiness of countries may reduce the impact of informational contagion. In its role as lender of last resort, and in its supervisory and monitoring capacities, an institution such as the International Monetary Fund is well situated and important in limiting contagion in international financial markets.

TABLE 2.1
PANEL DATA REGRESSIONS FOR SIX COUNTRIES: ALTERNATE SPECIFICATIONS

Independent Variable	Regression (1)	(2)	(3)	(4)	(5)
Liquidity risk	0.07*	0.25*	0.07*	0.10*	0.07**
	(0.02)	(0.05)	(0.02)	(0.02)	(0.03)
Index of Political Risk (ln)	-0.44***	-1.31*	-0.42	-0.21	-0.42
	(0.27)	(0.17)	(0.26)	(0.25)	(0.29)
Foreign Exchange/Imports (ln)	-0.21*	-0.32*	-0.21*	-0.20*	-0.21**
	(0.06)	(0.05)	(0.06)	(0.05)	(0.09)
Change in trade balance	0.001	0.26*	-0.005	-0.02	-0.005
	(0.037)	(0.07)	(0.037)	(0.03)	(0.037)
Terms of trade (ln)	-0.10	-0.50*	-0.09	-0.07	-0.09
	(0.13)	(0.11)	(0.13)	(0.11)	(0.12)
Rate of inflation	0.10	0.11*	0.13	0.12	0.13
	(0.01)	(0.04)	(0.11)	(0.15)	(0.09)
Real exchange rate (ln)	0.40*	-0.13	0.45*	0.39*	0.47***
	(0.16)	(0.18)	(0.16)	(0.14)	(0.25)
Constant	7.25*	15.21*	-0.001	-0.007	-0.001
	(1.39)	(0.95)	(0.016)	(0.021)	(0.015)
Adjusted R-squared	0.08	0.52	0.08	0.09	0.08
Observations	361	368	361	354	361
Estimation Procedure	Cochrane-Orcutt 2SLS on levels	regression on levels; standard errors adj by White's method	regression on first differences	Cochrane-Orcutt 2SLS on first differences	regression on first differences; standard errors adj by White's method

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

TABLE 2.2
PANEL DATA REGRESSIONS FOR FOUR COUNTRIES: ALTERNATE SPECIFICATIONS

Independent Variable	Regression (6)	(7)	(8)	(9)	(10)
Liquidity risk	0.07*	0.16*	0.07*	0.11*	0.07**
	(0.02)	(0.04)	(0.02)	(0.03)	(0.03)
Index of Political Risk (ln)	-0.33	-0.92*	-0.34	-0.18	-0.34
	(0.29)	(0.30)	(0.29)	(0.27)	(0.29)
Foreign Exchange/Imports (ln)	-0.32*	-0.35*	-0.29*	-0.25*	-0.29*
	(0.07)	(0.05)	(0.07)	(0.07)	(0.09)
Change in trade balance	0.009	0.14**	0.002	-0.01	0.002
	(0.042)	(0.07)	(0.041)	(0.04)	(0.039)
Foreign Liabilities/Exports (ln)	0.21*	0.03	0.23*	0.13	0.23**
	(0.08)	(0.05)	(0.09)	(0.08)	(0.11)
Terms of trade (ln)	-0.10	-0.34*	-0.07	-0.05	-0.07
	(0.13)	(0.11)	(0.13)	(0.12)	(0.11)
Rate of inflation	1.99*	3.36*	1.11	0.78	1.11
	(0.59)	(0.20)	(0.74)	(0.86)	(0.91)
Real exchange rate (ln)	0.35**	0.46*	0.39**	0.34**	0.39
	(0.19)	(0.15)	(0.19)	(0.17)	(0.28)
Constant	7.30*	9.87*	0.009	-0.001	0.009
	(1.46)	(1.08)	(0.016)	(0.021)	(0.016)
Adjusted R-squared	0.18	0.78	0.11	0.10	0.11
Observations	249	254	249	244	249
Estimation Procedure	Cochrane-Orcutt 2SLS on levels	regression on levels; standard errors adj by White's method	regression on first differences	Cochrane-Orcutt 2SLS on first differences	regression on first differences; standard errors adj by White's method

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

TABLE 2.3
REGRESSION OF LOG OF STRIPPED SPREAD: INDIVIDUAL COUNTRIES

	Argentina	Brazil	Mexico	Morocco	Philippines	Venezuela
Liquidity risk	0.16***	0.02	0.19**	0.02	0.21**	0.15
	(0.09)	(0.05)	(0.08)	(0.02)	(0.10)	(0.10)
Index of Political Risk (ln)	-4.44*	-0.23	-1.59***	-0.25	0.40	-1.48**
	(1.26)	(0.80)	(0.95)	(0.43)	(0.35)	(0.66)
Foreign Exchange/Imports (ln)	-0.63*	-0.19	-0.25*	0.12	0.23	-0.40***
	(0.20)	(0.15)	(0.08)	(0.26)	(0.36)	(0.24)
Change in trade balance	-1.77*	0.05	0.13	-1.23*	-1.57	0.03
	(0.51)	(0.08)	(0.14)	(0.48)	(1.55)	(0.05)
Foreign Liabilities/Exports (ln)	--	--	0.37*	0.22	-0.17	0.34
			(0.11)	(0.17)	(0.24)	(0.22)
Terms of trade (ln)	-21.62*	-0.74	0.35	-0.42	-5.88***	0.05
	(6.98)	(0.91)	(0.80)	(2.65)	(3.47)	(0.16)
Rate of inflation	7.54*	0.15	1.41*	-2.97**	9.60	5.53*
	(2.12)	(0.10)	(0.47)	(1.44)	(6.91)	(1.48)
Real exchange rate (ln)	-3.73**	0.67***	1.49*	1.49	0.004	0.12
	(1.52)	(0.35)	(0.36)	(1.05)	(1.20)	(0.26)
Trend	0.10*	0.02***	0.002	-0.09*	-0.14**	-0.01
	(0.02)	(0.01)	(0.003)	(0.04)	(0.07)	(0.01)
Constant	136.42*	6.53	5.37	5.74	34.87**	11.11*
	(32.67)	(5.91)	(5.79)	(12.76)	(15.52)	(2.97)
Adjusted R-squared	0.87	0.01	0.75	0.15	0.13	0.56
Observations	41	71	71	67	45	66

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

TABLE 2.4A
COMOVEMENT WITH MEXICAN PAR BOND: ARGENTINE PAR BOND

Column:	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
	Stripped Spread			Predicted Values			Residuals		
Dummy 12/94-	β_0	β_1	adj R^2	β_0	β_1	adj R^2	β_0	β_1	adj R^2
none	1.17*		0.73	1.18*	--	0.71	0.37*	--	0.11
	(0.11)			(0.12)			(0.15)		
4/95	1.09*	0.03	0.74	1.07*	0.04**	0.73	0.42*	-0.50	0.11
	(0.12)	(0.02)		(0.13)	(0.02)		(0.16)	(0.48)	
5/95	1.06*	0.03**	0.75	1.04*	0.04**	0.74	0.46*	-0.34	0.11
	(0.11)	(0.02)		(0.14)	(0.02)		(0.17)	(0.34)	
6/95	1.03*	0.04**	0.76	0.99*	0.04*	0.75	0.46*	-0.32	0.11
	(0.12)	(0.02)		(0.13)	(0.02)		(0.17)	(0.33)	
7/95	1.02*	0.04*	0.76	0.95*	0.05*	0.77	0.48*	-0.39	0.12
	(0.12)	(0.01)		(0.13)	(0.02)		(0.17)	(0.32)	
8/95	1.00*	0.04*	0.76	0.91*	0.05*	0.78	0.49*	-0.42	0.12
	(0.12)	(0.01)		(0.13)	(0.01)		(0.17)	(0.32)	
9/95	0.98*	0.04*	0.76	0.86*	0.05*	0.79	0.49*	-0.41	0.13
	(0.12)	(0.01)		(0.13)	(0.01)		(0.17)	(0.32)	
10/95	0.92*	0.04*	0.77	0.76*	0.06*	0.81	0.50*	-0.43	0.13
	(0.13)	(0.01)		(0.13)	(0.01)		(0.17)	(0.32)	
11/95	0.84*	0.05*	0.79	0.59*	0.08*	0.86	0.50*	-0.43	0.13
	(0.13)	(0.01)		(0.12)	(0.01)		(0.18)	(0.32)	
12/95	0.75*	0.06*	0.82	0.40*	0.10*	0.94	0.50*	-0.43	0.13
	(0.12)	(0.01)		(0.09)	(0.01)		(0.18)	(0.32)	

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

TABLE 2.4B
COMOVEMENT WITH MEXICAN PAR BOND: BRAZILIAN EXIT BOND

Column:	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
	Stripped Spread			Predicted Values			Residuals		
Dummy 12/94-	β_0	β_1	adj R^2	β_0	β_1	adj R^2	β_0	β_1	adj R^2
none	1.49*		0.59	-0.15	--	-0.009	0.19*	--	0.19
	(0.14)			(0.25)			(0.04)		
4/95	1.44*	0.02	0.59	-0.51**	0.11*	0.14	0.19*	0.18	0.19
	(0.15)	(0.02)		(0.25)	(0.03)		(0.05)	(0.30)	
5/95	1.43*	0.03	0.59	-0.63*	0.12*	0.19	0.19*	0.18	0.19
	(0.15)	(0.02)		(0.25)	(0.03)		(0.05)	(0.30)	
6/95	1.42*	0.03	0.59	-0.77*	0.13*	0.25	0 19*	0.19	0.19
	(0.15)	(0.02)		(0.25)	(0.03)		(0.05)	(0.30)	
7/95	1.42*	0.02	0.59	-0.87*	0.13*	0.29	0.19*	0.17	0.19
	(0.15)	(0.02)		(0.25)	(0.02)		(0.05)	(0.30)	
8/95	1.42*	0.02	0.59	-0.96*	0.13*	0.32	0.19*	0.14	0.19
	(0.15)	(0.02)		(0.25)	(0.02)		(0.05)	(0.29)	
9/95	1.41*	0.02	0.59	-1.05*	0.14*	0.36	0.19*	0.14	0.19
	(0.15)	(0.02)		(0.24)	(0.02)		(0.05)	(0.29)	
10/95	1.39*	0.03***	0.60	-1.19*	0.15*	0.44	0.19*	0.14	0.19
	(0.15)	(0.02)		(0.23)	(0.02)		(0.05)	(0.29)	
11/95	1.36*	0.03**	0.60	-1.35*	0.16*	0.53	0.19*	0.10	0.18
	(0.15)	(0.02)		(0.22)	(0.02)		(0.05)	(0.28)	
12/95	1.34*	0.03**	0.61	-1.52*	0.17*	0.64	0.19*	0.18	0.18
	(0.15)	(0.01)		(0.19)	(0.02)		(0.05)	(0.30)	

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

TABLE 2.4C
COMOVEMENT WITH MEXICAN PAR BOND: MOROCCAN CONSOL LOANS

Column:	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
	Stripped Spread			Predicted Values			Residuals		
Dummy 12/94-	β_0	β_1	adj R^2	β_0	β_1	adj R^2	β_0	β_1	adj R^2
none	0.62*		0.27	0.36*		0.29	-0.10*		0.11
	(0.12)			(0.07)			0.03		
4/95	0.64*	0.09*	0.37	0.42*	0.12*	0.49	-0.11*	0.31	0.12
	(0.11)	(0.03)		(0.06)	(0.02)		(0.04)	(0.23)	
5/95	0.65*	0.09*	0.39	0.44*	0.12*	0.55	-0.11*	0.24	0.11
	(0.11)	(0.02)		(0.05)	(0.02)		(0.04)	(0.21)	
6/95	0.65*	0.09*	0.41	0.45*	0.13*	0.60	-0.12*	0.25	0.12
	(0.10)	(0.02)		(0.05)	(0.02)		(0.04)	(0.19)	
7/95	0.64*	0.09*	0.42	0.47*	0.13*	0.65	-0.12*	0.18	0.11
	(0.10)	(0.02)		(0.05)	(0.02)		(0.04)	(0.17)	
8/95	0.64*	0.09*	0.42	0.48*	0.13*	0.68	-0.12*	0.17	0.11
	(0.10)	(0.02)		(0.05)	(0.01)		(0.04)	(0.17)	
9/95	0.65*	0.09*	0.44	0.49*	0.13*	0.72	-0.12*	0.18	0.11
	(0.10)	(0.02)		(0.04)	(0.01)		(0.04)	(0.17)	
10/95	0.65*	0.09*	0.47	0.50*	0.13*	0.78	-0.12*	0.17	0.11
	(0.10)	(0.02)		(0.04)	(0.01)		(0.04)	(0.17)	
11/95	0.65*	0.09*	0.50	0.52*	0.14*	0.85	-0.12*	0.17	0.11
	(0.10)	(0.02)		(0.03)	(0.01)		(0.04)	(0.17)	
12/95	0.66*	0.10*	0.53	0.53*	0.14*	0.92	-0.12*	0.18	0.11
	(0.09)	(0.01)		(0.02)	(0.01)		(0.04)	(0.17)	

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

TABLE 2.4D
COMOVEMENT WITH MEXICAN PAR BOND: PHILIPPINE PAR BOND

Column:	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
	Stripped Spread			Predicted Values			Residuals		
Dummy 12/94-	β_0	β_1	adj R^2	β_0	β_1	adj R^2	β_0	β_1	adj R^2
none	0.65*		0.13	0.50***		0.05	0.42*		0.46
	(0.23)			(0.28)			(0.07)		
4/95	0.44**	0.09*	0.27	0.47***	0.11*	0.31	0.48*	-0.44**	0.50
	(0.22)	(0.03)		(0.24)	(0.03)		(0.07)	(0.22)	
5/95	0.39***	0.10*	0.31	0.47**	0.12*	0.39	0.51*	-0.57*	0.54
	(0.21)	(0.03)		(0.22)	(0.02)		(0.07)	(0.19)	
6/95	0.35***	0.10*	0.36	0.49**	0.12*	0.46	0.53*	-0.57*	0.55
	(0.21)	(0.02)		(0.21)	(0.02)		(0.07)	(0.19)	
7/95	0.37***	0.10*	0.40	0.51**	0.12*	0.52	0.52*	-0.51*	0.53
	(0.20)	(0.02)		(0.20)	(0.02)		(0.07)	(0.18)	
8/95	0.39**	0.10*	0.44	0.50*	0.12*	0.57	0.52*	-0.47*	0.54
	(0.19)	(0.02)		(0.19)	(0.02)		(0.07)	(0.17)	
9/95	0.40**	0.11*	0.49	0.52*	0.13*	0.63	0.52*	-0.47*	0.54
	(0.18)	(0.02)		(0.17)	(0.02)		(0.07)	(0.16)	
10/95	0.37**	0.11*	0.55	0.51*	0.13*	0.72	0.52*	-0.47*	0.54
	(0.17)	(0.02)		(0.15)	(0.01)		(0.07)	(0.16)	
11/95	0.31**	0.12*	0.63	0.47*	0.14*	0.83	0.53*	-0.48*	0.54
	(0.15)	(0.01)		(0.12)	(0.01)		(0.07)	(0.16)	
12/95	0.25***	0.12*	0.70	0.39*	0.14*	0.93	0.52*	-0.44*	0.53
	(0.14)	(0.01)		(0.07)	(0.01)		(0.07)	(0.16)	

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

TABLE 2.4E
COMOVEMENT WITH MEXICAN PAR BOND: VENEZUELAN PAR BOND

Column:	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
	Stripped Spread			Predicted Values			Residuals		
Dummy 12/94-	β_0	β_1	adj R^2	β_0	β_1	adj R^2	β_0	β_1	adj R^2
none	0.50*		0.29	0.51*	--	0.27	0.22*	--	0.12
	(0.10)			(0.10)			(0.07)		
4/95	0.44*	0.04***	0.31	0.41*	0.05**	0.31	0.23*	0.04	0.11
	(0.10)	(0.03)		(0.11)	(0.02)		(0.08)	(0.37)	
5/95	0.42*	0.04**	0.21	0.38*	0.05**	0.32	0.23*	0.08	0.11
	(0.02)	(0.02)		(0.11)	(0.02)		(0.08)	(0.35)	
6/95	0.40*	0.05**	0.33	0.35*	0.06**	0.33	0.23*	0.06	0.11
	(0.10)	(0.02)		(0.11)	(0.02)		(0.08)	(0.34)	
7/95	0.39*	0.05**	0.33	0.32*	0.06*	0.34	0.23*	0.10	0.11
	(0.11)	(0.02)		(0.12)	(0.02)		(0.08)	(0.33)	
8/95	0.37*	0.05**	0.33	0.30**	0.06*	0.35	0.22*	0.11	0.11
	(0.11)	(0.02)		(0.12)	(0.02)		(0.08)	(0.33)	
9/95	0.36*	0.05**	0.33	0.26**	0.06*	0.36	0.22*	0.10	0.11
	(0.11)	(0.02)		(0.13)	(0.02)		(0.08)	(0.32)	
10/95	0.32*	0.05*	0.35	0.19	0.07*	0.39	0.23*	0.05	0.11
	(0.11)	(0.02)		(0.13)	(0.02)		(0.08)	(0.31)	
11/95	0.27**	0.06*	0.37	0.11	0.08*	0.44	0.23*	-0.05	0.11
	(0.12)	(0.02)		(0.13)	(0.02)		(0.08)	(0.28)	
12/95	0.22***	0.07*	0.39	0.01	0.10*	0.50	0.24*	-0.12	0.11
	(0.12)	(0.02)		(0.12)	(0.02)		(0.08)	(0.27)	

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

A Appendix: Data Sources and Definitions

A.1 Brady Bonds

The following provides a list of Brady bonds for which high-frequency data is available. Bonds used in the sample are in boldface, and were chosen on the basis of sufficient data availability.

COUNTRY	BOND	ISSUE	DUE	MOODY'S	S&P
ARGENTINA	**PAR BOND**	**3/31/1993**	**3/31/2023**	**B1**	**BB-**
	DISCOUNT BOND	3/31/1993	3/31/2023	B1	BB-
	FLOATING RATE BOND	3/31/1993	3/31/2005	B1	BB-
BRAZIL	**EXIT BOND**	**9/15/1989**	**3/15/2013**	**B1**	**B**
	PAR BOND	4/15/1994	4/15/2024	B1	B
	DEBT CONVERSION BOND	4/14/1994	4/15/2012	B1	B
	ELIGIBLE INTEREST BOND	4/14/1994	4/15/2006	B1	B
ECUADOR	PAR BOND	2/28/1995	2/28/2025	NR	NR
	PAST DUE INTEREST BOND	2/28/1995	2/28/2015	NR	NR
	DISCOUNT BOND	2/28/1995	2/28/2025	NR	NR
MEXICO	**PAR BOND**	**3/28/1990**	**12/31/2019**	**Ba2**	**BB**
	DISCOUNT BOND	3/28/1990	3/31/2019	Ba2	BB
VENEZUELA	**PAR BOND**	**12/18/1990**	**3/31/2020**	**Ba2**	**B+**
	DEBT CONVERSION BOND	12/18/1990	3/31/2007	Ba2	B+
	FRONT LOADED INTEREST REDUCTION BOND	12/18/1990	3/31/2007	Ba2	B+
BULGARIA	INTEREST ARREARS BOND	7/28/1994	7/28/2011	NR	NR
	FLOATING RATE BOND	--	--	--	--
	DISCOUNT BOND	7/28/1994	7/28/2024	NR	NR
MOROCCO	**CONSOL LOANS**	--	--	--	--
NIGERIA	PAR BOND	1/21/1992	11/15/2020	NR	NR
PHILIPPINES	**PAR BOND**	**12/1/1992**	**12/1/2017**	**Ba2**	**BB**
	FLOATING RATE BOND	12/1/1992	6/1/2008	Ba2	BB
	DEBT CONVERSION BOND	12/1/1992	12/1/2009	Ba2	BB
POLAND	PAR BOND	10/27/1994	10/27/2024	Baa3	BB
	PAST DUE INTEREST BOND	10/27/1994	10/27/2024	Baa3	BB
	DISCOUNT BOND	10/27/1994	10/27/2024	Baa3	BB

A.2 Political Risk

The ICRG Model for estimating political risk is based on an evaluation of the following thirteen factors which contribute to political risk:

Economic Expectations versus Reality (12%)
-Measures the perceived gap between popular expectations for the standard of living and the willingness of the government to improve income and welfare.

Economic Planning Failures (12%)
-Measures the ability of the government to adopt a sustained and successful strategy for economic development.

Political Leadership (12%)
-Assesses the viability of the current regime, the stability of the government, and the continuation of policies in the event of a regime change.

External Conflict (10%)
-Measures possible conflict based on the probability of external invasion, geopolitical disputes, and border threats.

Corruption in Government (10%)
-Measures corruption risk by looking at the duration of the present government, whether officials are elected or appointed, and the frequency of bribes.

Military in Politics (6%)
-Measures the probability of a military takeover and the degree to which the military is involved in the control of the government.

Law and Order Tradition (6%)
-Reflects the willingness of the citizens to accept the rule of the law, the strength of the legal system, and the orderly transition of power.

Racial and Nationality Tensions (6%)
-Measures the conflict due to diverse racial, national and indigenous conflicts within the country

Organized Religion in Politics (6%)
-Reflects the strength of organized religion in conducting policy and in controlling the government.

Political Terrorism (6%)
-Measures the degree to which political dissidence is expressed through terrorist activities.

Civil War Risk (6%)
-Measures the likelihood of conflict breaking into a civil war.

Political Party Developments (6%)
-Measures the dispersion of participation in policymaking

Quality of Bureaucracy (6%)
-Measures the institutional strength and efficiency of the bureaucracy, and ability to deliver services in the face of political change.

A.3 Independent Variables: Sources and Measures

1. Liquidity Risk: Publicly available data. Proxied by the average bid-ask spread over the month for each particular bond issue.

2. Political Risk: ICRG Political Risk Index (see preceding Appendix A.2), measured monthly.

3. Foreign Exchange/Imports: International Financial Statistics data. This is the ratio total reserves minus gold (line 11.d) to imports f.o.b. in dollars (line 71), measured monthly.

4. Change in Trade Balance: International Financial Statistics data. This is the year over year percentage change in an index of the trade balance, measured monthly. The index is constructed as the ratio of the sum of exports over one year ending in the month of the observation, to the sum of imports over one year ending in the month of the observation. Exports and imports are given in lines 70 and 71 of the IFS.

5. Terms of Trade: International Financial Statistics data. This is the ratio of the average value of export to the average value of imports, measured annually and prorated to a monthly frequency.

6. Rate of inflation: International Financial Statistics data. This is the year over year change in the CPI (line 64), averaged over the preceding 12 months. It is measured monthly.

7. Real Exchange Rate: Measured using Goldfajn and Valdes measures of the trade weighted real exchange rate.

B Appendix: CAPM With Illiquidity and Default Risk

The formalized characterization of sovereign risk builds upon the standard CAPM model extended to incorporate a risk premium for illiquidity, referring to the difficulty with which an asset can be transformed into cash (i.e., sold), and potential default. The standard CAPM model implies that the risk premium on any asset is the product of the risk premium on the market portfolio and the beta coefficient. In addition, the basic CAPM model assumes that all trading in costless. In reality, however, trading involves transaction costs, and assets which are fairly illiquid trade at prices lower than those of assets which are relatively more liquid, ceteris paribus. Equivalently, this implies that investors require a higher return for holding relatively illiquid assets. The following model is a simplified variant of the CAPM which incorporates both sovereign risk and liquidity risk, which in turn is assumed to be a function of sovereign risk.

I start with the simplest incarnation of the basic CAPM, in which I assume that assets are completely uncorrelated with one another. Consequently, the return on a well-diversified portfolio of these assets will converge to the risk-free rate of return, which I take to be the return on US Treasuries. In addition, since assets are assumed to be uncorrelated, the covariance of any asset with the well-diversified market portfolio equals zero. Consequently, according to CAPM, the return on any asset should equal the risk-free rate of return.

I assume that there is a probability of default as well as known transaction costs which characterizes an asset A. In contrast, the risk-free asset is free of transaction costs (and by definition, free of the risk of default). In order for investors to hold A-type assets along with risk-free assets in equilibrium, they require additional compensation for default and illiquidity associated with holding asset A. In equilibrium, therefore, the net return to holding both the risk-free asset and asset A are equal. This yields a gross rate of return on asset A formally stated by the following relationship:

$$r_A = r_f + f(\theta) + h(c), \qquad (3)$$

where r_f equals the risk-free rate, r_A equals the gross rate on asset A, $f(\theta)$ indicates an increasing function of default probability (θ) that measures the effect of the sovereign risk premium, and h(c) is a function of trading costs which measures the effect of the market liquidity given trading costs c.

C Appendix: Sovereign Risk Decomposition for Individual Countries

TABLE C.1A
REGRESSION OF LOG OF STRIPPED SPREAD: ARGENTINA

Independent Variables	Regression (11A)	(12A)	(13A)	Argentina (14A)
Liquidity risk	0.19**	0.17**	0.16***	0.16***
	(0.08)	(0.08)	(0.09)	(0.09)
Index of Political Risk (ln)				-4.44*
				(1.26)
Foreign Exchange/Imports (ln)		-0.40**	-0.49**	-0.63*
		(0.19)	(0.21)	(0.20)
Change in trade balance				-1.77*
				(0.51)
Foreign Liabilities/Exports (ln)				--
Terms of trade (ln)				-21.62*
				(6.98)
Rate of inflation				7.54*
				(2.12)
Real exchange rate (ln)			0.51	-3.73**
			(1.82)	(1.52)
Trend				0.10*
				(0.02)
Constant	7.16*	6.98*	4.59	136.42*
	(0.31)	(0.32)	(8.10)	(32.67)
Adjusted R-squared	0.09	0.16	0.17	0.87
Observations	45	45	41	41

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

TABLE C.1B
REGRESSION OF LOG OF STRIPPED SPREAD: BRAZIL

Independent Variables	Regression (11B)	(12B)	(13B)	Brazil (14B)
Liquidity risk	0.05 (0.05)	0.05 (0.05)	0.04 (0.05)	0.02 (0.05)
Index of Political Risk (ln)				-0.23 (0.80)
Foreign Exchange/Imports (ln)		-0.05 (0.12)	-0.10 (0.13)	-0.19 (0.15)
Change in trade balance				0.05 (0.08)
Foreign Liabilities/Exports (ln)				--
Terms of trade (ln)				-0.74 (0.91)
Rate of inflation				0.15 (0.10)
Real exchange rate (ln)			0.51 (0.32)	0.67*** (0.35)
Trend				0.02*** (0.01)
Constant	6.72* (0.11)	6.71* (0.11)	4.26* (1.54)	6.53 (5.91)
Adjusted R-squared	-0.0004	-0.0118	0.007	0.01
Observations	75	75	73	71

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

TABLE C.1C
REGRESSION OF LOG OF STRIPPED SPREAD: MEXICO

Independent Variables	Regression (11C)	(12C)	(13C)	Mexico (14C)
Liquidity risk	0.36*	0.23*	0.15***	0.19**
	(0.10)	(0.09)	(0.08)	(0.08)
Index of Political Risk (ln)				-1.59***
				(0.95)
Foreign Exchange/Imports (ln)		-0.47*	-0.34*	-0.25*
		(0.08)	(0.08)	(0.08)
Change in trade balance				0.13
				(0.14)
Foreign Liabilities/Exports (ln)		*0.65**	*0.53**	*0.37**
		(0.11)	(0.11)	(0.11)
Terms of trade (ln)				0.35
				(0.80)
Rate of inflation				1.41*
				(0.47)
Real exchange rate (ln)			1.20*	1.49*
			(0.35)	(0.36)
Trend				0.002
				(0.003)
Constant	6.91*	7.24*	1.78	5.37
	(0.26)	(0.21)	(1.59)	(5.79)
Adjusted R-squared	0.15	0.49	0.52	0.75
Observations	75	74	74	71

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

TABLE C.1D
REGRESSION OF LOG OF STRIPPED SPREAD: MOROCCO

Independent Variables	Regression (11D)	(12D)	(13D)	Morocco (14D)
Liquidity risk	0.04***	0.04***	0.04***	0.02
	(0.02)	(0.02)	(0.02)	(0.02)
Index of Political Risk (ln)				-0.25
				(0.43)
Foreign Exchange/Imports (ln)		-0.18	-0.17	0.12
		(0.25)	(0.25)	(0.26)
Change in trade balance				-1.23*
				(0.48)
Foreign Liabilities/Exports (ln)		0.18	0.18	0.22
		(0.14)	(0.14)	(0.17)
Terms of trade (ln)				-0.42
				(2.65)
Rate of inflation				-2.97**
				(1.44)
Real exchange rate (ln)			0.14	1.49
			(0.90)	(1.05)
Trend				-0.09*
				(0.04)
Constant	6.78*	7.26*	6.60	5.74
	(0.30)	(0.46)	(4.15)	(12.76)
Adjusted R-squared	0.03	0.02	0.008	0.15
Observations	71	71	70	67

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

TABLE C.1E
REGRESSION OF LOG OF STRIPPED SPREAD: PHILIPPINES

Independent Variables	Regression (11E)	(12E)	(13E)	Philippines (14E)
Liquidity risk	0.1! (0.09)	0.17*** (0.09)	0.18*** (0.10)	0.21** (0.10)
Index of Political Risk (ln)				0.40 (0.35)
Foreign Exchange/Imports (ln)		-0.04 (0.30)	-0.07 (0.32)	0.23 (0.36)
Change in trade balance				-1.57 (1.55)
Foreign Liabilities/Exports (ln)		-0.10 (0.19)	-0.08 (0.20)	-0.17 (0.24)
Terms of trade (ln)				-5.88*** (3.47)
Rate of inflation				9.60 (6.91)
Real exchange rate (ln)			0.31 (1.09)	0.004 (1.20)
Trend				-0.14** (0.07)
Constant	6.44* (0.15)	6.38* (0.43)	4.90 (5.22)	34.87** (15.52)
Adjusted R-squared	0.0087	0.02	-0.006	0.13
Observations	49	46	46	45

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

TABLE C.1F
REGRESSION OF LOG OF STRIPPED SPREAD: VENEZUELA

Independent Variables	Regression (11F)	(12F)	(13F)	Venezuela (14F)
Liquidity risk	0.14***	0.14	0.14	0.15
	(0.08)	(0.09)	(0.09)	(0.10)
Index of Political Risk (ln)				-1.48**
				(0.66)
Foreign Exchange/Imports (ln)		-0.30	-0.30	-0.40***
		(0.21)	(0.21)	(0.24)
Change in trade balance				0.03
				(0.05)
Foreign Liabilities/Exports (ln)		0.10	0.09	0.34
		(0.20)	(0.21)	(0.22)
Terms of trade (ln)				0.05
				(0.16)
Rate of inflation				5.53*
				(1.48)
Real exchange rate (ln)			0.02	0.12
			(0.21)	(0.26)
Trend				-0.01
				(0.01)
Constant	7.20*	7.20*	7.11*	11.11*
	(0.49)	(0.48)	(1.04)	(2.97)
Adjusted R-squared	0.02	0.02	0.002	0.56
Observations	68	67	67	66

Note: Standard errors are in parentheses. * indicates significance at 1% level; ** indicates significance at 5% level; *** indicates significance at 10% level.

Chapter 3

THE IMPACT OF MACROECONOMIC AND POLITICAL INSTABILITY ON FOREIGN DIRECT INVESTMENT

3.1 Introduction

Foreign direct investment (FDI) has consistently accounted for a significant portion of capital inflows into developing countries over the last two decades. The share of FDI in total capital inflows reached inauspicious heights during the debt crises of the 1980s, due in part to the virtual extinction of bank and portfolio lending to developing countries accompanied by less severe declines in FDI. The resolution of the debt crisis, in tandem with stabilization and financial liberalization policies pursued in many developing economies, permitted the re-entry of many of these countries into international capital markets as active borrowers. During the early 1990s, despite huge surges of both short-term and long-term capital into the countries of East Asia and Latin America, the share of FDI in this increased total capital inflow remained quite substantial;[11] Table 3.1 demonstrates this.[12]

Even though private-sector capital is flowing back to these rechristened "emerging markets" in the form of bank lending and portfolio investment, the role of FDI as a steady source of long-term external financing for investment continues to be important. FDI increased from

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[11] During the same time period, South Asia and the Middle East experienced dramatic and slight increases, respectively, in the proportion of capital inflows attributed to FDI; only Africa suffered a dramatic decline.

[12] All tables are located at the end of the text of this chapter, unless otherwise noted.

1995 to 1996 by $14 billion to $110 billion, a four-fold increase between 1990 and 1996.[13] As a share of total inflows, FDI remains substantial, and as a share of GDP, it has risen in the aftermath of the debt-crisis; this is illustrated in Table 3.2. This essay investigates the role of macroeconomic and political stability in promoting FDI. It finds that macroeconomic stability, proxied by different indices of creditworthiness, tends to increase FDI in developing countries, while extreme political instability tends to reduce it. It also finds that trade openness, rather than depress FDI as suggested by much of the literature on FDI, tends to increase the level of FDI (relative to GDP) which countries receive.

FDI provides a steady source of long-term external financing for investment, and can bring with it tangible benefits to the recipient country, such as employment creation. In addition to equity finance, the foreign investment package may include even greater amounts of loan finance, and other benefits to the recipient country such as management expertise, modern technologies, and access to world markets.[14] Realizing these potential benefits, developing countries have undertaken targeted measures to increase incentives for multinationals to locate in their respective economies (e.g., tax holidays and other tax incentives, monopoly rights in the domestic market, and covenants which allow the investor to repatriate their profits). Many survey studies have documented the importance of tax incentives and the protection of property rights as relevant to the foreign investor's decision to invest in a particular host country.[15] Less attention has been given to macroeconomic and political conditions in the host economy as potential determinants for FDI.[16]

Theory predicts that both macroeconomic and political stability should be conducive to FDI by reducing the uncertainty associated with investment. The literature on irreversible investment shows that in an environment of fixed costs and uncertainty, uncertainty increases the option value of waiting to invest. This class of models postulates that in an environment of high uncertainty, investment is diminished because the option to wait is valuable. Moreover, increased uncertainty may also decrease FDI by reducing the growth of domestic demand. Increased uncertainty should negatively impact the level of productivity by decreasing the

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[13] See Global Development Finance (formerly the World Debt Tables) published by the World Bank, March 1997.
[14] Although the ability of the recipient country to appropriate these benefits is contestable; see Gillis et al.
[15] See the survey study published by the United Nations, Determinants of Foreign Direct Investment.
[16] For this strand of the literature, see Edwards (1990) and Schneider and Frey.

efficiency of the price mechanism, and reduce growth by increasing the frictions which accompany the reallocation of factors to their most efficient uses (assuming the reallocation of factors is integral to the growth process). If FDI is undertaken for the purposes of supplying and locating near an expanding market, then growth of the recipient economy matters for FDI decisions, and this chain of causality from uncertainty to growth becomes a possible channel through which macroeconomic instability affects FDI

This chapter is organized as follows. The second section describes the standard theory behind the role of uncertainty and investment, and offers a simple model which characterizes the option to invest as a function of the underlying volatility of the investment project. The third section begins the empirical section of the chapter; it describes the rationale for choosing and the method of constructing the macroeconomic and political stability indicators, summarizes the data employed in the analysis, and indicates their potential shortcomings. The fourth section details the empirical evidence from panel data regressions regarding the relationship between FDI and macroeconomic and political uncertainty, respectively. The fifth section concludes.

3.2 Review of the Theory of Irreversible Investment Under Uncertainty

This section summarizes a basic model of investment under uncertainty, and presents the general results and intuition which emerge from it. The model follows directly from McDonald and Siegel (1986); the discussion is based on Pindyck and Solimano (1993), and a more detailed exposition can be found in Dixit (1992), Pindyck (1991) and Dixit and Pindyck (1993).

The literature of irreversible investment likens the investment opportunity to a financial call option. A call option gives its holder the right, for some specified amount of time, to pay an exercise price and receive an asset in return. Exercising the option is irreversible; that is, once the option has been exercised, one can not retrieve the option or the money that was paid to exercise it. Similarly, a firm with an investment opportunity can invest now (at an "exercise price") or invest in the future, in return for an asset of some value (the future returns on the investment). Like a financial call option, the investment is irreversible (i.e., there are sunk costs to investing). Similar to a financial call option, the option to invest is valuable because its net

payoff is a function of the future value of the asset obtained by investing, which is uncertain. Once the firm irreversibly invests, it exercises (or "kills") its option to invest. In other words, it gives up the opportunity to wait for additional information which may affect the investment conditions, the timing of the investment, and the attractiveness of the investment opportunity. Moreover, since there are irreversibilities, the firm can not disinvest should conditions adversely change the desirability of the investment. This option value of investing is an opportunity cost which must be included in the cost of investment; as such, any classic NPV rule of investment must be modified to account for the value of keeping the option alive as an additional cost.

The exercise rule can be obtained from the following model, which answers the following question: At what point is it optimal to pay a sunk cost I in return for a project whose value is V, given that V evolves according to the following Brownian motion:

$$dV = \alpha V dt + \sigma V dz, \qquad (1)$$

where dz is the increment of a Wiener process. This equation implies that the current value of the project is known, but future values are lognormally distributed with a variance that grows linearly with time, reflecting the uncertainty associated with V which increases as we move further into the future. In other words, the future value of V is always uncertain. The following investment rule maximizes the value of the investment opportunity, which we denote by F(V). Since, according to our set-up, the payoff of investing at time t is denoted by V_t-I, we want to maximize the following:

$$F(V) = \max E[(V_T - I)e^{-\rho T}], \qquad (2)$$

where T is the unknown time in the future when the investment is made, ρ denotes the discount rate, and the maximization program is subject to equation (1). We denote the difference ρ-α as equal to δ ($-\delta$ can be interpreted as the dividend yield on the project). In this example, the option value of investing at any time t is equal to $V^* - V_t$, i.e., the difference between the exercise value of the investment opportunity at the optimum (V^*-I) and the exercise value of the investment

opportunity at time t (V_t-I). We must also assume that $\alpha<\rho$; otherwise, F(V) would become infinite for time $T\rightarrow\infty$ and the firm would never invest since the option value of investing would grow at a rate $\alpha-\rho>0$.

The solution to this problem is derived in Dixit and Pindyck. We reproduce the main results here. The optimal investment rule takes the form of a critical value V* such that it is optimal to invest once $V\geq V^*$. The value of the investment opportunity, if we assume that investment in undertaken once this critical value is reached, is found by solving (2) with the appropriate boundary conditions. F(V) is given by:

$$F(V) = aV^{\beta}, \tag{3}$$

where β is denoted by:

$$\beta = \frac{1}{2} - (\rho-\delta)/\sigma^2 + \sqrt{\left[(\rho-\delta)/\sigma^2 - \frac{1}{2}\right]^2 + 2\rho/\sigma^2} > 1. \tag{4}$$

The critical value V* and the constant a are given by the following:

$$V^* = \frac{\beta}{\beta-1} I, \tag{5}$$

and

$$a = \frac{V^*-I}{(V^*)^{\beta}}. \tag{6}$$

Since $\beta>1$, $V^*>I$. Uncertainty, measured by σ^2, drives a wedge between the critical value V* and the investment cost I. Since $V^*-I=I/(\beta-1)$ and $\partial\beta/\partial\sigma < 0$, this wedge is larger the greater the uncertainty associated with future values of V (i.e., the higher σ^2).

In summary, this basic model of investment under uncertainty shows how uncertainty and irreversibility create an opportunity cost of investing; this opportunity cost increases the cost of

investment. The opportunity cost (also known as the option value of the investment) is an increasing function of the volatility of the value of the investment project. In the short run, therefore, an increase in volatility can reduce investment temporarily by increasing V*, the critical threshold of the project value required to trigger investment. In other words, investment projects which were at or near the old critical value V* must be reconsidered (and not undertaken) since they are now subjected to a higher hurdle value V*. Graphically, these relationships are captured by the schedule of investment depicted in Figure 3-1. Investments are arrayed on the x-axis in decreasing order of their value V; the investment schedule is represented by the downward sloping line R(I). A higher hurdle rate V* (diagrammatically reflected in an upward shift of the horizontal line from V* to V**) implies that the total number of investments which can be undertaken falls from I* to I**.

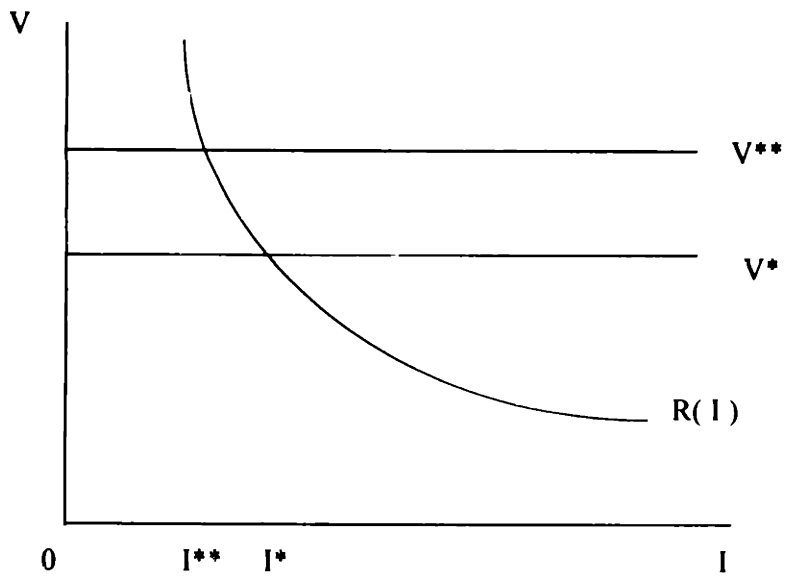

Figure 3-1. Schedule of Investment Opportunities

In order to capture the dynamic implications of this theory on a cross-section of countries, we must introduce two additional assumptions. First, we assume that the schedule of investment is unchanging through time, and is not affected by the uncertainty in the investment environment; that is, $\partial R(I)/\partial t = 0$, and $\partial R(I)/\partial \sigma = 0$. Secondly, we assume that the schedule of investment is identical for all countries in the sample. With the inclusion of these two assumptions, we are

able to empirically evaluate the relationship between uncertainty and investment proposed by the option value approach to investment using a panel data of countries.

3.3 Macroeconomic and Political Variables

The empirical analysis uses panel data analysis to assess the relationship between FDI, measured as the ratio of FDI a country receives relative to its GDP, and indicators of macroeconomic stability and political stability. Rather than explicit measures of volatility, the analysis uses indices of macroeconomic creditworthiness and indices which summarize the macroeconomic environment as proxies for uncertainty arising from the economic environment. These indicators are suitable proxies for risk since volatile macroeconomic policy, as captured by these indices, engenders instability and uncertainty. The sample spans the time period 1975-1994, and includes over 60 developing countries. Data are either quinquennial for the sample period (i.e., 1975, 1980, 1985, 1990), or presented as averages of five year sub-periods over 1970-1994. This reduces difficulties associated with potential serial correlation and smoothes out fluctuations in the data which may be attributed to business cycles.

We begin by describing how a set of macroeconomic and political instability proxies were chosen and measured, and discuss their relative merits and drawbacks. Appendix D provides a condensed description of the data, sources, and expected relationship with FDI/GDP.

3.3.1 Indicators of Macroeconomic Stability

Macroeconomic stability is signaled by a series of possible variables, such as the inflation rate and its associated variability.[17] The inflation rate serves as an indicator for the ability of a government to manage its economy. High inflation, and the high variation in the relative prices of different goods normally associated with it, diminish the efficiency of the price mechanism and distort the allocation of resources and the decisions of consumers and investors. The

[17] Fischer (1993) argues that the public sector deficit is a reasonable indicator for the unsustainability of macroeconomic policy. If spiraling deficits translate into high and variable inflation, then fiscal deficits contribute to macroeconomic instability. Inflation is a more direct approximation of the *uncertainty* in the economic environment than government deficits; consequently, we focus on the inflation rate and its attendant variability as an estimate of economic uncertainty.

empirical analysis undertaken in this essay assesses three indicators of macroeconomic stability for their respective correlation with FDI. Each indicator incorporates various elements of the macroeconomic environment. The first indicator is constructed using components obtained from Economic Freedom of the World 1995, published by the Cato Institute in the United States, in conjunction with a number of other research organizations throughout the world. The indices are constructed for the rating years 1975, 1980, 1985 and 1990. The second and third indices, country credit ratings publicly available from Institutional Investor and ratings used internally by the World Bank, are available for our sample of countries as averages over the time periods 1975-79, 1980-84, 1985-89 and 1990-94. Because each of the following indices rewards the best economic performers with high ratings, we expect each of these indices to be related positively with FDI.

(1) *Index for money growth and inflation variability, data for components obtained from the Economic Freedom of the World (INFLATSD).* This index measures the stability of the monetary policy, defined by a monetary framework which permits the unit of exchange to maintain a stable, predictable purchasing power domestically. It is comprised of two components, an index of money growth and an index of inflation variability, each weighted by the inverse of their respective standard deviations, so that both indices exert equal weight upon the consolidated index INFLATSD. Real money growth, measured as the compound average annual growth rate of the money supply (M1) during the 5-year period prior to the rating year, minus the average growth rate of real GDP during the last ten years, is calculated for each country in the sample for the rating years 1975, 1980, 1985, and 1990.[18] Using 1985 as the base year, the countries are arranged in ascending order and separated into 11 groups of equal size. The countries in the group which experience the lowest money expansion (relative to real GDP growth)[19] are given the highest rating of 10, while the countries with the highest rate of money expansion (relative to real GDP growth) are rated 0. The midpoints between rating levels for the base year 1985 are used to determine the range for each of the 0-10 ratings for the three other rating years.

[18] The average growth rate of real GDP is assumed to proxy the growth rate of potential GDP.
[19] In absolute value terms.

An index for inflation variability is constructed in an identical fashion across countries and through time (i.e., for the four rating years). Countries with the most stable (and therefore most predictable) rates of inflation are given the highest ratings. Conversely, countries with the highest variability in their inflation rates are given the lowest ratings. The rate of inflation is calculated for each country each year using the GDP deflator; the standard deviation of the inflation rate is calculated for the five year period preceding the rating year.

(2) *Institutional Investor country credit ratings (INSTIN).* These credit ratings are based on information provided by leading international banks, who are asked to grade countries on a scale of 0 (least creditworthy) to 100 (which represents the least chance of default). The sample of the study is based on information provided by approximately 75-100 banks, each of which independently provides its own ratings. The individual responses are weighted according to an undisclosed formula, which gives greater weight to banks with more sophisticated country analysis procedures and greater worldwide exposure. The ratings are undertaken bi-annually in March and in September, and are available from 1979 onwards. For the purposes of this essay, the September ratings for each year are averaged to obtain average ratings over the sub-periods in our sample.

This index indicates the market perception of the repayment risk associated with different countries; this creditworthiness rating is implicitly dependent upon macroeconomic factors, the country's level of indebtedness, the portfolio composition of its external debt, the probability of illiquidity in the market for developing country debt, convertibility risk if the debt is denominated in foreign currency, and political risk. Therefore this country risk measure incorporates the uncertainty which arises from all these factors, and not simply from macroeconomic mismanagement.

(3) *World Bank country performance ratings (WBPROJ).* The World Bank country ratings rate countries on a scale of 1-5, with 5 indicating the best performers. It is available annually from 1977 onwards. For the purposes of this essay, these annual ratings are averaged to obtain an average rating for the five time periods in our sample. The ratings from 1977-1984 have been

rescaled from the original ratings (which were based on a scale of 1-10).[20] For the period 1977-1992, the ratings are based on three components, each with equal weights: economic management, poverty alleviation, and responsiveness of the country to the World Bank's policy recommendations. Starting in 1992, the component for Bank impact was dropped. In 1993, Bank project portfolio performance was added with a weight of 20 percent, while short term economic management, long term management and poverty alleviation accounted for equal portions of the remaining 80 percent.

The World Bank performance index is not publicly available, and is intended for the exclusive use of the Bank for its review of lending allocations. The ratings are meant primarily to compare performance across countries at a given point in time, rather than to track a country through time. However, when countries do undergo major changes in their economic performance, an effort is made to reflect this in the ratings change from one year to the next. Nevertheless, cross-sectional comparison is the overriding objective of the performance index.

The country performance ratings reflect the World Bank's perception of the country's macroeeconomic environment, as well as the performance of World Bank projects in these borrowing countries (which are, in turn, a function of the project design and implementation, the idiosyncratic environment in which the project is undertaken, as well as the general macroeconomic environment). When using either the World Bank and Institutional Investor ratings as indicators of the general macroeconomic environment, it is essential to bear in mind that both measures reflect more than macroeconomic conditions; when possible, the empirical analysis controls for the impact of these non-economic factors on country credit ratings. Table 3.3 summarizes the partial correlation coefficients between the various macroeonomic instability indices.

3.3.2 Indicators of Political Stability

Extreme political instability and war do apparent harm to economic growth, and severely reduce the attractiveness of a country to potential investors. The following three indicators are used as measures of political instability. Because each of the three political indices assigns high values

[20] After 1984, the official rating scale was changed to the 1-5 scale.

to countries suffering from the most acute political instability, we expect each of these indices to be related negatively to FDI.

(1) *Political rights index (PRIGHTS).* This index measures the right to participate meaningfully in the political process. Countries are ranked on a scale of 1-7 where 1 indicates the greatest degree of political rights. A country which protects an individual's political rights is characterized by a fully-operating electoral procedure. It undergoes regular, non-disruptive changes in government, usually from the incumbent to an opposition party. Such a country is characterized by an absence of foreign domination, a government in which political power is decentralized, and a political process which guarantees all segments of the population a political voice. This index, constructed by the Freedom House and compiled for the years 1975-1985 by Barro and Lee, rates countries according to the above criteria.

(2) *Civil liberties index (CIVLIB).* This index measures the degree to which people are able to express their opinion publicly without fear of reprisals, and are guaranteed the right to freely express their opinion or protected in doing so by an independent judiciary. This index also reflects the right of individuals to organize and demonstrate, as well as the right of citizens to freely practice their religion, access publicly provided education, travel unconstrained throughout the country and across its borders, and exercise other personal rights. More weight, however, is given to variables which reflect an individual's ability to express their political rights. Countries are ranked on a scale of 1-7 where 1 indicates the greatest degree of civil liberties, and 7 the greatest deprivation of civil liberties. Not surprisingly, countries which offer the greatest protection of civil liberties are those in which individuals have the greatest amount of political freedom: the correlation between CIVLIB and PRIGHTS is 0.94 (and statistically different from 0). CIVLIB, as with the previous index, is obtained from Barro and Lee (1994), and from various issues of Freedom House's annual publication, Freedom in the World. The annual values of PRIGHTS and CIVLIB are averaged for years in the four time periods in the sample.

(3) *An index of war (WARS).* This measures the number of years, during each sub-period, in which a country has been engaged in war. The data is obtained from Bruno and Easterley (1994).

3.4 Empirical Results

This section begins by presenting simple correlations between the various macroeconomic and political indicators with FDI. It then proceeds with a discussion of the other variables which enter into the FDI decision, and which we control for in regression analysis in order to test the partial correlation between FDI and economic and political instability. The section ends by summarizing the results from panel data regressions. When we analyze the credit rating variable INSTIN for correlation with the measure of FDI, we decompose it into two parts: the index attributed to political factors, and the part attributed to non-political (re: economic) factors. This is because the components of this rating are not explicitly defined. We then test the different components of INSTIN for a robust relationship with FDI.

3.4.1 Other Variables Relevant to the FDI Decision

In order to test our hypothesis regarding the impact of economic and political instability on FDI using regression analysis, we control for an array of variables which enter into the FDI decision. This allows us to test the strength of the partial correlation between FDI/GDP and the variables of interest. A caveat regarding the interpretation of results is worth noting. Because we are using aggregate level data, we have insufficient information regarding the destination of FDI production; in other words, we can not know whether FDI is undertaken to supply the recipient economy (so-called horizontal integration) or whether FDI in the recipient economy is intended to supply third markets (vertical integration). At this level of generality, we can only remain agnostic and conclude that FDI can, in principle, be undertaken to supply either of these markets.

The first set of variables which we include in the regression controls for the impact of trade openness. Since FDI in a domestic (recipient) economy may be undertaken in order to supply third markets cheaply (e.g., by means of relatively inexpensive domestic labor, combined with proximity to third markets), the openness of the domestic economy to trade is an important

determinant of FDI. If inputs are imported (e.g., from the parent company located in the investor's homeland) and production exported, then trade barriers diminish the profitability of the FDI enterprise, and therefore decrease FDI. This hypothesis regarding the relationship between FDI and trade restrictions is in contrast to an alternative hypothesis prevalently held in the FDI literature, which proposes that foreigners undertake direct investment in the host economy in order to supply a host market whose access is otherwise restricted by trade barriers. Under this alternative hypothesis, higher trade barriers emerge as key locational-influences favoring overseas production as a means of supplying those markets. This alternative hypothesis is intuitively unappealing since it characterizes FDI as a means of circumventing trade barriers and supplying the domestic market, without regard to the growth potential of the domestic market or the sustainability of the profitability artificially generated by trade protection. Moreover, this alternative hypothesis does not take into account the negative impact of trade distortions on the growth potential of the domestic market.

The variables which indicate a country's openness to trade include an index of the degree of controls on foreign direct investment in the recipient country (CAPTR). Greater restrictions on FDI (a decrease in the index) will decrease the FDI flowing into as well as out of a country; we expect, therefore to observe a positive relationship between this index and FDI/GDP. A variable which denotes the degree of tariff protection in the economy proxies the degree of tariff restrictiveness: TRDTAX is measured as the ratio of taxes on international trade transactions as a proportion of trade volume. This variable will be somewhat biased since trade volume tends to decrease as tariffs become more restrictive. We should expect this variable to be related negatively to FDI.

As a final indicator of openness, we include OPNEST, which rates the degree to which actual trade is distorted away from the "natural" trade level attributed to structural attributes and natural trade impediments. This divergence arises because countries impose tariffs, exchange controls, quotas, and other discriminatory regulation which distort actual trade. Countries are ranked cross-sectionally and through time according to their degree of openness (10=most open, actual/expected trade is high; 0=closed, actual/expected trade is very low); we expect a positive relationship between this index and FDI/GDP. The expected size is the trade which can be attributed to the following structural variables:

1. geographic size,

2. population,

3. a dummy variable indicating the country is land-locked,

4. a dummy variable indicating the country has potential trading partners within 150 miles of its borders, but that les than 50% of the population resides within this distance from the trading partners, and

5. a dummy variable indicating a country has potential trading partners within 150 miles of its borders, and more than 50% of the country's population is located within 150 miles of this trading partner.

Geographical size tends to reduce the size of the trading sector since many consumers and producers are located far from potential foreign trading partners. A large population tends to decrease the size of the trading sector since it facilitates the ability of domestic producers to sell in the domestic market and realize the gains from scale economies associated with large-scale production. Land-locked countries are expected to have a smaller trade sector, while countries which have potential trading partners in close proximity should experience greater trade. The variable OPENALL consolidates the three above elements of trade openness as well as the degree of the black market exchange rate premium into a general index of openness. Based on a 0-10 scale, with 10 denoting the greatest degree of trade openness, it is expected to positively impact FDI/GDP. Data for all trade variables are obtained from the Fraser and Cato Institutes' publication Economic Freedom in the World, 1995.

We control for factor cost in a number of ways. We use the skill level of the domestic labor force, with the assumption that this measure proxies factor costs. The skill level is denoted by the proportion of adults who have completed secondary school education, and the proportion of adults who have completed primary education (SECC and PRICC respectively). Secondly, we include a variable which specifically measures factor cost (LRWAGE, the (log of the) real wage (in 1987 US dollars) received by the manufacturing sector) in addition to controlling for skill level. All cost variables are expected to have a negative impact on FDI/GDP.

We include variables which address the recipient country's market characteristics and key locational influences. (Log of) per capita GDP (LRGDPCH) denotes the demand potential of the

market and the advantages associated with locating production near and supplying an expanding market. Complementarities are relevant for determining FDI. To the extent that complementarities may exist between foreign and domestic investment, and to the extent that both domestic and foreign investment respond to the same set of incentives (e.g., the expected profitability of the domestic market) we expect the coefficient on the share of investment in GDP (INVSH) to be positive. Countries with a well-developed industrial sector may experience greater flows of FDI than countries with relatively undeveloped industrial sectors, since FDI may benefit from the externalities associated with a well-developed industrial sector and infrastructure. However, countries with heavily developed industrialized sectors may be relatively more expensive (e.g., high rents and high wages) than countries with less industrial buildup. Particularly if FDI enterprises bring with them their own technology and manufacturing processes, they do not necessarily consider the externalities from domestic industrial development as relevant reasons for locating production in the domestic economy. We include the proportion of industrial value added in GDP (INDGDP) with no a priori expectation about its relationship with FDI.

3.4.2 Results from Panel Data Regressions

We turn to panel data regression evidence to see if we can support our hypotheses. The discussion begins with a summary of the results from regression analysis using INFLATSD as a measure of macroeconomic instability; the section then turns to a summary of the results which emerge when the World Bank and the Institutional Investor indices are separately used as proxies of macroeconomic stability.

Table 3.4 summarizes the results of panel data regressions using INFLATSD as the measure of macroeconomic stability.[21] Five alternative regression specifications are estimated. Regression 1 represents the basic regression; in addition to the macroeconomic and political variables, variables which control for openness, demand, market structure, and cost are included in the regression. The first three regressions differ only in the way they address cost: the first

[21] Note that variable names in the summary tables of regression results contain either the suffix "XX" or "X"; these suffixes denote whether the variables are quinquennial observations or averages over sub-periods, respectively.

and second regressions use the skill level as a proxy for cost, and add an estimate for real wage, respectively. Regression 3 uses an instrumental variables estimate of the real exchange rate (YHAT). The fourth regression uses a different measure of openness from the preceding three regressions. In the fifth regression the initial value of growth during each sub-period is included in the basic regression.

In the three regressions, INFLATSD is found immediately to be statistically insignificant. Since PRIGHTS and CIVLIB exhibit a high correlation (their correlation coefficient is equal to 0.93) we include only CIVLIB in the regression. Of the two political instability indicators, only WARS emerges as consistently significant, exerting a negative impact on FDI/GDP. Evidence from this first set of regressions also supports the hypothesis that trade restrictions discourage FDI. OPNEST and OPENALL, as measures of openness, are each consistently statistically significant, and emerge positively related to FDI. The significant partial correlation between the share of investment in GDP and FDI/GDP also confirms the existence of complementarities between FDI and domestic investment; a 1 percentage increase in the investment share of GDP is associated with half a percentage increase in FDI as a share of GDP. Lastly, with the exception of SEC in Regressions 2 none of the cost variables appear significantly related to FDI (even though all emerge with the expected negative coefficient), implying that the search for inexpensive factors of production across different countries is not the principal determinant which propels or deters the FDI decision.

Table 3.5 presents the results from panel data regressions which use the World Bank's country performance rating as an indicator of macroeconomic stability. Regression 6 controls only for the log of real GDP per capita and the economy's skill level. In this "base" regression, the macroeconomic performance index enters in significantly, as does the measure of GDP per capita. A one point increase in the index, all other things equal, elicits an increase in the proportion of FDI to GDP of 0.45 percentage points. Regression 7 introduces indicators of political risk and the measure of controls on the inflow and outflow of capital related to direct investment. The performance index remains significant, though its impact on FDI/GDP is somewhat and expectedly diminished. Neither of the political variables emerges statistically significant. Capital controls are found to depress FDI/GDP.

Regressions 8 and 9 successively include the share of trade taxes in relation to the volume of trade, and an index of trade (OPNESTXX), respectively, as other measures of openness to trade. In these regressions, trade barriers are found to significantly depress FDI/GDP; from regression 9 we see that two of the three openness variables are statistically significant. Regression 10 includes the (log of) the real wage as another measure of costs. While higher costs are found to diminish FDI, only the coefficient on SECCXX is independently significant. The final specification employs the consolidated measure of openness to trade in place of the three separate trade openness measures. This alternative measure does not change the initial result that trade openness increases FDI/GDP; in this case an increase in the openness index of one unit increases FDI as a percentage of GDP by 0.2 percentage points.

Several results are independent of the six above regression specifications. The World Bank index is consistently statistically significant; an improvement in the index increases FDI/GDP. In contrast, the political stability indicators (even WARS) are never significant; this is a vast contrast to the results from the previous set of regressions which use INFLATSD as an indicator of macroeconomic instability. The share of industrial value added in total GDP is found to be positively and significantly related to FDI; again, this is in contrast to the previous set of results. The finding of a significant and positive relationship between FDI/GDP and INDGDPXX supports the assertion that externalities arising from the existence of a well developed industrial base may attract FDI into the domestic economy. Similarly, demand in the domestic market (as proxied by the per capita GDP) is found to be a significant determinant in attracting FDI. Relative factor prices continue to be insignificant determinants.

Tables 3.6 and 3.7 summarize the results from panel data regressions which use the Institutional Investor's country credit ratings. In Table 3.6, the country rating itself is used as a direct measure of credit risk; this credit risk incorporates both political and macroeconomic elements which impact a country's ability to repay its debt. We first control for cost and demand factors (Regression 12) then successively control for industrial structure and trade openness, and then include an additional measure of cost in the final regression specification (Regression 17). The credit rating in all the above specifications emerges as highly

statistically significant; according to regression 17, a one unit increase in the credit rating increases the volume of FDI as a share of GDP by 0.03 percentage points.

We then decompose the credit rating into the portion attributed to political variables and that imputed to economic (re: residual) factors. We do this by regressing the credit rating on the political variables (i.e., WARS and CIVLIB), and use the fitted values (EST) as a measure of the credit rating which can be ascribed to political elements. For this analysis, we use the residual (RES) as a proxy for the macroeconomic environment, even though it also incorporates other information, such as the sovereign default probability associated with a country's level of indebtedness, the portfolio composition of its external debt, convertibility risk of debt denominated in a foreign currency, and illiquidity risk in the market for developing country debt.[22]

The results from regressions which use EST and RES as measures of political stability and macroeconomic stability, respectively, are summarized in Table 3.7. As in previous exercises, we successively control for demand, industrial development, cost, and trade openness. In the three specifications denoted by Regressions 18-20, EST emerges as consistently statistically significant. RES is statistically significant for the first two specifications; however, when we include LRWAGE in the regression, the t-statistic on RES falls beyond conventional levels of significance. Both political uncertainty and macroeconomic uncertainty are found to reduce the level of FDI/GDP. An increase in political risk which leads to a one unit decline in EST elicits a decrease of 0.06 percentage points in the proportion of FDI/GDP (according to regression 20), while an increase of one unit in the macroeconomic component of INSTIN elicits an increase of 0.02 percentage points in the ratio of FDI to GDP (according to regression 22).

3.5 Concluding Remarks

The results from this chapter support the view that countries which actively pursue policies of macroeconomic stabilization experience higher inflows of FDI as a share of GDP. This assertion

[22] These other elements which contribute to sovereign risk (with the exception of illiquidity risk) are dependent on the degree of macroeconomic management in the economy. This essay contends that most elements which comprise the residual measure of country creditworthiness are implicitly dependent on the general macroeconomic environment; therefore, the residual serves as an appropriate proxy for the macroeconomic environment.

is based upon models of irreversible investment under uncertainty which imply that macroeconomic stability should be conducive to FDI by reducing the uncertainty associated with investment. The results also show that undistorted trade and international competitiveness help to induce, rather than reduce, the flow of FDI into the recipient country. This finding does not support the contention that FDI is undertaken as a means of "tariff-jumping" to access local markets; rather it is consistent with the view that FDI may be undertaken in the recipient economy as a means of supplying third markets more easily and inexpensively. These two findings, regarding the positive impact of macroeconomic stability and trade openness on FDI, are fairly robust to the regression specification, the omission of outliers, and the inclusion of regional dummy variables.

The results also indicate that extreme political instability, as represented by an indicator variable for wartime, is highly disruptive to FDI. However, the ability of the recipient government to guarantee political rights or civil liberties does not appear to have an identifiable impact on FDI. Other conclusions about potential economic determinants of FDI emerge from our panel data analysis. We find that all other things equal, countries characterized by higher income per capita, high per capita growth and high domestic investment ratios tend to attract greater flows of FDI (relative to GDP); in contrast, low wage costs do not play a principal role in the FDI decision. These results comment favorably on the proposition that FDI is determined by economic fundamentals, and not subject merely or exclusively to the impulses of speculative forces.

TABLE 3.1

FOREIGN DIRECT INVESTMENT (AS A PERCENTAGE SHARE OF CAPITAL INFLOWS)

	Region						
Period	EMENA	LACAR	SASIA	EASIA	AFRICA	OECD	ALL COUNTRIES
1970-74	-38.28	41.88	.	40.04	60.97	23.68	27.00
1975-79	14.15	16.67	1.41	22.05	-16.11	11.56	5.06
1980-84	-13.13	24.04	3.58	21.53	22.52	18.28	16.55
1985-89	4.59	67.25	4.18	67.31	22.29	49.26	38.36
1990-94	9.80	49.06	19.96	39.90	0.40	23.91	21.54

Note: EMENA: Europe and Middle East; LACAR: Latin America and Caribbean; SASIA: South Asia; EASIA: East Asia; AFRICA: sub-saharan Africa; OECD: original 24 members. Capital inflows are calculated as the sum of FDI received by the reporting country, its portfolio investment liabilities (e.g., corporate securities, bonds, notes, money market instruments, and financial derivatives) and other investment liabilities (excluding exceptional financing, LCFARs and reserve assets). Source: IMF International Financial Statistics

TABLE 3.2

FOREIGN DIRECT INVESTMENT (AS A SHARE OF GDP) IN DEVELOPING COUNTRIES

Region	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
EMENA	56	0.991526	1.819327	-3.71221	6.829395
LACAR	147	1.255762	2.281598	-9.32018	14.70302
SASIA	27	0.195127	0.310016	-0.08141	1.179246
EASIA	56	2.856199	3.386377	-0.08173	14.61848
AFRICA	196	1.212183	1.850418	-3.0984	12.96669
Period					
1970-74	69	1.352571	2.956171	-3.71221	14.70302
1975-79	79	1.420819	1.98456	-2.87462	9.261441
1980-84	93	1.117757	1.655117	-1.87649	9.289776
1985-89	99	1.095411	2.128432	-9.32018	10.85481
1990-93	81	1.57803	2.74558	-7.32128	14.61848

Source: FDI and GDP in US dollars, obtained from World Bank World Tables Database.

TABLE 3.3

PARTIAL CORRELATIONS BETWEEN INDICATORS OF MACROECONOMIC STABILITY

[P-values are in brackets]

	INSTINX	INSTINXX	WBPROJX	WBPROJXX
INSTINXX	0.97			
	[0.00]			
WBPROJX	0.71	0.60		
	[0.00]	[0.00]		
WBPROJXX	0.68	0.63	0.89	
	[0.00]	[0.00]	[0.00]	
INFLATSDXX	0.11	0.31	0.18	0.26
	[0.08]	[0.00]	[0.00]	[0.00]

Note: The suffix "X" denotes index values in the ratings year 1975, 1980, 1985, and 1990; the suffix "XX" denotes index values averaged over the sub-periods 1975-79, 1980-84, 1985-89, 1990-94.

TABLE 3.4
THE IMPACT OF MACROECONOMIC AND POLITICAL FACTORS ON FOREIGN DIRECT INVESTMENT IN DEVELOPING COUNTRIES
(Dependent variable: FDI/GDP)

Independent variables	Regression (1)	(2)	(3)	(4)	(5)
INFLATSDXX	0.021	0.030	0.019	0.036	0.013
	(0.637)	(0.730)	(0.658)	(1.203)	(0.404)
CIVLIBX	-0.022	0.086	-0.032	-0.029	-0.026
	(-0.545)	(2.254)	(-0.791)	(-0.741)	(-0.751)
WARS	-0.171	-0.186	-0.168	-0.170	-0.162
	(-3.070)	(-4.097)	(-3.200)	(-3.502)	(-3.686)
TRDTAXXX	-0.001	0.011	-0.003		-0.002
	(-0.036)	(0.784)	(-0.150)		(-0.077)
CAPTRXX	0.069	0.079	0.073		0.068
	(1.997)	(1.422)	(1.961)		(1.846)
OPNESTXX	0.123	0.153	0.120		0.123
	(4.204)	(3.518)	(4.350)		(4.192)
OPENALLXX				0.151	
				(5.327)	
INVSHXX	0.045	0.053	0.044	0.060	0.043
	2.339	(2.148)	(2.446)	(3.690)	(2.146)
INDGDPXX	-0.011	-0.024	-0.010	-0.002	-0.012
	(-1.345)	(-1.234)	(-0.968)	(-0.483)	(-1.282)
LRGDPCH	0.713	1.197	0.724	0.506	0.714
	(3.162)	(3.540)	(3.139)	(2.698)	(3.083)
SECCXX	-0.053	-0.120		-0.051	-0.052
	(-1.491)	(-3.787)		(-1.541)	(-1.483)
PRICXX	-0.010	0.006		-0.014	-0.011
	(-0.541)	(0.316)		(-0.922)	(-0.625)
LRWAGEXX		-0.010			
		(-0.100)			
YHAT			-0.034		
			(-1.724)		
GROWTHXX					1.780
					(0.847)
Constant	-4.912	-8.981	-3.257	-3.727	-4.821
	(-3.387)	(-4.267)	(-2.311)	(-2.711)	(-3.476)
Observations	193	114	193	194	193
Adj. R-Squared	0.25	0.30	0.25	0.24	0.25

Note: T-statistics are in parentheses.

TABLE 3.5
THE IMPACT OF MACROECONOMIC AND POLITICAL FACTORS
ON FOREIGN DIRECT INVESTMENT IN DEVELOPING COUNTRIES
(Dependent variable: FDI/GDP)

Independent	Regression					
Variables	(6)	(7)	(8)	(9)	(10)	(11)
WBPROJX	0.454	0.344	0.347	0.190	0.292	0.274
	(7.599)	(3.523)	(3.448)	(2.649)	(4.641)	(3.831)
CIVLIBX		0.029	0.016	-0.024	0.037	-0.043
		(0.421)	(0.278)	(-0.401)	(0.455)	(-0.809)
WARS		-0.069	-0.058	-0.066	-0.059	-0.062
		(-1.386)	(-0.984)	(-1.000)	(-0.792)	(-1.143)
TRDTAXXX			-0.034	-0.004	-0.013	
			(-4.333)	(-0.197)	(-0.768)	
CAPTRXX		0.138	0.128	0.095	0.115	
		(2.121)	(1.953)	(1.494)	(3.683)	
OPNESTXX				0.140	0.140	
				(3.755)	(2.614)	
OPENALLXX						0.221
						(2.659)
INDGDPXX		0.036	0.034	0.016	0.008	0.027
		(7.164)	(6.073)	(2.004)	(0.397)	(3.498)
LRGDPCH	0.677	0.400	0.392	0.723	0.844	0.483
	(4.184)	(2.337)	(2.313)	(2.625)	(1.704)	(1.673)
SECCXX	-0.043	-0.041	-0.042	-0.054	-0.115	-0.047
	(-1.291)	(-0.952)	(-0.982)	(-1.077)	(-4.290)	(-0.962)
PRICXX	-0.016	-0.025	-0.028	-0.024	-0.009	-0.026
	(-0.913)	(-3.299)	(-4.259)	(-6.899)	(-0.784)	(-3.439)
LRWAGEXX					0.058	
					(0.776)	
Constant	-4.869	-3.980	-3.508	-5.550	-7.970	-4.300
	(-4.011)	(-2.278)	(-2.021)	(-2.298)	(-2.312)	(-1.772)
Observations	236	178	178	176	106	177
Adj. R-Squared	0.10	0.22	0.23	0.28	0.30	0.24

Note: T-statistics are in parentheses.

TABLE 3.6
THE IMPACT OF MACROECONOMIC AND POLITICAL FACTORS
ON FOREIGN DIRECT INVESTMENT IN DEVELOPING COUNTRIES
(Dependent variable: FDI/GDP)

Independent	Regression					
Variables	(12)	(13)	(14)	(15)	(16)	(17)
INSTINX	0.040	0.031	0.035	0.023	0.023	0.027
	(5.607)	(10.125)	(10.212)	(4.388)	(9.485)	(2.115)
CAPTRXX		0.144	0.096	0.074		0.150
		(3.733)	(2.211)	(1.521)		(2.380)
TRDTAXXX			-0.083	-0.050		-0.010
			(-4.828)	(-1.737)		(-0.315)
OPNESTXX				0.153		0.224
				(4.777)		(2.809)
OPENALLXX					0.257	
					(4.836)	
INDGDPXX		-0.008	-0.011	-0.033	-0.022	-0.037
		(-1.185)	(-1.435)	(-3.810)	(-4.345)	(-1.406)
LRGDPCH	0.406	0.594	0.603	1.060	0.804	1.401
	(3.893)	(3.752)	(2.973)	(4.055)	(7.067)	(2.148)
SECCXX	-0.052	-0.028	-0.033	-0.049	-0.034	-0.137
	(-2.130)	(-1.081)	(-1.376)	(-1.497)	(-1.070)	(-4.823)
PRICXX	-0.002	-0.007	-0.021	-0.018	-0.013	-0.003
	(-0.381)	(-1.100)	(-3.633)	(-2.455)	(-3.066)	(-0.559)
LRWAGEX						-0.065
						(-0.598)
Constant	-2.749	-4.261	-3.431	-6.733	-5.729	-9.469
	(-3.462)	(-5.461)	(-3.446)	(-4.056)	(-9.850)	(-2.508)
Observation	156	126	123	121	124	76
Adj. R-Sq.	0.15	0.22	0.26	0.28	0.25	0.34

Note: T-statistics are in parentheses

TABLE 3.7
THE IMPACT OF MACROECONOMIC AND POLITICAL FACTORS
ON FOREIGN DIRECT INVESTMENT IN DEVELOPING COUNTRIES
(Dependent variable: FDI/GDP)

Independent	Regression			Independent	Regression		
Variables	(18)	(19)	(20)	Variables	(21)	(22)	(23)
EST	0.084	0.069	0.061	RES	0.028	0.016	0.017
	(4.144)	(3.712)	(5.052)		(8.085)	(2.793)	(1.440)
CAPTRXX		0.097	0.122	CAPTRXX		0.082	0.156
		(2.533)	(2.223)			(1.642)	(2.375)
TRDTAXXX		0.002	0.000	TRDTAXXX		-0.046	-0.005
		(0.070)	(-0.022)			(-1.618)	(-0.159)
OPNESTXX		0.172	0.229	OPNESTXX		0.165	0.245
		(4.425)	(4.613)			(5.237)	(2.893)
OPENALLXX				OPENALLXX			
INDGDPXX	-0.001	-0.009	-0.024	INDGDPXX	-0.014	-0.032	-0.037
	(-0.119)	(-1.573)	(-1.590)		(-1.845)	(-3.770)	(-1.430)
LRGDPCH	0.677	0.816	1.227	LRGDPCH	0.798	1.164	1.570
	(2.976)	(3.248)	(3.925)		(7.846)	(4.407)	(2.431)
SECCXX	-0.028	-0.043	-0.117	SECCXX	-0.043	-0.050	-0.139
	(-1.251)	(-1.291)	(-4.155)		(-1.642)	(-1.462)	(-5.152)
PRICXX	-0.008	-0.007	0.007	PRICXX	-0.004	-0.018	-0.002
	(-0.781)	(-0.566)	(0.978)		(-0.884)	(-2.178)	(-0.438)
LRWAGEX			0.003	LRWAGEX			-0.057
			(0.028)				(-0.553)
Constant	-6.158	-7.586	-10.344	Constant	-4.300	-6.981	-10.167
	(-5.119)	(-4.468)	(-4.751)		(-5.046)	(-3.840)	(-2.465)
Observations	272	194	114	Observations	135	121	76
Adj. R-sq.	0.09	0.23	0.27	Adj. R-sq.	0.12	0.27	0.33

Note: T-statistics are in parentheses

D Appendix: Data

TABLE D.1[23]
SUMMARY OF VARIABLES

VARIABLE (Root name)	Definition	Primary Source	Expected correlation with FDI
Macroeconomic Environment			
INFLATSD	Index of real money growth and inflation variability (0-10, with 0 indicating highest growth and variability)	Economic Freedom of the World 1995	+
INSTIN	Country credit rating (0-100, with 100 indicating least probability of default)	Institutional Investor, various issues	+
WBPROJ	Country performance rating (1-5, with 5 indicating best performance)	World Bank, unpublished data	+
Political Instability			
PRIGHTS	Index of political rights (1-7, where 1=most freedom)	Barro-Lee (1994), Freedom in the World, various issues	-
CIVLIB	Index of civil liberties (1-7, where 1=most freedom)	Barro-Lee (1994), Freedom in the World, various issues	-
WARS	Duration of war in domestic territory over time period	Bruno and Easterly (1994)	-
Openness			
CAPTR	Variable indicating intensity of restrictions on FDI (0-10, with 0 the most restrictive)	Economic Freedom of the World 1995	+
OPNEST	Variable indicating degree of openness, as measured by actual/expected trade (0-10, with 0 the least open)	Economic Freedom of the World 1995	+
TRDTAX	Trade taxes as a proportion of exports + imports	Economic Freedom of the World 1995	-
OPENALL	Openness variable incorporating all of above openness measures, weighted by respective (inverse of) standard deviations (0-10, with 0 the least open)	Economic Freedom of the World 1995	+

[23] Note that variable names include a suffix "X" or "XX" in the tables which summarize panel data regressions.

VARIABLE	Definition	Primary Source	Expected correlation with FDI
Market potential/ complementarities			
GROWTH	log per capita growth rate	World Bank World Tables	+
LRGDPCH	Real GDP per capita in constant dollars (chain index)	Summers-Heston PWT	+
INDGDP	Value added of industry, as a share of GDP	World Bank World Tables	?
INVSH	Investment, as a share of GDP	Summers-Heston, World Bank World Tables	+
Cost/ Return to Capital			
HUMAN	Average schooling years attained in population over age 25	Barro-Lee	-
PRIC	Percentage of primary school complete in the total population	Barro-Lee	-
SEC	Percentage of secondary school complete in the total population	Barro-Lee	-
LRWAGE	Real wage in manufacturing	Sourced from data obtained from World Bank World Tables	-

Chapter 4

OUTWARD ORIENTATION, TRADE DISTORTIONS AND LONG RUN ECONOMIC GROWTH: AN EMPIRICAL ANALYSIS

4.1 Introduction

The disparity in growth rates between Asian countries and their counterparts in Latin America and Africa over the last three decades has been well established in economic lore and empirical literature. Growth in real per capita GDP over the period 1960-1989 averaged 4.1 percent per annum for East Asia, compared to 1.2% and 1 percent for Latin America and sub-saharan Africa, respectively. A number of authors have cited the strategy of export-orientation, secured by a combination of correct exchange rate management and undistorted trade regimes, as instrumental to Asia's stellar growth performance. The relationship between outward orientation and economic performance has gained renewed currency with the re-entry of many developing economies into international capital markets, and with the continuing attempts of countries in the former Soviet Union at wholesale economic reform. Using a group of newly constructed indicators which comment upon a country's trade orientation, the intensity of import price distortion, and the degree of real exchange rate misalignment, this essay presents international cross-sectional evidence that supports the view that openness and undistorted foreign exchange markets generate growth. In cross-country regressions which control for an array of factors which potentially impact economic growth, indicators which represent outward orientation remain positively and significantly related to growth. In addition, this analysis employs a growth

accounting framework to elucidate the mechanisms through which trade impacts growth. This procedure decomposes growth into capital accumulation, human capital improvements, and residual productivity growth using standard growth accounting methodology. It then assesses the relationship between openness and each of these growth components using cross-country regression techniques. This approach yields a positive and significant correlation between growth attributed to residual productivity and outward orientation.

Theory predicts that policies which encourage outward orientation, reflected in the absence of trade distortions and in real exchange rate management which encourages exports, foster economic growth in the long run. Trade theorists argue that openness in international markets generates economic growth by encouraging specialization in industries which benefit from internal or external scale economies.[24] The ties between outward orientation and growth have recently been formalized in models of endogenous growth.[25] Within this literature, trade allows the economy to specialize in industries with scale economies which result from research and development, learning-by-doing, and human capital accumulation. In neoclassical models of growth, trade directly transmits technological innovations, and consequently, economic growth, across borders.[26] Trade permits the import of relatively more efficient foreign inputs for use in the domestic production process, thereby promoting growth. The impact of trade policy which restricts the availability of imported inputs (e.g., tariffs on intermediate and capital goods) therefore decreases growth in the domestic economy. Moreover, several empirical studies have shown that externalities associated with exporting cause more open economies to grow more rapidly: in the course of exporting and importing inputs and machinery, developing countries are found to benefit from accelerated technological innovation.[27]

For similar reasons, real exchange rate management which allows a country's exports to be price competitive in world markets, without a deleterious impact on imports, is beneficial to growth. Countries which impose policies which generate real exchange rate overvaluation depress growth by encouraging the growth of the non-tradables sector (e.g., services), at the

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[24] See Bhagwati (1988) and Kruger (1980).

[25] This explicit relationship between openness and growth has been formalized within models of endogenous growth by Rivera-Batiz and Romer (1991), Grossman and Helpman (1990), and Romer (1986, 1990).

[26] See Edwards (1992) and Lee (1993).

[27] See Nishimizu and Robinson (1984) and Dollar and Sokoloff (1990); both studies find a strong correlation between export growth and total factor productivity growth.

expense of developing the relatively more productive tradables sector (e.g., manufacturing). Countries characterized by exchange rate overvaluation usually incur an accompanying increase in current account deficits. These in turn lead either to a depletion of international reserves or to an expansion in international indebtedness, and to attendant difficulties in servicing the corresponding debt. The debt burden and the debt crises which may result both hinder growth considerably, by forcing borrowing countries to redirect resources from production towards repayment.

This chapter is organized as follows. The second section describes the rationale for choosing and (where applicable) the method of constructing the openness indicators, summarizes the data employed in the analysis, and indicates their potential shortcomings. It briefly introduces the two empirical approaches we use to assess the relationship between outward orientation and long run growth. The third section details the empirical evidence from cross-sectional regressions regarding the relationship between openness and growth, while the fourth section presents the results from a growth accounting framework. The fifth section concludes and provides suggestions for future research.

4.2 Definitions and Theoretical Considerations

We begin by describing how a set of outward orientation measures were chosen and measured, and discuss their relative merits and drawbacks. This section then proceeds to a discussion of the other data used in the analysis, and ends by summarizing the empirical approach followed in this chapter.

4.2.1 Indicators of Openness

The empirical analysis assesses the following indicators of outward orientation for correlations with economic growth.

(1) *Average black market premium (BMP).* This is computed as the Black Market Exchange Rate/Official Exchange Rate - 1, where exchange rates are expressed in local currency per dollar. The data was obtained from Barro and Lee (1994), who obtained the raw data from the World

Bank's 1991 World Development Report Data Set (WDR) and Wood (1988), who in turn assembled the original data from Pick's Currency Yearbook.

The black market premium on foreign exchange captures the distortions associated with foreign exchange controls. While such controls have been pervasive throughout many developing countries, they are particularly characteristic of developing countries which fix nominal exchange rate and pursue a policy of seignorage to finance huge fiscal deficits. The overvalued exchange rate, in combination with the monetization of the deficit, leads to a depletion of central bank reserves. In order to protect reserves and maintain the fixed exchange rate, the monetary authority imposes quantitative restrictions in the official foreign exchange market. This leads to excess demand in the official market for foreign exchange at the prevailing overvalued rate. If costs associated with an illegal market are not prohibitive, a curb market, or parallel (unofficial) market for foreign exchange emerges. In this unofficial market the equilibrium exchange rate settles to a level above the official rate.

The black market premium on foreign exchange is oftentimes an indicator of rationing in the official market. As such, it can be perceived as a means of import control. Some schemes of foreign exchange control involve forcing exporters to surrender their foreign exchange earnings to the central bank at the official rate, which then sells the foreign exchange to importers of inputs. These importers sell their imported intermediate goods to exporters at a rate above the official rate. The black market premium therefore goes to the importers of capital goods, at the expense of the exporters' profitability. If the link between outward orientation and growth involves the synergy between imported technology and export sector development, then heightened exchange rate rationing, as reflected in increases in the black market premium, should be associated with diminished growth.

The relationship between the black market premium and growth may be tenuous: for instance, this relationship may go in the opposite direction. When access to foreign exchange is controlled, oftentimes the trade regime involves preferential treatment for the import of investment goods. In such an environment, we might observe the black market premium to be positively associated with growth. There are drawbacks associated with treating the black market premium as an indicator of openness. A high premium may signal thinness in the black market for foreign exchange, rather than the degree of import control. The black market

premium may also be an inappropriate indicator of the unsustainability of the exchange rate, since an exchange rate can be unsustainable and overvalued even when the black market premium is nonexistent.

(2) *Indices of openness* based on barriers to trade and foreign exchange convertibility:

(2a) *An index of trade openness (OPENIND).* This is an indicator variable partially based on the openness measure calculated in Sachs and Warner (1992). A country is classified as closed (i.e., has a dummy value of 0) if it can be characterized by at least one of the following criteria:

1. Nontariff barriers (NTBs) covering 40 percent more of trade.
2. Average tariff rates of 40 percent or more.
3. A socialist economic system (as defined by Gastil).[28]
4. A state monopoly on major exports.

These four characteristics comment upon a wide range of trade restrictions. Unlike Sachs and Warner (1992),[29] we do not include the black market premium as a component of the trade openness index since it represents the interaction of many policies, and does not signify one particular aspect of trade distortions.

Data on quotas and tariffs are collected from UNCTAD by Barro and Lee (1992). The indicator for quotas summarizes the coverage of quotas on imports of capital and intermediate goods from 1985-1988. It is a measure of the own-import weighted nontariff frequency on imported capital and intermediate goods, such as licensing, quotas and prohibitions. The indicator for tarriffs measures the own-import weighted average tariff rate on imports of intermediates and capital goods, covering the period 1985-1988.

Since export controls have the same impact of closing the economy as import controls such as tarriffs and quotas, export controls are included as a determinant of trade openness.[30] This variable is used to signal the sub-saharan African countries which relied extensively on government-run marketing boards to export their agricultural products. These state-run monopsonies purchase domestically produced agricultural products at prices substantially below

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[28] Gastil (1987).

[29] Sachs and Warner classify a country as closed if it meets any of the four characteristics listed, or if the black market premium is 40 percent depreciated over the official rate during the 1970s and 1980s.

[30] See Lerner (1936).

the world price, and manage to exploit huge profit margins by exporting them at the world price. The socialist classification is used to characterize countries which relied on central planning rather than transparent trade restrictions to maintain a closed economy. Appendix E.2 summarizes the values of these four variables used to compute an indicator of trade openness.

(2b) *An index of trade openness (OPENDUR).* This indicator is based upon the country summary in the appendix of Sachs and Warner (1992). For each country, the value of OPENDUR refers to the number of years the country is classified as open during the time period 1960-1989. Sachs and Warner establish during which years individual countries were open over a time span of over three decades (1960-1994), by relying upon the four criteria used in the classification scheme for OPENIND and the black market premium as guidelines for their appraisal, and by undertaking a thorough review of the relevant country-specific literature for their data. For many of the OECD countries which did not institute such prohibitive trade barriers, Sachs and Warner base the initial date of openness on the introduction of full currency convertibility. Whereas OPENIND takes on binary values (0 if a country is closed, or 1 if open), OPENDUR is a continuous variable, ranking countries according to the duration of openness.[31] Controlling for other variables, we should expect a country which has been open for a longer of period of time to experience a higher rate of growth, since it takes time to capture the economies of scale available to the export industry.

As indicators of openness, there are a few caveats associated with both OPENIND and OPENDUR. The data on tariff and quantitative restrictions used to determine the value of OPENIND are available for only a short period (1985-1988) and therefore do not address the degree of trade distortion in the 1960s and 1970s. This presents less of a problem if there is little variation in the tariff structure during the sample period. Moreover, since the tariff rates are weighted by their own-import value, there will be downward bias as imports decrease with

[31] For Bolivia, Botswana, Guatemala, Jamaica, and Morocco the years of openness during 1960-1989 are interrupted by a long period of being closed: they are all open briefly during the early 1960s and again in the late 1980s. For all other countries in the sample, the value OPENDUR denotes the number of years a country is continuously open in the time period 1960-1989. For some countries (such as Kenya, Peru, Sri Lanka,) this period of consecutively open years is early in the time period, followed by closing (and opening again in the 1990s, which is outside the time frame of our sample). For most countries (such as the OECD countries), the period of continuous openness dates from the initial date of openness to the present (or for the purposes of our sample, 1989).

increases in tariff rates. The measure for quantitative restrictions suffers also from a significant drawback: while the measure for non-tariff barriers denotes the frequency, it does not accurately measure the intensity of NTBs. This is partially offset by including the black market premium as a criterion of openness for OPENDUR, since the black market premium may capture part of the intensity of quantitative restrictions in the economy. Because OPENDUR relies on a comprehensive survey of the literature on trade restrictions, it manages to take into consideration information regarding trade barriers throughout the entire sample period. With regard to both indicators, a country is characterized as open (closed) if it meets (fails to satisfy) a definite and particular set of standards. This essay chooses these standards based on criteria set forth in Sachs and Warner. Obviously the rating of countries as closed or open is contingent upon the classification scheme; the acceptability of a classification scheme depends in turn upon subjective evaluation.

(3) *Measures of Tariff Restrictiveness.*

(3a) *A measure of tariff restriction (TAROP).* Constructing a measure of tariff restriction involves first creating a measure of free-trade openness, which captures the level of trade which prevails in the absence of trade distortions. This free-trade (or natural) openness is the ratio of export and imports over GDP which can be ascribed to structural attributes of a country, such as natural resource endowments and natural barriers to trade. We should expect smaller trade shares in free-trade from larger countries since due to their size they are relatively more self-sufficient; we should also anticipate smaller trade shares from countries facing greater geographical distance from their trading partners, since these distances proxy unavoidable trade barriers such as transportation costs. The measure of natural openness is obtained by regressing the log of (X+M)/GDP on the logs of distance from major trading partners (LDIST), population (LPOP), and land area (LAREA), in addition to a series of regional dummies (OECD, LAAM, ASIAE and SAFRICA). The fitted values of the dependent variable (ln NATOP) are interpreted as a measure of natural trade openness. The regression has an adjusted R-squared of 0.69 and the expected signs on all coefficients (negative for LDIST, LPOP, and LAREA, and significant for LDIST and LPOP). Econometrically, this is similar to instrumenting (X+M)/GDP with exogenous variables.

The measure of trade restrictiveness is computed by multiplying NATOP with ln(1+OWTI), where OWTI measures the own-import weighted average tariff rate on imports of intermediates and capital goods, covering the period 1985-1988.[32] This transformation weights tariff rates by the natural level of openness of the economy. Thus according to this criterion, a country which imposes very high tariff rates and has a high natural trade share level is ranked most restrictive, while one with light tariffs and a small natural level of trade would be characterized as much less restrictive.

(3b) *A measure of tariff restriction (TARIMP).* We reconstruct the measure of tariff restriction using different data. Rather then instrumenting the total trade share, we use similar instruments for the import share.[33] In place of using OWTI for a measure of tariff rates, we use an alternative measure of tariff rates (TARIFF) derived from Fischer (1993) who uses data from the WDR database. This measure of tariff rates is available for a smaller sample of countries, and unlike OWTI, measures the average rate of tariff protection over a longer time period.

4.2.2 Other Data

The empirical investigation in this chapter assesses data which cover the period 1960-1989. For all data, I draw directly from several sources:[34] (1) the Barro-Lee dataset for a panel of 138 countries (1994), (2) the Summers-Heston Penn World Table Mark 5.6 (1994), (3) Economic Growth in a Cross Section of Countries by Robert Barro and Holger Wolf (1989), (4) Inflation Crises and Long Run Growth by Michael Bruno and William Easterly (1996), (5) The Role of Macroeconomic Factors in Growth by Stanley Fischer (1993), and (6) data from the International Monetary Fund International Financial Statistics data base.[35] The Summers/Heston data set has widely become the standard reference in empirical analyses which involve cross-country comparisons of aggregate data. For the purposes of this analysis, I obtain from the

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[32] This is the same measure of tariff rates used in the previous section, and subject to the same reservations described earlier.

[33] The equation estimated is identical to Lee (1993): M/GDP =0.528-0.26ln(AREA)-0.095ln(DIST). The fitted values produce an alternative estimate of natural openness.

[34] These sources may in turn collect their data from a variety of primary sources.

[35] All data used are detailed in Appendix E at the end of this chapter.

Summers/Heston data set the measure of real per capita growth rate averaged annually from 1960-1989. I use the variable RGDPCH (real GDP measure from a chain index), which Summers and Heston recommend as the appropriate measure of real GDP to use for intertemporal comparisons and measurements, since it does not suffer from a Laspeyre's fixed-base problem.[36]

The data obtained from all sources span a tremendous scope in terms of the number of countries and the extensiveness of the time period for which data is available. The data suffer from the expected statistical problems of data which span such a wide range. For instance measurement error may cause biased results; this can occur in household survey data or in data which is the product of lack of attention to proper data gathering; in developing nations where few resources are targeted towards data collection this may be the case. This errors-in-variables problem is reduced when we run regressions on a cross-section of countries, averaged over a long time span.

4.2.3 Empirical Approach

In the section which follows we study the relationship between different indicators of openness and long run real per capita growth. We run cross-country regressions to gauge the strength between the partial correlation between real per capita GDP growth averaged over the sample period and each of the openness indicators. Including variables which represent the quality of the labor force, as well as the investment rate as a regressor into the regression, we can interpret the coefficient on the openness indicator as the contribution of trade openness to improvements in productivity. However, it is reasonable to believe that variables which affect growth do so by increasing investment, as well as through affecting the rate of productivity. We therefore run cross-country regressions using the average annual investment rate as the dependent variable, in order to assess the relationship between openness and capital accumulation.

To examine further the channels through which openness affects growth, we supplement the cross-country regression growth regression evidence with a production function-based approach pioneered by Elias (1992) and implemented in Fischer (1993). This involves

[36] See Summers and Heston (1991) for a more extensive discussion and overview of the Penn World Table.

separating growth into several components, reflecting the accumulation of factor supplies and a residual productivity category. We then use this decomposition to examine the relationship between openness and changes in the supply of factors, and the productivity residual.

4.3 Contemporaneous Associations

4.3.1 Simple Correlations

Simple statistical evidence supports the basic proposition that outward orientation is conducive to growth. Tables 4.1A and 4.1B present summary statistics on the openness indicators, growth, and investment.[37] All indicators of openness, with the exception of TARIMP, are strongly correlated with per capita GDP growth at the 5 percent significance level. Individual correlations with growth are of the expected sign: we observe the variables which reflect distortions to free trade, such as the black market premium and measures of tariff restrictiveness, to be negatively related to the rate of growth; in contrast, the duration of openness and the indicator variable for openness are both positively correlated with growth. All indicators of openness, with the exception of BMP, are strongly correlated with the average rate of investment at the 1 percent level of significance. As before the correlation coefficients are all of the expected direction.

Tables 4.1A and 4.1B also demonstrate a "step" relationship between openness and growth for the indicators most strongly correlated with growth (BMP, OPENIND, OPENTOT). We divide the countries according to their average annual growth rate into four categories (very fast, fast, slow and very slow), with each category containing approximately the same number of countries. In Table 4.1A as we go from countries which experienced slower growth over 1960-1989 to countries which experienced the fastest rates of growth over the same time period, we observe average declines in the black market premium, an increase in the frequency of countries classified as open in the group, and a longer duration of openness. Equivalently countries which experience higher rates of investment tend to be more open: there is a higher frequency of openness, a longer duration of openness, and (to a less pronounced degree) a reduction in tariff restrictiveness in countries characterized by faster rates of capital accumulation.

[37] All tables are found at the end of the text of this chapter, unless stated otherwise.

4.3.2 Contemporaneous Regressions

We now turn to cross-country regression evidence to see if we can support and deepen the initial findings from simple statistical correlations. An identical group of nine regressions is run for each indicator of openness. Table 4.2 summarizes the results for the specification which contains the most comprehensive set of growth determinants. Tables F.1A-F.1E in Appendix F.1 present the results for the complete set of regression specifications for each of the five indicators. In each set of regressions, regression 1 represents the basic regression, with initial real income (LGDP60), the 1960 rate of secondary enrollment (LSEC60), and the average level of the openness indicator over 1960-1989 as regressors.[38] The coefficient on initial real income is always negative and significant, supporting the theory of growth convergence, conditional on the initial level of human capital.[39] The coefficient on initial secondary education enrollment is similarly statistically significant in all versions of regression 1, and is of the expected positive direction. In this basic regression, the coefficients on all indicators of openness emerge with the expected sign, and all with the exception of TARIMP are statistically significant.

Regression 2 includes two additional variables which address the macroeconomic environment: these are the ratio of real government consumption net of spending on defense and on education to real GDP (GOV) and the average rate of inflation in the sample period (INFLAT). Both enter significantly into the regression, and have a deleterious impact on growth. Controlling for these aspects of the macroeconomic environment renders the coefficient on TAROP insignificant, while the coefficients on BMP, OPENIND, and OPENDUR remain statistically significant.

In regressions 3 and 4 we include various indicators of political instability which we expect to exhibit negative correlations with growth: these variables approximate the number of revolutions and coups per year during the time period 1960-1985 (REVCOUP), the average number of assassinations per year during the sample period (ASSASSIN), the number of years a

[38] LSEC60 may provide little informational content on the quality of human capital, since it only serves to measure the ratio of individuals involved in formal schooling.

[39] This is consistent with the results in Barro (1991), Barro and Sala-i-Martin (1992) and Levine and Renelt (1992) which find that initially poor countries tend to grow faster than initially rich countries, after controlling for the level of human capital.

country has been engaged in war between the years 1960-1989 (WARS), and an index of political rights (POLRIGHT) taken from Gastil, where an increase in the index implies greater deprivation of civil and political rights. Of these four political instability indicators, only WARS appears individually statistically significant in the versions of regression 4 which use BMP, TAROP, and TARIMP as openness indicators. Controlling for these political instability indicators causes the coefficient on OPENIND to become insignificant from zero.

In regressions 5-8 we successively control for a uncertainty, external shocks , relative factor endowments, and problems associated with the repayment of external debt. Uncertainty should negatively impact growth by decreasing the efficiency of the price mechanism, by amplifying the frictions which accompany the reallocation of factors to their most efficient uses, and by diminishing the rate of investment. In this context, uncertainty is most generally associated with substantial fluctuations in the rate of inflation or in the current account; in this analysis uncertainty is approximated by the standard deviation of the inflation rate over the sample period (INFLATSD). For the period under consideration many developing countries underwent shocks to their terms of trade; consequently, we control for the impact of these external shocks on economic growth by including separately a regressor for the average difference between the growth rate of export prices and the growth rate of import prices (TOT). We also include as a separate regressor the ratio of total population to land area as a measure of relative factor endowments (DENS). This follows Sachs and Warner who suggest that openness may be a proxy for relative factor endowments, since relative factor intensities (and their associated competing welfare interests) may dictate the degree of outward orientation a country decides to pursue. Lastly, since many developing countries underwent debt crises in the 1980s, we add a measure approximating the number of years countries requested debt renegotiations to ease their debt service (DRELIEFS). This does not offer explicit estimations of their external indebtedness, but does imply the relative difficulty countries experienced meeting their debt obligations.

Regressions 5-8 document the inclusion of the four above variables progressively into the cross-country regression. In all version of equation 8 DRELIEFS enters significantly and negatively. In one version of equation 8 (8A), DENS appears statistically significant. The

inclusion of these four additional variables does not impact the significance (or lack thereof) of any of the openness indicators.

Regression 9 represents the final growth regression which incorporates the average rate of investment over the sample period, in addition to all the regressors in the previous eight regressions; the results from this specification are summarized for all openness indicators in Table 4.2. Conditional on the rate of investment, there remains statistically significant evidence for the existence of growth convergence. The initial level of secondary school enrollment is still found to contribute significantly to growth, while government consumption, war, and the frequency of debt renegotiations each continue to exhibit statistically significant negative relationships with growth.

By controlling for investment, we can assess the impact of openness on the rate of productivity. The coefficient on investment is positive and statistically significant for all versions of regression 9. Furthermore, the coefficients on BMP and OPENDUR remain independently significant, suggesting they contribute to growth directly through increasing the rate of efficiency. However, openness can contribute indirectly to growth by enhancing capital accumulation. Tables F.2A-F.2E located in Appendix F.2 present results of analogous investment regressions used to assess this proposition. As before, in each successive equation we include additional possible determinants of investment drawing upon a set of variables identical to those used in the growth equations. Skipping regressions 10-16 and referring immediately to regression 17 (summarized in Table 4.3 for all openness indicators), we observe that few of the regressors (apart from the openness indicators) are consistently statistically significant in the different versions of regression 17. Government consumption appears as significant in most versions of regression 17; WARS is also significantly different from zero when either BMP proxies openness or TAROP approximates the degree of tariff distortion. This suggests that many of the variables which exhibit strong correlations with growth do not contribute to capital accumulation. Of the five openness indicators, the duration of openness (OPENDUR) has a consistently positive significant affect on investment, while measures of tariff restrictiveness (TAROP and TARIMP) both significantly diminish the rate of investment.

4.3.3 Sensitivity Analyses

The respective relationships between growth and the openness indicators, and capital accumulation and the openness indicators, are tested for robustness using a variety of sensitivity checks. We have already initiated tests of sensitivity, by altering the conditioning set of information. Of the five indicators of openness, only BMP and OPENDUR emerge robust against the successive inclusion of additional regressors; OPENDUR, TARIMP and TAROP are each found significantly related to investment. We perform further sensitivity checks by changing the sample of countries under consideration, and by implementing extreme bounds analyses described in Levine and Renelt (1992).

When regressions 1-9 are run on different subsamples of countries, of the set of openness indicators under consideration, the coefficients on OPENDUR and BMP remain statistically significant. Omitting the OECD countries from the full sample of countries does not alter the conclusions; nor does removing the sub-saharan countries or the countries of East Asia. In contrast, changing the subsample of countries renders the coefficients on TARIMP and TAROP each insignificantly different from zero (while OPENDUR remains significant at conventional confidence levels). When regressions 10-17 are estimated with alternate subsamples of countries, all three openness indicators initially found to be significantly related to investment suffer a decline in significance level. Altering the subsample of countries causes the t-statistic on TARIMP to fall beneath conventional confidence levels, while TAROP and OPENDUR remain significantly related to investment at the 10 percent level of confidence.

Based on Levine and Renelt, we conduct extreme bounds analyses (EBA) to test for robustness in the partial correlation between openness and growth. The EBA in this analysis takes on the form:

$$Y = \beta_i \mathbf{I} + \beta_m M + \beta_z \mathbf{Z} \qquad (1)$$

where Y is real per capita GDP growth (or the rate of investment), **I** is a set of variables always included in the regression, M is the variable of interest, and **Z** represents the conditioning set of variables, a subset of variables which past empirical studies have shown to be potentially important in determining growth. For the purposes of this investigation, the M-variable

represents a measure of the degree of trade distortion or openness in a trade regime. The basic procedure involves varying the combination of **Z**- variables included in the regression to obtain the widest possible range of β_m, the coefficient on the variable of interest, which can not be rejected at standard levels of significance.

The EBA proceeds in the following manner to test the robustness of the variable in question. First, we run a "base" regression using only the **I**-variables and the M-variable. As a second step, we run a regression which includes the **I**-variables, the M-variable (the variable of interest), and alternative linear combinations of at most three variables from the subset of **Z**-variables, noting the regression results and identifying the highest and lowest estimates of β_m which still remain within the 95 percent confidence level of the estimated β_m in the base regression. In other words, the extreme upper bound is defined by the set of **Z**-variables which produces the maximum estimate of β_m located within an additional two standard errors away from the β_m computed in the base regression, and the extreme lower bound is defined by the set of **Z**-variables which produces the minimum estimate of β_m within negative two standard errors of the base estimate for β_m. Thus the "degree of confidence" one can have in the partial correlation between Y and M is defined by the properties of the estimated coefficients which form the lower and the upper bounds. If both the lower and the upper bounds still maintain a high level of significance within their respective regressions, then the partial correlation between Y and M is defined to be robust. If, however, this property is not met for both the upper and the lower bounds, the partial correlation between Y and M is referred to as fragile; in other words, extreme sensitivity to alterations in the conditioning variables leads to changes in the statistical inference drawn from the relationship between Y and M, and reduces the degree of confidence one can have in the partial correlation between Y and M.

Following the procedure outlined in Renelt and Levine, we restrict the EBA in three ways. First, we limit the EBA by constraining the conditioning information set to six variables used in Renelt and Levine, rather than searching over a larger universe of potential growth determinants. Secondly, for any **M** variable under consideration, we restrict the selection of **Z** variables to those which do not pose multicollinearity problems when added to the base regression. This additional restriction is intended to avoid inferential problems which arise from

highly correlated regressors. Finally we allow the EBA procedure to include combinations of up to three variables from the set of **Z** variables to the base regression, limiting the maximum number of right-hand-side variables to eight.

The **I** variables which are always included in the regression are LGDP60, LSEC60, INV, and the average growth rate of the population over the sample period (POPGR). The pool of **Z** variables represents a conditioning information set which delineate the fiscal, trade, monetary, uncertainty and political instability indicators. The variables which constitute the set of **Z** variables include INFLAT, INSD6089A, the ratio of government expenditure to GDP (GOVALL), a measure of the number of revolution, coups and assassinations per annum (PINSTAB), the growth of domestic credit (DCREDGR) and the standard deviation of the growth of domestic credit over the sample period (DCREDSD). The results of the EBA for the five openness indicators under consideration are presented in Tables 4.4A and 4.4B.

The results from the EBA show that BMP and OPENDUR continue to exhibit robust partial correlations with growth, and OPENDUR, TAROP, and TARIMP demonstrate robust partial correlations with the average investment rate. The EBA results for evaluating the strength of the relationship between openness and growth are consistent with those found in preceding sensitivity analyses, conducted by using different conditioning sets of variables and alternate subsamples of countries. However, the results for the EBA used in assessing the strength in the relationship between openness and capital accumulation correspond only partially with the results from the preceding sensitivity analysis, which find a lack of robustness in the relationship between INV and the indicators for tariff restrictiveness (TARIMP and TAROP).

4.3.4 Conclusions from Contemporaneous Regressions

In the third section we assessed five openness indicators for correlation with per capita income growth, after controlling for a number of possible growth determinants. We conducted the same exercise using the rate of investment as the dependent variable, to examine the conduit between openness and capital accumulation. Deploying a battery of sensitivity analyses, we find that the black market premium and the duration of time a country can be classified as open (given a particular set of criteria) each respectively diminish and generate economic growth through their

impact on efficiency. The sensitivity analyses also show that the duration of openness is robustly and positively associated with the average rate of investment over the sample period, implying that countries which are classified as open for a longer period of time experience higher rates of capital accumulation, which also fuel growth.

4.4 Growth Accounting

4.4.1 Channels of Economic Growth

Openness can directly influence growth either by increasing the factors of production, or by eliciting increases in productivity. In the cross-country regression framework employed in the previous section, the inclusion of some factors of production as right-hand-side variables implicitly presumes that openness does not directly influence these included variables; instead, openness impacts growth through the factors which are neither explicitly included in the regression, nor accounted for through the use of instrumental variables. Therefore, when we include investment (along with measures of human capital) into the right-hand-side of the growth regression we make the tenuous assumption that openness to trade does not influence factor accumulation, but rather, affects growth only by generating improvements in efficiency. Since it is difficult to think of policies which influence growth without impacting investment, we also estimate investment equations to assess the influence of trade openness on investment, and therefore, capital accumulation.

As an alternative way of assessing the relationship between openness and growth this section implements the so-called "production-function based approach."[40] We decompose growth into factor accumulation and residual productivity, following standard growth accounting techniques. We then use cross-country regressions to examine the correlation between the various openness indicators and changes both in the supply of factors, and in the efficiency with which these factors are used (i.e., residual productivity). Assume the economy obeys a production function of the following form:

$$Y_t = A_t K_t^{\alpha} L_t^{\beta} H_t^{\gamma}, \qquad (2)$$

[40] After Fischer (1993).

where K_t, L_t, and H_t respectively represent the capital stock, the labor force, and human capital at time t. A_t signifies a general efficiency factor, embodying potential determinants of growth which increases in the supply of factors fail to capture, such as the level of technology, the efficiency of institutions, and the quality of governance. Differentiating the above equation with respect to time we obtain the standard growth accounting equation:

$$\frac{dY/dt}{Y} = \frac{dA/dt}{A} + \alpha \frac{dK/dt}{K} + \beta \frac{dL/dt}{L} + \gamma \frac{dH/dt}{H}. \qquad (3)$$

The productivity residual is the change in income which is not attributed to percentage changes in factors; in this case the productivity residual is denoted by $\frac{dA/dt}{A}$.

4.4.2 Productivity Residuals

We construct three alternate measures of productivity residuals. All three measures assume that the production function for each country is identical (that is, all countries face the same values of α,β, and γ). The first measure is derived from a panel data estimation of equation (3) using 78 countries and 1912 observations. Regional dummies are included but are individually statistically insignificant. The data are provided by Fischer (1993) who obtained the data on human capital from the WDR database, GDP from the Summers-Heston IPC dataset, and the capital stock series from the World Bank (Nehru) dataset. The production function estimated from this full panel GLS (with t-statistics in parentheses) is given by:

$$\underset{}{ZGDP_t} = \underset{(7.97)}{0.397\ ZKAP_t} + \underset{(4.02)}{0.460\ ZLAB_t} + \underset{(0.42)}{0.015\ ZHUM_t} + RES_t \qquad (4)$$

where $ZGDP_t$ is the growth rate of real GDP (in 1980) prices, $ZKAP_t$ is the growth rate of the capital stock, $ZLAB_t$ denotes the growth rate of the labor force, and $ZHUM_t$ defines the growth

rate of the educational stock in the labor force (calculated as the product of the labor force and the average years of educational attainment of the labor force).[41]

The two other alternative measures of productivity residuals are obtained by imposing specific coefficients on the general production function. Solow residuals are computed by the following equation:

$$RESOLOW_t = ZGDP_t - 0.4\ ZKAP_t - 0.6\ ZLAB_t, \quad (5)$$

using 86 countries, and 2342 observations. Mankiw-Romer-Weil residuals are calculated using the production function described in their 1992 paper:

$$RESMRW_t = ZGDP_t - 0.333\ ZKAP_t - 0.333\ ZLAB_t - 0.333\ ZHUM_t, \quad (6)$$

using the same data sample employed in the panel estimation. The partial correlations among these three alternative measures of residual productivity are at least 0.97 (between the Solow residual and the panel data residual, this partial correlation is 0.99), and statistically significant beyond the 1 percent level of confidence. For the purposes of our estimation, we rely on the Solow residuals, which are available for a larger sample of countries, as the measure of productivity.

Table 4.5 provides a brief regional breakdown of the estimated productivity growth, as calculated using equation (5); Appendix E.3 gives a breakdown by country, listing the countries in ascending order of productivity growth. The disparity between regions is substantial (for instance, 2.18 per cent per annum is the differential between regions experiencing the highest and lowest productivity growth), as are the differences among countries within particular regions. These productivity residual measures are a function of the underlying income and input data used to estimate them; as such, any seeming anomalies should be viewed as an artifact of the input and income data.

[41] Also included in this equation are a constant and regional dummies. The constant and all coefficients on regional dummies are small in absolute value, and insignificantly different from zero at conventional confidence levels. The constant equals 0.0013; coefficients on regional dummies are the following: for EMENA, 0.0075; for Latin America and the Caribbean, 0.00004; for East Asia, 0.0048; for sub-saharan Africa, -0.0072; and for the OECD, 0.0063.

It is important to state at the outset that the results from the growth accounting exercise may differ somewhat from those which emerge from the cross-country regressions. In the cross-country regressions we follow the standard convention of using investment as a percentage of GDP as a proxy for capital accumulation. In this section, however, we use input data to explicitly measure capital accumulation. The disparity in these two proxies of capital accumulation is stark: the correlation between the rate of investment and the percentage change in capital is not significantly different from zero.[42] According to the strict accounting definition of capital stock growth,[43] the correlation between these two measures does not have to be significantly positive (however, assuming depreciation is invariant across countries, the correlation between the change in the capital stock and investment should be); nevertheless, the complete lack of correlation is troublesome because the rate of investment and the percentage change in the capital stock are used as conventional proxies of capital accumulation in cross-country growth regressions and growth accounting exercises, respectively.[44]

4.4.3 Results from a Growth Accounting Framework

The growth accounting framework allows us to separate out the effect of openness on different channels of income growth. Cross-country regressions are estimated to assess the relationship between each openness indicator with the average annual percentage change in each of the following dependent variables: income per worker, productivity, capital stock per worker, and human capital. All variables are average values over the sample period, 1960-1989. The

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[42] However, the correlation of both measures of capital accumulation is each respectively positively and significantly correlated with growth and growth per capita (as expected). The partial correlations between measures of capital accumulation and measures of growth are given by the following matrix (ρ are in italics, and * denotes correlations significant at the 5 percent level of confidence):

	INV	ZKAPLAB	ZKAP	ZGDPLAB
ZKAPLAB	0.0352			
	0.7489			
ZKAP	-0.0851	0.9346*		
	0.4252	*0.0000*		
ZGDPLAB	0.4417*	0.5570*	0.4752*	
	0.0000	*0.0000*	*0.0000*	
GDPGR	0.4078*	0.4331*	0.2640*	0.8152*
	0.0000	*0.0000*	*0.0119*	*0.0000*

[43] i.e., the change in the capital stock equals investment minus depreciation.

[44] For instance see Levine and Renelt (1991) for a survey of empirical papers on growth using cross-country growth regressions, and Fischer (1993) and Elias as examples of papers which employ the growth accounting approach.

regressions contain no regional dummies, and only a constant and initial income as additional regressors. The results are presented in Table 4.6.

All variables with the exception of TARIMP demonstrate a significant relationship with income growth per worker, after controlling for the initial level of income. This resembles the results from growth regressions in which the initial value of human capital and income are included as regressors in addition to the openness indicator (i.e., regressions 1 in Tables F.1A-F.1E).

However, when growth in the stock of capital per worker (ZKAPLAB) is used as the dependent variable, the results from growth accounting and cross-country growth regressions are dissimilar in the majority of cases. From the growth accounting exercises, we see that the relationship between BMP and ZKAPLAB, as well as the relationship between OPENDUR and ZKAPLAB, are statistically significant: the black market premium depresses capital accumulation, while the duration of openness enhances it. According to the investment regressions which control for initial values of human capital and income (i.e., regressions 10 in Tables F.2A-F.2E), the majority of openness indicators emerge statistically significant (OPENDUR, TARIMP, and TAROP). As we mentioned earlier, this disparity in the results should not be surprising since the proxies for capital accumulation are not significantly correlated. When we add additional regressors (such that the set of RHS variables (besides the openness indicator) is identical to that found in regression 20 in Tables F.2A-F.2E) we find that BMP and TAROP significantly impact ZKAPLAB; this again is at variance with the results from the cross-country growth regressions.[45]

Similarly, when examining the relationship between individual indicators of openness and productivity growth it should not be surprising to find a disparity in the results which emerge from growth accounting and those derived from growth regressions. The incongruity may arise for two reasons. First, the different capital accumulation measures (i.e., INV and ZKAPLAB) have a direct impact on the measures of residual productivity. Secondly, the two empirical approaches estimate "productivity" differently. The growth accounting procedure assesses the

[45] The regression results which include additional regressors are available from the author on request. Note that Table 4.6 displays the results in which the only additional regressor (besides the indicator for openness) is initial income.

correlation between openness and a residual productivity measure defined as the portion of income growth which can not be attributed to factor accumulation, while cross-country growth regressions examine the contribution of openness to efficiency by including variables *in addition* to those which proxy factor accumulation in the growth regression (i.e., in this case productivity is defined as the portion of growth which can not be explained by this set of RHS variables).

The results for the black market premium exhibit this disparity. While the results from growth accounting reveal a significant negative relationship between BMP and capital stock growth per worker, they show no evidence of a significant correlation between BMP and productivity growth. These results are in contrast to those from cross-country growth regressions, which indicate that a rise in the black market premium slows growth through its deleterious impact on efficiency, and not through significant negative effects on capital accumulation. In the case of the openness index OPENIND, growth accounting demonstrates a positive and significant relationship with productivity growth. This too is at variance with the results of cross-country growth regressions which find no evidence of a significant relationship between OPENIND and growth, once controlling for other factors. However, for OPENDUR, TARIMP, and TAROP the results from the growth accounting exercises resemble those from the augmented growth regressions. The coefficient on OPENDUR is positive and statistically significant, indicating that the duration of openness enhances growth through productivity, while neither of the tariff distortion measures are significantly related to productivity growth.

Surprisingly, the addition of other variables to the regressions of ESOLOW on alternate openness indicators (and initial income) do not change the original results;[46] openness indicators found to be statistically significantly related to ESOLOW (OPENIND and OPENDUR) remain highly significant, and those originally found insignificantly related to ESOLOW remain so. This implies that any divergence in the growth accounting and growth regressions conclusions (regarding the relationship between individual indicators of openness and productivity growth) arises exclusively from differences in the measurement of capital accumulation.

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[46] These additional variables are equivalent to those found in regression 9 in Tables F.1A-F.1E, with the exception of LSEC60. The coefficients (with the t-stats in parentheses) for the openness indicators are as follows: BMP: -0.0016(0.51); OPENIND: 0.009 (2.54); OPENDUR: 0.0004 (2.29); TARIMP: -0.016 (0.11); TAROP: -0.0004 (1.20).

For thoroughness we examine the relationship between indicators of openness and growth in human capital (ZHUMLAB). We would not expect a country's openness orientation to impact on the accumulation of its human capital. Indeed, four out of the five indicators of openness are not statistically significantly related to human capital accumulation. However, the *negative* coefficient on OPENDUR is statistically significant; this implies that countries characterized by a longer duration of openness experience *lower* growth in human capital. With the addition of other variables which could affect human capital accumulation (e.g., government consumption and political instability) the relationship between OPENDUR and ZHUMLAB is rendered statistically insignificant.[47]

4.4.4 Conclusions from a Growth Accounting Framework

In the fourth section, we examined the five openness indicators for partial correlation with per capita growth and its components: capital accumulation, human capital accumulation, and residual productivity. We find that the index for openness and the duration of time a country can be classified as open each contribute to economic growth through improvements in factor productivity, even after controlling for other elements which may contribute to efficiency. We find that the duration of openness also contributes to capital accumulation, while the black market premium reduces it, after controlling for the initial level of income. Once we control for an array of other factors (such as political instability, government spending, and so forth) both the black market premium and tariff restrictiveness (as measured by TAROP) are found significantly to diminish growth in the capital stock, while the duration of openness is no longer found to exert a significant effect.

4.5 Concluding Remarks

The results from this chapter support the view that policies which promote undistorted trade lead to higher growth rates and improvements in economic well-being. This chapter demonstrates the robust relationship between outward orientation and growth using an new set of openness

[47] Specifically, these additional regressors are GOV and WARS.

indicators. These indicators provide an approximation for the degree of trade distortions which arise from import tariffs, inappropriate exchange rate regimes and export controls. The empirical analysis employs two distinct approaches to assess the partial correlation between openness and growth: (1) standard cross-country growth regression and (2) the regression analog of growth accounting, in which growth is disassembled into factor accumulation and residual productivity. The results from the two empirical techniques are at times incongruent; this may be an artifact of the input data used in the growth accounting exercise. For instance cross-country growth regressions demonstrate that the black market premium diminishes growth through its deleterious impact on productivity. The results from growth accounting do not confirm this result. Cross-country growth regressions also find that the duration of time a country can be classified as open (given a particular set of criteria) is robustly and positively associated with capital accumulation. In contrast results from growth accounting demonstrate that the black market premium and tariff rates, interacting with an estimate of free trade, each exerts a statistically significant negative impact on capital accumulation.

Empirical results from both techniques do confirm that the duration of openness has a statistically significant positive effect on improvements in efficiency and long run growth. This finding is consonant with open-economy extensions of neoclassical models of growth such as Lee (1993). These models asserts that tariffs and exchange controls, which hinder access to imported inputs, weaken growth by decreasing the productivity of capital. The results from the empirical analysis also suggest that the duration of openness matters for growth. The openness indicator which emerges robustly related to growth is one which ranks countries according to the length of time they are classified as open within the sample period. The statistically significant relationship between the duration of openness and growth may reflect the fact that it takes time for the economy to benefit from scale economies which arise from open trade and specialization. However, the empirical results do not provide conclusive evidence for this dynamic efficiency argument put forth in models of endogenous growth. Because the empirical analysis relies on cross-country data it can not appropriately evaluate endogenous growth models which suggest that openness generates growth by encouraging specialization in industries which benefit from scale economies. Future research may want to assess the contention regarding dynamic efficiency by focusing the empirical analysis at the industry level.

TABLE 4.1A

THE AVERAGE LEVEL OF INDICATORS FOR OPENNESS AND THE CONTEMPORANEOUS GROWTH RATE OF REAL PER CAPITA GDP: 1960-1989

	Very Fast	Fast	Slow	Very Slow	Obs	Correlation with Growth	[P-value]
BMP	0.08	0.28	0.41	0.98	111	-0.30	[0.001]
OPENIND	0.92	0.59	0.37	0.22	100	0.50	[0.000]
OPENDUR	22.23	14.83	5.04	0.81	102	0.64	[0.000]
TAROP	5.36	5.87	8.67	8.21	84	-0.24	[0.028]
TARIMP	0.02	0.03	0.03	0.03	56	-0.16	[0.242]
NATOP	4.10	3.72	3.86	3.79	84	0.24	[0.029]

Growth rate cut-offs yield potentially 28 countries in each category. Very Slow: GDPGR<0.0075, Slow: 0.0075<GDPGR<0.02, Fast: 0.02<GDPGR<0.03, Very Fast: GDPGR>0.03.

TABLE 4.1B

THE AVERAGE LEVEL OF INDICATORS FOR OPENNESS AND THE CONTEMPORANEOUS RATE OF INVESTMENT: 1960-1989

	Very Fast	Fast	Slow	Very Slow	Obs	Correlation with Investment	[P-value]
BMP	0.33	0.46	0.36	0.71	133	-0.14	[0.11]
OPENIND	0.82	0.70	0.38	0.32	118	0.41	[0.00]
OPENDUR	23.03	12.25	4.85	2.16	110	0.62	[0.00]
TAROP	2.95	5.77	10.04	8.20	92	-0.40	[0.00]
TARIMP	0.02	0.02	0.03	0.03	62	-0.21	[0.00]
NATOP	4.07	3.77	3.83	3.84	92	0.16	[0.12]

Investment rate cut-offs yield potentially 34 countries in each category. Very Slow: INV<10.43, Slow: 0.43<INV<16.56, Fast: 16.56<INV<22.75, Very Fast: INV>22.75.

TABLE 4.2
MOST COMPREHENSIVE REGRESSION SPECIFICATION EXPLAINING INCOME GROWTH
(DEPENDENT VARIABLE: AVERAGE REAL PER CAPITA GDP GROWTH (1960-1989))

Regression:	(9A)	(9B)	(9C)	(9D)	(9E)
Independent	OPENNESS INDICATOR				
Variables	BMP	OPENIND	OPENDUR	TAROP	TARIMP
LGDP60	-1.582	-1.568	-1.654	-1.646	-1.874
	(6.52)	(5.64)	(6.59)	(5.25)	(3.99)
LSEC60	0.511	0.582	0.516	0.658	0.872
	(3.95)	(4.10)	(3.80)	(3.94)	(4.05)
GOV	-8.867	-10.528	-10.144	-11.927	-13.964
	(3.80)	(4.05)	(4.22)	(4.46)	(4.23)
INFLAT	0.011	0.002	0.010	0.003	0.005
	(1.39)	(0.17)	(1.23)	(0.32)	(0.45)
REVCOUP	0.147	-0.287	-0.498	-0.267	-0.521
	(0.28)	(0.49)	(0.89)	(0.43)	(0.73)
ASSASSIN	0.413	-0.343	0.205	-0.098	0.398
	(0.31)	(0.24)	(0.15)	(0.06)	(0.21)
WARS	-0.064	-0.058	-0.056	-0.088	-0.071
	(2.48)	(1.92)	(2.06)	(2.79)	(1.87)
POLRIGHT	-0.097	-0.030	-0.050	-0.049	-0.005
	(1.12)	(0.30)	(0.54)	(0.40)	(0.03)
INFLATSD	-0.003	-0.001	-0.003	-0.001	-0.002
	(1.57)	(0.34)	(1.42)	(0.49)	(0.62)
TOT	5.360	4.118	5.433	3.717	12.268
	(0.88)	(0.62)	(0.86)	(0.51)	(1.36)
DENS	0.001	0.001	0.001	0.001	0.001
	(2.31)	(1.47)	(1.55)	(1.38)	(0.90)
DRELIEFS	-0.203	-0.180	-0.160	-0.197	-0.161
	(3.77)	(2.99)	(2.83)	(2.86)	(1.92)
INV	0.097	0.093	0.071	0.075	0.049
	(5.24)	(4.52)	(3.37)	(2.99)	(1.43)
OPENNESS	-0.604	0.448	0.041	-0.029	-12.112
INDICATOR	(3.40)	(1.41)	(3.05)	(0.98)	(1.00)
Constant	13.005	12.475	13.288	14.017	15.688
	(6.62)	(5.52)	(6.50)	(5.21)	(4.02)
Obs	78	73	75	66	45
Adj R-sq.	0.74	0.69	0.72	0.68	0.66

Note: Absolute values of t-statistics are in parentheses.

TABLE 4.3

MOST COMPREHENSIVE REGRESSION SPECIFICATION EXPLAINING INVESTMENT

(DEPENDENT VARIABLE: AVERAGE RATE OF INVESTMENT, RELATIVE TO GDP (1960-1989))

Regression:	(17A)	(17B)	(17C)	(17D)	(17E)
Independent	OPENNESS INDICATOR				
Variables	BMP	OPENIND	OPENDUR	TAROP	TARIMP
LGDP60	2.493	2.985	1.894	1.130	-1.218
	(1.58)	(1.73)	(1.26)	(0.66)	(0.50)
LSEC60	0.697	0.423	0.041	0.496	0.960
	(0.81)	(0.47)	(0.05)	(0.54)	(0.86)
GOV	-31.272	-32.144	-23.662	-32.381	-31.465
	(2.06)	(2.01)	(1.66)	(2.30)	(1.93)
INFLAT	-0.020	-0.046	0.019	-0.030	0.037
	(0.38)	(0.80)	(0.39)	(0.55)	(0.61)
REVCOUP	-2.574	-2.487	-4.731	-2.900	-2.749
	(0.73)	(0.67)	(1.43)	(0.86)	(0.74)
ASSASSIN	6.768	5.278	7.849	7.672	12.109
	(0.77)	(0.58)	(0.95)	(0.92)	(1.26)
WARS	-0.339	-0.264	-0.158	-0.446	-0.348
	(2.02)	(1.40)	(0.97)	(2.74)	(1.85)
POLRIGHT	-0.419	-0.210	-0.136	-0.155	-0.885
	(0.73)	(0.32)	(0.24)	(0.23)	(1.12)
INFLATSD	0.004	0.011	-0.005	0.007	-0.009
	(0.34)	(0.77)	(0.42)	(0.53)	(0.64)
TOT	-18.352	-20.325	1.944	-13.095	15.419
	(0.47)	(0.48)	(0.05)	(0.33)	(0.33)
DENS	0.003	0.003	0.002	0.001	0.003
	(0.88)	(0.74)	(0.49)	(0.39)	(0.71)
DRELIEFS	0.076	0.201	0.261	-0.213	0.066
	(0.21)	(0.53)	(0.76)	(0.56)	(0.15)
OPENNESS	-0.351	1.533	0.263	-0.573	-125.488
INDICATOR	(0.30)	(0.76)	(3.60)	(3.96)	(2.13)
Constant	2.934	-2.224	2.702	17.851	33.173
	(0.23)	(0.16)	(0.22)	(1.22)	(1.70)
Obs	79	73	75	66	45
Adj R-sq.	0.45	0.45	0.54	0.56	0.25

Note: Absolute values of t-statistics are in parentheses.

TABLE 4.4A
SENSITIVITY RESULTS FOR OPENNESS VARIABLES
(DEPENDENT VARIABLE: AVERAGE REAL PER CAPITA GDP GROWTH RATE (1960-1989))

M-variable		β_m	Standard error	t	Countries	Adj. R-squared	Robust/fragile - Other variables
BMP	base:	-0.66	0.19	3.42	93	0.54	robust
	high:	-0.57	0.19	3.03	93	0.59	GOVALL, PINSTAB
	low:	-0.79	0.21	3.79	82	0.58	INFLATSD, PINSTAB, DCREDSD
OPENIND	base:	0.92	0.33	2.78	86	0.51	fragile(3)
	high:	0.95	0.33	2.86	86	0.51	PINSTAB
	low:	0.39	0.33	1.18	76	0.58	GOVALL, INFLATSD, DCREDGR
OPENDUR	base:	0.08	0.01	5.53	88	0.62	robust
	high:	0.08	0.01	5.64	88	0.62	PINSTAB
	low:	0.05	0.01	4.00	78	0.66	GOVALL, INFLAT, DCREDSD
TAROP	base:	0.0	0.04	0.02	75	0.47	fragile(0)
TARIMP	base:	-3.66	14.33	0.25	49	0.39	fragile(0)
NATOP	base:	0.44	0.32	1.37	75	0.49	fragile(0)

TABLE 4.4B
SENSITIVITY RESULTS FOR OPENNESS VARIABLES
(DEPENDENT VARIABLE: AVERAGE INVESTMENT RATE (1960-1989))

M-variable		β_m	Standard error	t	Countries	Adj. R-squared	Robust/fragile - Other variables
BMP	base:	-1.4290	0.8900	1.60	97	0.48	fragile(0)
OPENIND	base:	0.6948	1.5274	0.46	89	0.47	fragile(0)
OPENDUR	base:	0.2480	0.0634	3.90	91	0.53	robust
	high:	0.2753	0.0745	3.70	79	0.51	INFLAT, INFLATSD, DCREDSD
	low:	0.2368	0.0633	3.74	91	0.55	GOVALL, PINSTAB
TAROP	base:	-0.4125	0.1370	3.01	78	0.51	robust
	high:	-0.3884	0.1377	2.82	78	0.52	GOVALL
	low:	-0.4726	0.1400	3.36	75	0.52	PINSTAB, DCREDGR, DCREDSD
TARIMP	base:	-119.3800	49.8100	2.40	51	0.24	robust
	high:	-118.9175	49.8021	2.39	51	0.24	GOVALL
	low:	-134.6669	53.1875	2.53	50	0.21	PINSTAB, DCREDGR, DCREDSD
NATOP	base:	0.7550	1.4400	0.52	78	0.45	fragile(0)

TABLE 4.5
ESTIMATED PRODUCTIVITY GROWTH, 1961-1988 (IN PER CENT PER ANNUM)

Region	Number of Countries	Regional Mean	Maximum		Minimum	
			Country	Rate	Country	Rate
EMENA	6	0.63	Malta	1.72	Iraq	-1.70
LACAR	21	-0.24	Brazil	1.90	Haiti	-4.81
SASIA	6	-0.48	Tanzania	1.63	Madagascar	-4.65
EASIA	8	0.28	Burma	1.47	Bangladesh	-3.63
AFRICA	21	-1.50	Taiwan	1.69	Singapore	-2.82
OECD	24	0.68	Greece	1.63	New Zealand	-1.03

Source: Calculated using GDP data from Summers-Heston and input data from World Bank datasets. Data appendix gives further data descriptions.

TABLE 4.6
EFFECTS OF OPENNESS ON GROWTH IN INCOME PER WORKER, GROWTH IN PRODUCTIVITY, AND FACTOR ACCUMULATION (CAPITAL AND HUMAN)

Openness Indicator:	Dependent Variable			
	ZGDPLAB	ESOLOW	ZKAPLAB	ZHUMLAB
BMP	-0.0067887**	0.000[illegible]936	-0.0156342*	-0.0003368
t-statistic	(2.257)	(0.033)	(3.422)	(0.053)
P-value	[0.026]	[0.974]	[0.001]	[0.957]
Adj. R2	0.04	0.04	0.17	0.11
countries	102	82	82	87
OPENIND	0.0093**	0.0098**	0.0129***	0.0020
t-statistic	(2.22)	(2.42)	(1.90)	(0.18)
P-value	[0.03]	[0.02]	[0.06]	[0.86]
Adj. R2	0.05	0.11	0.05	0.12
countries	95	77	77	82
OPENDUR	0.0008*	0.0005*	0.0008*	-0.0006**
t-statistic	(5.17)	(4.13)	(3.32)	(2.07)
P-value	[0.00]	[0.00]	[0.00]	[0.04]
Adj. R2	0.19	0.16	0.12	0.13
countries	98	79	79	84
TARIMP	-0.16	0.14	-0.50***	0.10
t-statistic	(1.53)	(1.35)	(1.91)	(0.32)
P-value	[0.13]	[0.18]	[0.06]	[0.75]
Adj. R2	-0.01	-0.03	0.09	0.02
countries	53	43	43	47
TAROP	-0.0008**	-0.0006	-0.0006	0.0007
t-statistic	(2.42)	(1.43)	(1.14)	(0.70)
P-value	[0.02]	[0.16]	[0.26]	[0.49]
Adj. R2	0.04	0.07	0.02	0.10
countries	80	70	70	72

Note: LGDP60 is the only additional RHS variable in each regression. Results for regressions which include additional RHS variables are available from the author on request. * indicates significance at 1 percent level of confidence, ** at 5 percent level of confidence, and *** at 10 percent level of confidence.

E Appendix: Data

E.1 Data Sources and Definitions

TABLE E.1
SUMMARY OF DATA USED IN EMPIRICAL ANALYSIS

VARIABLE	ALL COUNTRIES			DEVELOPING COUNTRIES			OECD COUNTRIES		
	OBS	MEAN	STD. DEV.	OBS	MEAN	STD. DEV.	OBS	MEAN	STD. DEV.
ASSASSIN	130	0.028	0.076	106	0.033	0.083	24	0.006	0.011
BMP	134	0.473	0.943	111	0.567	1.011	23	0.017	0.059
DCREDGR	129	0.343	0.704	106	0.383	0.771	23	0.158	0 067
DCREDSD	129	0.761	2.898	106	0.908	3.180	23	0.086	0.057
DENS	118	135.235	455.001	94	142.056	507.302	24	108.522	107.636
FREEOP	92	0.227	0.073	71	0.211	0.063	21	0.281	0.079
GDPGR	114	1.944	1.803	90	1.676	1.896	24	2.946	0.860
GOV	113	0.103	0.067	89	0.117	0.068	24	0.052	0.024
GOVALL	137	18.808	7.239	113	19.880	7.429	24	13.765	2.985
INFLAT	119	31.319	109.786	98	36.167	120.495	21	8.692	6.528
INFLATSD	119	84.383	444.905	98	101.170	489.053	21	6.045	5.817
INV	137	16.569	8.129	113	14.509	7.252	24	26.270	3.947
LAREA	118	5.285	1.986	94	5.243	2.022	24	5.450	1.870
LDIST	92	1.690	0.481	71	1.868	0.276	21	1.090	0.544
LGDP60	119	7.325	0.888	95	7.018	0.677	24	8.539	0.503
LOPEN	137	4.024	0.605	113	4.047	0.613	24	3.918	0.569
LPOP	137	8.466	1.894	113	8.280	1.898	24	9.343	1.639
LSEC60	110	1.616	1.298	87	1.327	1.238	23	2.710	0.876
NATOP	92	53.670	26.051	71	54.237	27.728	21	51.752	19.800
OWTI	104	0.169	0.163	82	0.202	0.167	22	0.044	0.039
PINSTAB	130	0.095	0.113	106	0.111	0.118	24	0.025	0.042
POPGR	133	0.022	0.014	109	0.025	0.013	24	0.008	0.005
TARIFF	68	0.150	0.103	67	0.150	0.104	1	0.164	.
TOT	118	-0.001	0.027	95	0.000	0.029	23	-0.006	0.013
ZGDP	123	0.041	0.019	99	0.042	0.020	24	0.037	0.009
ZGDPLAB	107	0.020	0.017	83	0.019	0.019	24	0.025	0.011
ZHUM	93	0.054	0.046	71	0.063	0.049	22	0.023	0.010
ZHUMLAB	92	0.033	0.045	70	0.040	0.050	22	0.011	0.006
ZKAP	90	0.069	0.025	66	0.073	0.028	24	0.058	0.012
ZKAPLAB	85	0.048	0.024	61	0.048	0.027	24	0.046	0.015
ZLAB	108	0.021	0.009	84	0.023	0.007	24	0.012	0.007

TABLE E.2
DATA DEFINITIONS AND SOURCES[48]

VARIABLE	Definition	Source
ASSASSIN	Number of assassinations per million population per year	Barro-Lee data set
BMP	(Black market exchange rate/Official exchange rate)-1 [the exchange rates are in domestic currency per US$]	Barro-Lee data set
DCREDGR	Average annual growth rate of domestic credit, averaged over 1960-1989	IMF International Financial Statistics
DCREDSD	Standard deviation of average annual growth rate of domestic credit over 1960-1989	IMF International Financial Statistics
DENS	POP/AREA	Author's own calculations using Barro-Lee data set
FREEOP	Measure of "free trade openness"=0.528-0.26 LAREA-0.95 LDIST	Barro-Lee data set
GDPGR	Annual growth rate of real per capita GDP, averaged over 1960-1989 [%]	Author's own calculations using Summers-Heston data set
GOV	Ratio of real government consumption expenditure net of spending in defense and education to real GDP	Barro-Lee data set
GOVALL	Real government share of GDP [%]	Summers-Heston data set
INFLAT	December over December CPI change, average over 1960-1989 [%]	Bruno and Easterly (World Bank manuscript 1996) data set
INFLATSD	Standard deviation of December over December CPI change over 1960-1989	Author's own calculations using Bruno and Easterly (World Bank manuscript 1996) data set
INV	Real investment share of GDP (1985 int. prices) [%]	Summers-Heston data set
LAREA	log of size of land [size is in million square Km.]	Barro-Lee data set
LDIST	log of average distance to capitals of 20 major exporters, weighted by values of bilateral imports [avg distance is in 1000's of km.]	Barro-Lee data set
LGDP60	log of real per capita GDP in constant dollars using Chain Index [level in international prices, base 1985]	Summers-Heston data set
LOPEN	log of (export plus imports)/nominal GDP	Summers-Heston data set
LPOP	log of population [population is in 1000's]	Summers-Heston data set
LSEC60	log of percent of secondary school attained in total population in 1960	Barro-Lee data set
NATOP	fitted estimate of OPEN from regression of LOPEN on LDIST LPOP LAREA and regional dummy variables	Author's own calculations

[48] Note that all values are averages over the period 1960-1989, unless otherwise stated.

VARIABLE	Definition	Source
PINSTAB	Measure of political instability: 0.5 ASSASSPX +0.5 REVOLX where REVOLX indicates number of revolutions per year, averaged over 1960-1984.	Barro-Lee data set
POPGR	Growth rate of population	Barro-Lee data set
TARIFF	Derived from OPENTARA computed in Fischer as OPENTARA=OPENC * ln(1+TARIFF) where OPENC is X+M/GDP and TARIFF is average tariffs	Sourced from data from Fischer (JME 1993) data set
TOT	Terms of trade shock (growth rate of export prices minus growth rate of import prices)	Barro-Lee data set
ZGDP	Growth rate of real GDP	Fischer (1993 JME) data set
ZGDPLAB	ZPGDP-ZLAB	Author's calculations using Fischer (1993 JME) data set
ZHUM	Annual growth rate of total human capital=Average years of educational attainment of the labor force*Labor force	Fischer (1993 JME) data set
ZHUMLAB	ZBARROHK-ZLAB	Author's calculations using Fischer (1993 JME) data set
ZKAP	Capital stock annual growth rate, averaged over 1960-1989	Fischer (1993 JME) data set
ZKAPLAB	ZKAP-ZLAB	Author's calculations using Fischer (1993 JME) data set
ZLAB	Labor force annual growth rate, averaged over 1960-1989	Fischer (1993 JME) data set

E.2 Openness Indicators

TABLE E.3
VALUES OF INDICATORS OF OPENNESS (AVERAGES: 1960-1989)

	COUNTRY	EMBI	SOC	OWTI	OWQI	OPENIND	OPENDUR	BMP	TAROP	TARIMP
1	ALGERIA	0	1	0.13	0.00	0	0	1.31	5.89	.
2	ANGOLA	0	1	0.09	0.05	0	0	1.76	3.83	.
3	BENIN	1	1	0.26	0.17	0	0	0.03	13.81	0.03
4	BOTSWANA	0	0	.	.	.	11	0.20	.	.
5	BURKINA FASO	1	1	0.48	0.68	0	0	0.03	.	.
6	BURUNDI	1	0	0.22	0.01	0	0	0.28	11.18	0.04
7	CAMEROON	1	0	0.26	0.14	0	0	0.03	10.44	0.04
8	CAPE VERDE IS.	0	.	.	.	.	.	.	.	
9	CENTRAL AFR.R.	1	0	0.20	0.04	0	0	0.03	12.03	0.02
10	CHAD	1	0	.	.	0	0	0.03	.	.
11	COMOROS	0	.	.	.	.	.	0.13	.	.
12	CONGO	1	1	0.20	0.04	0	0	0.03	13.11	0.03
13	EGYPT	0	0	0.10	0.25	1	0	0.74	3.30	0.04
14	ETHIOPIA	0	1	0.20	0.17	0	0	0.59	4.86	.
15	GABON	1	0	.	.	0	0	0.02	.	.
16	GAMBIA	1	0	.	.	0	5	0.11	.	.
17	GHANA	0	0	0.33	0.20	1	5	3.28	11.80	0.04
18	GUINEA	1	.	0.05	0.00	0	4	2.79	2.89	.
19	GUINEA-BISS	1	0	.	.	0	3	0.28	.	.
20	IVORY COAST	1	0	.	.	0	.	0.03	.	.
21	KENYA	0	0	0.28	0.20	1	5	0.16	8.68	0.03
22	LESOTHO	0	0	.	.	.	.	0.12	.	.
23	LIBERIA	0	0	.	.	.	.	0.10	.	.
24	MADAGASCAR	1	1	0.26	0.01	0	0	0.07	9.28	0.02
25	MALAWI	1	0	0.12	0.81	0	0	0.38	5.40	0.01
26	MALI	1	1	.	.	0	2	0.03	.	.
27	MAURITANIA	1	0	.	.	0	0	0.50	.	.
28	MAURITIUS	0	0	0.35	0.34	1	22	0.05	26.13	.
29	MOROCCO	0	0	0.30	0.31	1	11	0.09	12.32	0.04
30	MOZAMBIQUE	1	1	0.11	0.00	0	0	1.72	3.62	.
31	NIGER	1	0	.	.	0	0	0.03	.	.
32	NIGERIA	1	0	0.45	0.02	0	0	0.58	8.57	0.02
33	RWANDA	1	1	0.27	0.44	0	0	0.35	12.92	.
34	SENEGAL	1	0	0.19	0.05	0	0	0.03	9.47	0.03
35	SEYCHELLES	0	.	.	.	.	.	.	.	.
36	SIERRA LEONE	1	0	0.12	0.00	0	0	1.53	6.94	0.01
37	SOMALIA	0	1	0.20	0.02	0	0	0.58	9.58	0.02
38	SOUTH AFRICA	0	0	.	.	0	0	0.12	.	.
39	SUDAN	0	0	0.33	0.08	1	.	0.70	9.89	0.03
40	SWAZILAND	0	0	.	.	.	.	0.13	.	.
41	TANZANIA	1	1	0.17	0.28	0	0	1.06	5.33	0.03
42	TOGO	1	1	.	.	0	0	0.03	.	.
43	TUNISIA	0	0	0.22	0.54	0	1	0.27	14.27	0.04
44	UGANDA	1	0	0.10	0.00	0	2	2.68	3.88	0.09
45	ZAIRE	0	0	0.12	0.38	1	0	1.09	3.47	0.03
46	ZAMBIA	1	1	0.18	0.00	0	0	0.94	8.03	0.02
47	ZIMBABWE	0	0	0.23	0.87	0	0	0.58	9.07	0.02
48	BAHAMAS	0	.	0.18	0.00	1	.	0.11	.	.
49	BARBADOS	0	0	0.10	0.09	1	24	0.09	11.65	0.03
50	CANADA	0	0	0.05	0.02	1	30	0.00	1.87	.
51	COSTA RICA	0	0	0.16	0.70	0	6	0.21	8.81	0.04

	COUNTRY	EMBI	SOC	OWTI	OWQI	OPENIND	OPEN-DUR	BMP	TAROP	TARIMP
52	DOMINICA	0	.	0.31	0.00	1	.	0.17	.	.
53	DOMINICAN REP.	0	0	.	.	0	0	0.29	.	.
54	EL SALVADOR	0	0	0.13	0.04	1	1	0.65	6.66	0.02
55	GRENADA	0	.	0.18	0.09	1	.	0.17	.	.
56	GUATEMALA	0	0	0.08	0.82	0	4	0.11	3.67	0.02
57	HAITI	0	0	0.10	0.12	1	0	0.17	4.89	0.01
58	HONDURAS	0	0	.	.	0	2	0.12	.	.
59	JAMAICA	0	0	0.11	0.11	1	12	0.28	6.71	0.03
60	MEXICO	0	0	0.08	0.06	1	4	0.07	1.69	0.01
61	NICARAGUA	0	0	0.15	0.68	0	1	0.81	7.55	0.01
62	PANAMA	0	0	.	.	.	.	0.00	.	.
63	ST.LUCIA	0	.	0.14	0.03	1	.	0.17	.	.
64	ST.VINCENT&GRE	0	.	0.10	0.02	1	.	0.17	.	.
65	TRINIDAD&TOBAGO	0	0	0.29	0.25	1	0	0.36	19.30	0.06
66	U.S.A.	0	0	0.02	0.12	1	30	0.00	0.34	.
67	ARGENTINA	0	0	0.29	0.06	1	0	0.30	6.06	0.03
68	BOLIVIA	0	0	0.13	0.04	1	25	0.32	5.14	0.01
69	BRAZIL	0	0	0.16	0.05	1	0	0.28	2.22	0.02
70	CHILE	0	0	0.21	0.10	1	14	0.95	6.08	0.01
71	COLOMBIA	0	0	0.31	0.52	0	4	0.14	7.18	0.04
72	ECUADOR	0	0	0.28	0.40	1	23	0.20	9.35	0.03
73	GUYANA	0	1	0.12	0.01	0	2	2.98	8.78	0.02
74	PARAGUAY	0	0	0.46	0.01	0	1	0.28	20.31	0.05
75	PERU	0	0	0.41	0.37	0	8	0.21	9.85	0.03
76	SURINAME	0	0	.	.	.	.	7.19	.	.
77	URUGUAY	0	0	0.21	0.03	1	0	0.12	9.34	0.02
78	VENEZUELA	0	0	0.18	0.00	1	1	0.39	5.67	0.04
79	AFGHANISTAN	0	.	.	.	.	.	0.63	.	.
80	BAHRAIN	0	.	0.05	0.02	1	.	.	.	.
81	BANGLADESH	0	0	0.41	0.50	0	0	1.09	9.23	0.03
82	MYANMAR	0	1	.	.	0	0	3.19	.	.
83	CHINA	0	.	0.25	0.29	.	0	0.52	.	.
84	HONG KONG	0	0	0.00	0.00	1	30	0.00	0.00	0.01
85	INDIA	0	0	1.32	0.89	0	0	0.32	11.24	0.05
86	INDONESIA	0	0	0.14	0.10	1	20	0.14	4.48	0.01
87	IRAN	0	1	0.39	0.86	0	0	2.32	11.31	.
88	IRAQ	0	0	0.09	0.18	1	0	0.87	3.94	.
89	ISRAEL	0	0	.	.	.	5	0.17	.	.
90	JAPAN	0	0	0.02	0.06	1	26	0.00	0.42	.
91	JORDAN	0	0	0.19	0.11	1	25	0.03	13.83	0.04
92	KOREA, REP.	0	0	0.14	0.10	1	22	0.18	7.64	0.03
93	KUWAIT	0	0	0.03	0.05	1	.	0.00	2.89	0.02
94	MALAYSIA	0	0	0.09	0.05	1	27	0.01	6.42	0.01
95	NEPAL	0	0	0.10	0.05	1	0	0.38	4.72	0.01
96	OMAN	0	0	0.01	0.02	1	.	0.00	.	.
97	PAKISTAN	0	0	0.41	0.08	0	0	0.50	8.97	0.02
98	PHILIPPINES	0	0	0.22	0.47	0	2	0.12	10.48	0.02
99	SAUDI ARABIA	0	0	0.08	0.02	1	.	0.01	3.85	0.00
100	SINGAPORE	0	0	0.02	0.01	1	25	0.01	2.24	0.00
101	SRI LANKA	0	0	0.28	0.08	1	13	0.62	11.13	0.02
102	SYRIA	0	1	0.16	0.54	0	6	1.07	8.85	0.02
103	TAIWAN	0	0	0.07	0.38	1	27	0.07	5.38	.
104	THAILAND	0	0	0.29	0.06	1	30	0.01	13.98	0.02
105	UNITED ARAB E.	0	.	0.03	0.01	1	.	0.02	.	.
106	YEMEN	0	0	0.16	0.13	1	30	0.20	8.85	0.01
107	AUSTRIA	0	0	0.05	0.02	1	30	0.00	3.14	.

	COUNTRY	EMBI	SOC	OWTI	OWQI	OPENIND	OPENDUR	BMP	TAROP	TARIMP
108	BELGIUM	0	0	0.04	0.11	1	30	0.00	2.46	.
109	CYPRUS	0	0	0.08	0.35	1	30	0.05	9.85	0.04
110	DENMARK	0	0	0.04	0.11	1	30	0.00	3.11	.
111	FINLAND	0	0	0.06	0.07	1	30	0.00	3.94	.
112	FRANCE	0	0	0.02	0.05	1	30	0.00	0.67	.
113	GERMANY, WEST	0	0	0.04	0.12	1	30	0.00	1.30	.
114	GREECE	0	0	0.04	0.14	1	30	0.06	2.25	.
115	HUNGARY	0	.	.	.	0	0	1.92	.	.
116	ICELAND	0	0	.	.	.	.	.	.	.
117	IRELAND	0	0	0.02	0.05	1	24	0.00	1.61	.
118	ITALY	0	0	0.02	0.07	1	30	0.00	0.70	.
119	LUXEMBOURG	0	0	0.04	.	.	30	0.00	.	.
120	MALTA	0	0	.	.	.	.	0.04	.	.
121	NETHERLANDS	0	0	0.04	0.13	1	30	0.00	2.27	.
122	NORWAY	0	0	0.01	0.04	1	30	0.00	1.03	.
123	POLAND	0	.	.	.	0	0	4.21	.	.
124	PORTUGAL	0	0	0.05	0.19	1	30	0.05	2.56	.
125	SPAIN	0	0	0.04	0.12	1	30	0.00	1.44	.
126	SWEDEN	0	0	0.03	0.03	1	30	0.00	1.87	.
127	SWITZERLAND	0	0	0.01	0.18	1	30	0.00	0.88	.
128	TURKEY	0	0	0.13	0.87	0	1	0.28	4.11	0.03
129	U.K.	0	0	0.02	0.04	1	30	0.00	0.59	.
130	YUGOSLAVIA	0	.	0.09	0.37	0	0	0.43	.	.
131	AUSTRALIA	0	0	.	.	1	26	0.00	.	.
132	FIJI	0	0	.	.	.	.	0.08	.	.
133	NEW ZEALAND	0	0	0.18	.	0	4	0.00	9.62	.
134	PAPUA N.GUINEA	0	0	0.11	0.00	1	0	0.15	12.87	0.01
135	SOLOMON IS.	0	.	.	.	.	.	0.03	.	.
136	TONGA	0	.	.	.	.	.	0.22	.	.
137	VANUATU	0	.	.	.	.	.	0.23	.	.
138	WESTERN SAMOA	0	.	.	.	.	.	0.23	.	.

E.3 Solow Residuals

Listed are the Solow residuals calculated for countries which have the available input data. Countries are listed in ascending order of productivity growth. For instance Brazil is characterized by the highest productivity growth, equal to an average of 1.897 percent per annum over the period 1960-1989.

	COUNTRY	ESOLOW
1	HAITI	-0.04805
2	MADAGASCAR	-0.0465
3	MALI	-0.03897
4	RWANDA	-0.03789
5	SIERRA LEONE	-0.03641
6	BANGLADESH	-0.03632
7	SENEGAL	-0.0352
8	SINGAPORE	-0.02824
9	NIGERIA	-0.02673
10	CAMEROON	-0.02247
11	IVORY COAST	-0.02236
12	SUDAN	-0.02209
13	MOZAMBIQUE	-0.02161
14	ZAMBIA	-0.01949
15	IRAQ	-0.01697
16	NICARAGUA	-0.01505
17	TRINIDAD&TOBAGO	-0.01501
18	SRI LANKA	-0.01263
19	ZAIRE	-0.01181
20	GHANA	-0.01092
21	NEW ZEALAND	-0.01028
22	MALAWI	-0.01
23	EL SALVADOR	-0.00909
24	ETHIOPIA	-0.00554
25	MALAYSIA	-0.00532
26	URUGUAY	-0.00453
27	INDIA	-0.00411
28	IRAN	-0.00409
29	ARGENTINA	-0.00395
30	MEXICO	-0.003
31	DOMINICAN REP.	-0.00294
32	JAMAICA	-0.0029
33	SWITZERLAND	-0.00205
34	COSTA RICA	-0.00147
35	PARAGUAY	-0.00145
36	SOUTH AFRICA	-0.00129
37	DENMARK	-0.001
38	BOLIVIA	-0.00042
39	CHILE	-0.00026
40	PERU	0.000206
41	CANADA	0.000206
42	PHILIPPINES	0.001528
43	U.S.A.	0.002049
44	PAKISTAN	0.002328
45	IRELAND	0.002361
46	GUATEMALA	0.002417
47	U.K.	0.002512
48	NETHERLANDS	0.002869
49	AUSTRALIA	0.003064
50	HONDURAS	0.003273
51	INDONESIA	0.003521
52	SWEDEN	0.003665
53	UGANDA	0.004649
54	GERMANY, WEST	0.006145
55	THAILAND	0.006156
56	VENEZUELA	0.006248
57	FRANCE	0.006385
58	ZIMBABWE	0.006509
59	ICELAND	0.00679
60	COLOMBIA	0.007613
61	LUXEMBOURG	0.00795
62	PANAMA	0.008604
63	MOROCCO	0.009179
64	BELGIUM	0.009205
65	AUSTRIA	0.009665
66	ECUADOR	0.00988
67	MAURITIUS	0.010197
68	KOREA, REP.	0.010796
69	TURKEY	0.012034
70	CHINA	0.012469
71	NORWAY	0.012683
72	KENYA	0.013217
73	FINLAND	0.013336
74	SPAIN	0.013653
75	EGYPT	0.013911
76	PORTUGAL	0.01442
77	MYANMAR	0.014701
78	ISRAEL	0.014708
79	ITALY	0.01479
80	JAPAN	0.015686
81	GREECE	0.016316
82	TANZANIA	0.016364
83	TAIWAN	0.016862
84	MALTA	0.017184
85	BRAZIL	0.018970

F Appendix: Regression Specifications

F.1 Growth Regressions

TABLE F.1A

REGRESSIONS EXPLAINING INCOME GROWTH (DEPENDENT VARIABLE: AVERAGE REAL PER CAPITA GDP GROWTH (1960-1989); OPENNESS INDICATOR: BLACK MARKET PREMIUM)

Independent Variables	Regression (1A)	(2A)	(3A)	(4A)	(5A)	(6A)	(7A)	(8A)	(9A)
LGDP60	-0.611	-0.766	-1.129	-1.305	-1.292	-1.505	-1.305	-1.341	-1.582
	(2.53)	(3.07)	(4.31)	(4.57)	(4.48)	(4.94)	(4.34)	(4.74)	(6.52)
LSEC60	0.710	0.720	0.682	0.591	0.599	0.761	0.608	0.579	0.511
	(4.50)	(4.50)	(4.44)	(3.88)	(3.88)	(4.79)	(3.74)	(3.78)	(3.95)
GOV		-0.080	-14.955	-13.465	-13.509	-15.137	-13.590	-11.897	-8.867
		(3.15)	(5.06)	(4.62)	(4.60)	(5.30)	(4.86)	(4.43)	(3.80)
INFLAT		-0.003	-0.003	-0.002	-0.006	-0.007	-0.004	0.009	0.011
		(2.69)	(2.51)	(2.30)	(0.68)	(0.82)	(0.45)	(0.97)	(1.39)
REVCOUP			-0.443	0.006	0.038	0.022	0.193	-0.104	0.147
			(0.68)	(0.01)	(0.06)	(0.03)	(0.29)	(0.17)	(0.28)
ASSASSIN			-0.153	-0.030	-0.150	0.679	0.864	1.071	0.413
			(0.09)	(0.02)	(0.08)	(0.39)	(0.52)	(0.68)	(0.31)
WARS			-0.078	-0.076	-0.074	-0.100	-0.094	-0.097	-0.064
			(2.32)	(2.33)	(2.23)	(3.03)	(2.97)	(3.26)	(2.48)
POLRIGHT				-0.206	-0.198	-0.190	-0.181	-0.138	-0.097
				(1.92)	(1.80)	(1.69)	(1.69)	(1.35)	(1.12)
INFLATSD					0.001	0.001	0.000	-0.003	-0.003
					(0.42)	(0.56)	(0.21)	(1.14)	(1.57)
TOT						3.797	1.646	3.609	5.360
						(0.48)	(0.22)	(0.50)	(0.88)
DENS							0.002	0.001	0.001
							(2.68)	(2.43)	(2.31)
DRELIEFS								-0.196	-0.203
								(3.06)	(3.77)
INV									0.097
									(5.24)
BMP	-0.926	-0.829	-0.653	-0.632	-0.615	-0.553	-0.592	-0.637	-0.604
	(4.00)	(3.78)	(2.68)	(2.67)	(2.55)	(2.37)	(2.65)	(3.02)	(3.40)
Constant	5.790	8.416	11.369	13.313	13.217	14.680	13.014	13.294	13.005
	(3.49)	(4.35)	(5.67)	(5.65)	(5.55)	(5.85)	(5.25)	(5.69)	(6.62)
Obs	93	84	82	81	81	78	78	78	78
Adj R-sq.	0.30	0.40	0.50	0.50	0.50	0.55	0.59	0.63	0.74

Note: Absolute values of t-statistics are in parentheses.

TABLE F.1B

REGRESSIONS EXPLAINING INCOME GROWTH (DEPENDENT VARIABLE: AVERAGE REAL PER CAPITA GDP GROWTH (1960-1989); OPENNESS INDICATOR: DUMMY VARIABLE FOR OPENNESS)

Independent Variables	Regression								
	(1B)	(2B)	(3B)	(4B)	(5B)	(6B)	(7B)	(8B)	(9B)
LGDP60	-0.576	-0.711	-1.130	-1.232	-1.181	-1.342	-1.206	-1.292	-1.568
	(2.19)	(2.68)	(4.16)	(3.99)	(3.81)	(4.17)	(3.74)	(4.13)	(5.64)
LSEC60	0.607	0.570	0.624	0.551	0.562	0.732	0.632	0.621	0.582
	(3.67)	(3.37)	(3.85)	(3.38)	(3.46)	(4.44)	(3.74)	(3.80)	(4.10)
GOV		-0.101	-16.155	-15.094	-14.709	-15.624	-14.829	-13.502	-10.528
		(3.53)	(5.10)	(4.80)	(4.68)	(5.24)	(5.03)	(4.65)	(4.05)
INFLAT		-0.003	-0.003	-0.002	-0.015	-0.017	-0.014	-0.003	0.002
		(2.71)	(2.47)	(2.31)	(1.54)	(1.81)	(1.51)	(0.26)	(0.17)
REVCOUP			-0.795	-0.468	-0.352	-0.365	-0.203	-0.517	-0.287
			(1.23)	(0.70)	(0.52)	(0.53)	(0.30)	(0.77)	(0.49)
ASSASSIN			-0.579	-0.463	-0.876	-0.202	-0.031	0.145	-0.343
			(0.32)	(0.26)	(0.48)	(0.12)	(0.02)	(0.09)	(0.24)
WARS			-0.065	-0.064	-0.052	-0.076	-0.077	-0.082	-0.058
			(1.79)	(1.82)	(1.43)	(2.11)	(2.19)	(2.41)	(1.92)
POLRIGHT				-0.140	-0.102	-0.056	-0.064	-0.050	-0.030
				(1.17)	(0.83)	(0.45)	(0.53)	(0.42)	(0.30)
INFLATSD					0.003	0.004	0.003	0.000	-0.001
					(1.29)	(1.57)	(1.27)	(0.10)	(0.34)
TOT						2.098	0.220	2.238	4.118
						(0.26)	(0.03)	(0.29)	(0.62)
DENS							0.001	0.001	0.001
							(1.94)	(1.65)	(1.47)
DRELIEFS								-0.161	-0.180
								(2.33)	(2.99)
INV									0.093
									(4.52)
OPENIND	1.306	0.797	0.567	0.510	0.642	0.722	0.599	0.590	0.448
	(3.39)	(2.04)	(1.46)	(1.33)	(1.63)	(1.89)	(1.58)	(1.61)	(1.41)
Constant	4.549	7.785	11.010	12.244	11.695	12.565	11.532	12.269	12.475
	(2.58)	(3.88)	(5.36)	(4.76)	(4.51)	(4.68)	(4.30)	(4.71)	(5.52)
Obs	86	78	76	75	75	73	73	73	73
Adj R-sq.	0.29	0.37	0.49	0.47	0.47	0.54	0.56	0.59	0.69

Note: Absolute values of t-statistics are in parentheses.

TABLE F.1C

REGRESSIONS EXPLAINING INCOME GROWTH (DEPENDENT VARIABLE: AVERAGE REAL PER CAPITA GDP GROWTH (1960-1989); OPENNESS INDICATOR: DURATION OF PERIOD OF OPENNESS)

Independent Variables	Regression (1C)	(2C)	(3C)	(4C)	(5C)	(6C)	(7C)	(8C)	(9C)
LGDP60	-0.954	-1.063	-1.404	-1.413	-1.431	-1.601	-1.496	-1.519	-1.654
	(4.40)	(4.70)	(6.19)	(5.60)	(5.58)	(5.79)	(5.40)	(5.67)	(6.59)
LSEC60	0.510	0.501	0.522	0.486	0.47[c]	0.611	0.528	0.519	0.516
	(3.77)	(3.50)	(3.87)	(3.55)	(3.41)	(4.14)	(3.48)	(3.54)	(3.80)
GOV		-0.071	-13.194	-12.713	-12.656	-13.611	-12.824	-11.830	-10.144
		(3.17)	(5.04)	(4.85)	(4.80)	(5.23)	(4.95)	(4.65)	(4.22)
INFLAT		-0.002	-0.002	-0.002	0.002	0.001	0.003	0.011	0.010
		(2.26)	(2.28)	(2.21)	(0.26)	(0.17)	(0.37)	(1.30)	(1.23)
REVCOUP			-0.749	-0.588	-0.639	-0.756	-0.637	-0.835	-0.498
			(1.40)	(1.04)	(1.11)	(1.23)	(1.05)	(1.41)	(0.89)
ASSASSIN			-0.245	-0.202	-0.080	0.596	0.675	0.765	0.205
			(0.16)	(0.13)	(0.05)	(0.38)	(0.44)	(0.52)	(0.15)
WARS			-0.041	-0.041	-0.043	-0.062	-0.061	-0.067	-0.056
			(1.39)	(1.41)	(1.45)	(2.04)	(2.04)	(2.31)	(2.06)
POLRIGHT				-0.061	-0.068	-0.073	-0.081	-0.060	-0.050
				(0.60)	(0.66)	(0.69)	(0.78)	(0.60)	(0.54)
INFLATSD					-0.001	-0.001	-0.001	-0.003	-0.003
					(0.51)	(0.41)	(0.60)	(1.48)	(1.42)
TOT						6.111	4.551	5.571	5.433
						(0.86)	(0.65)	(0.82)	(0.86)
DENS							0.001	0.001	0.001
							(1.84)	(1.63)	(1.55)
DRELIEFS								-0.142	-0.160
								(2.32)	(2.83)
INV									0.071
									(3.37)
OPENDUR	0.098	0.085	0.075	0.071	0.073	0.067	0.064	0.059	0.041
	(7.80)	(6.65)	(6.05)	(5.47)	(5.40)	(4.91)	(4.77)	(4.55)	(3.05)
Constant	7.147	9.451	12.291	12.598	12.706	14.014	13.200	13.481	13.288
	(4.90)	(5.59)	(7.20)	(5.99)	(5.97)	(6.14)	(5.78)	(6.10)	(6.50)
Obs	88	80	78	77	77	75	75	75	75
Adj R-sq.	0.54	0.55	0.64	0.62	0.62	0.64	0.65	0.67	0.72

Note: Absolute values of t-st tistics are in parentheses.

TABLE F.1D

REGRESSIONS EXPLAINING INCOME GROWTH (DEPENDENT VARIABLE: AVERAGE REAL PER CAPITA GDP GROWTH (1960-1989); OPENNESS INDICATOR: INTENSITY OF TARIFF PROTECTION)

Independent Variables	Regression (1D)	(2D)	(3D)	(4D)	(5D)	(6D)	(7D)	(8D)	(9D)
LGDP60	-0.639	-0.833	-1.437	-1.620	-1.559	-1.550	-1.414	-1.561	-1.646
	(2.05)	(2.77)	(5.09)	(4.87)	(4.67)	(4.41)	(4.00)	(4.66)	(5.25)
LSEC60	0.926	0.846	0.843	0.755	0.781	0.819	0.703	0.695	0.658
	(4.50)	(3.87)	(4.51)	(4.01)	(4.15)	(4.50)	(3.69)	(3.89)	(3.94)
GOV		-0.110	-17.843	-17.080	-16.966	-17.081	-16.192	-14.359	-11.927
		(3.69)	(5.91)	(5.71)	(5.70)	(6.00)	(5.70)	(5.25)	(4.46)
INFLAT		-0.004	-0.003	-0.003	-0.015	-0.018	-0.015	0.001	0.003
		(3.03)	(2.75)	(2.48)	(1.60)	(1.85)	(1.60)	(0.09)	(0.32)
REVCOUP			-0.562	-0.152	-0.030	-0.204	-0.075	-0.485	-0.267
			(0.89)	(0.23)	(0.05)	(0.30)	(0.11)	(0.74)	(0.43)
ASSASSIN			0.039	0.256	-0.122	-0.050	0.104	0.478	-0.098
			(0.02)	(0.15)	(0.07)	(0.03)	(0.06)	(0.29)	(0.06)
WARS			-0.117	-0.119	-0.112	-0.118	-0.115	-0.122	-0.088
			(3.25)	(3.34)	(3.12)	(3.45)	(3.42)	(3.84)	(2.79)
POLRIGHT				-0.197	-0.149	-0.057	-0.064	-0.061	-0.049
				(1.51)	(1.11)	(0.40)	(0.45)	(0.46)	(0.40)
INFLATSD					0.003	0.004	0.003	-0.001	-0.001
					(1.33)	(1.59)	(1.35)	(0.25)	(0.49)
TOT						-0.007	-1.437	2.734	3.717
						(0.00)	(0.18)	(0.35)	(0.51)
DENS							0.001	0.001	0.001
							(1.76)	(1.43)	(1.38)
DRELIEFS								-0.213	-0.197
								(2.89)	(2.86)
INV									0.075
									(2.99)
TAROF	-0.079	-0.047	-0.055	-0.042	-0.048	-0.062	-0.057	-0.073	-0.029
	(2.06)	(1.32)	(1.83)	(1.36)	(1.55)	(2.07)	(1.94)	(2.57)	(0.98)
Constant	5.795	9.178	13.924	15.887	15.362	15.150	14.037	15.358	14.017
	(2.56)	(3.93)	(6.28)	(5.62)	(5.42)	(5.07)	(4.68)	(5.39)	(5.21)
Obs	75	68	68	67	67	66	66	66	66
Adj R-sq.	0.25	0.37	0.55	0.53	0.54	0.57	0.58	0.63	0.68

Note: Absolute values of t-statistics are in parentheses.

TABLE F.1E

REGRESSIONS EXPLAINING INCOME GROWTH (DEPENDENT VARIABLE: AVERAGE REAL PER CAPITA GDP GROWTH (1960-1989); OPENNESS INDICATOR: INTENSITY OF TARIFF PROTECTION)

Independent Variables	Regression (1E)	(2E)	(3E)	(4E)	(5E)	(6E)	(7E)	(8E)	(9E)
LGDP60	-1.015	-1.427	-1.930	-2.050	-1.950	-2.068	-1.976	-1.934	-1.874
	(2.03)	(3.06)	(4.47)	(4.35)	(3.78)	(4.17)	(4.01)	(4.07)	(3.99)
LSEC60	1.164	1.028	1.086	1.011	1.014	1.072	0.951	0.920	0.872
	(3.94)	(3.91)	(4.86)	(4.50)	(4.46)	(5.08)	(4.25)	(4.25)	(4.05)
GOV		-0.116	-18.573	-17.873	-17.811	-18.017	-17.317	-15.512	-13.964
		(3.48)	(5.49)	(5.30)	(5.22)	(5.73)	(5.53)	(4.89)	(4.23)
INFLAT		-0.003	-0.003	-0.003	-0.008	-0.006	-0.004	0.007	0.005
		(2.59)	(2.46)	(2.22)	(0.73)	(0.58)	(0.39)	(0.60)	(0.45)
REVCOUP			-0.298	-0.062	-0.011	-0.474	-0.339	-0.656	-0.521
			(0.42)	(0.09)	(0.02)	(0.65)	(0.47)	(0.91)	(0.73)
ASSASSIN			0.415	0.735	0.436	0.925	1.189	0.993	0.398
			(0.21)	(0.38)	(0.21)	(0.47)	(0.62)	(0.53)	(0.21)
WARS			-0.096	-0.100	-0.095	-0.090	-0.091	-0.088	-0.071
			(2.44)	(2.54)	(2.29)	(2.34)	(2.41)	(2.41)	(1.87)
POLRIGHT				-0.102	-0.073	-0.022	-0.025	-0.048	-0.005
				(0.66)	(0.44)	(0.14)	(0.16)	(0.31)	(0.03)
INFLATSD					0.001	0.001	0.000	-0.002	-0.002
					(0.51)	(0.34)	(0.17)	(0.78)	(0.62)
TOT						11.234	9.227	13.027	12.268
						(1.21)	(1.00)	(1.42)	(1.36)
DENS							0.001	0.001	0.001
							(1.45)	(1.07)	(0.90)
DRELIEFS								-0.157	-0.161
								(1.85)	(1.92)
INV									0.049
									(1.43)
TARIMP	-21.442	-22.590	-14.760	-12.479	-11.542	-15.115	-11.729	-18.283	-12.112
	(1.43)	(1.70)	(1.27)	(1.06)	(0.96)	(1.35)	(1.04)	(1.60)	(1.00)
Constant	7.799	13.320	16.794	17.968	17.153	17.994	17.102	17.319	15.688
	(2.32)	(3.91)	(5.43)	(4.82)	(4.18)	(4.54)	(4.36)	(4.56)	(4.02)
Obs	49	47	47	46	46	45	45	45	45
Adj R-sq.	0.24	0.44	0.59	0.55	0.55	0.61	0.62	0.65	0.66

Note: Absolute values of t-statistics are in parentheses.

F.2 Investment Regressions

TABLE F.2A
REGRESSIONS EXPLAINING INVESTMENT(DEPENDENT VARIABLE: AVERAGE RATE OF INVESTMENT, RELATIVE TO GDP (1960-1989); OPENNESS INDICATOR: BLACK MARKET PREMIUM)

Independent	Regression							
Variables	(10A)	(11A)	(12A)	(13A)	(14A)	(15A)	(16A)	(17A)
LGDP60	4.041	4.572	3.292	2.507	2.514	2.148	2.487	2.493
	(4.41)	(4.08)	(2.73)	(1.82)	(1.80)	(1.42)	(1.59)	(1.58)
LSEC60	1.269	0.655	0.389	0.292	0.296	0.944	0.683	0.697
	(2.11)	(0.92)	(0.55)	(0.40)	(0.40)	(1.18)	(0.80)	(0.81)
GOV		-0.062	-30.485	-29.854	-29.872	-33.218	-30.579	-31.272
		(0.57)	(2.39)	(2.30)	(2.29)	(2.31)	(2.08)	(2.06)
INFLAT		-0.004	-0.002	-0.002	-0.004	-0.021	-0.015	-0.020
		(0.76)	(0.47)	(0.34)	(0.09)	(0.45)	(0.32)	(0.38)
REVCOUP			-4.740	-3.778	-3.759	-2.966	-2.677	-2.574
			(1.55)	(1.17)	(1.15)	(0.86)	(0.77)	(0.73)
ASSASSIN			4.785	5.033	4.965	6.477	6.808	6.768
			(0.57)	(0.59)	(0.57)	(0.74)	(0.78)	(0.77)
WARS			-0.220	-0.225	-0.224	-0.351	-0.340	-0.339
			(1.40)	(1.42)	(1.39)	(2.11)	(2.04)	(2.02)
POLRIGHT				-0.579	-0.575	-0.412	-0.399	-0.419
				(1.12)	(1.09)	(0.74)	(0.71)	(0.73)
INFLATSD					0.001	0.005	0.003	0.004
					(0.05)	(0.41)	(0.28)	(0.34)
TOT						-14.436	-17.995	-18.352
						(0.38)	(0.46)	(0.47)
DENS							0.003	0.003
							(0.87)	(0.88)
DRELIEFS								0.076
								(0.21)
BMP	-1.722	-1.503	-0.744	-0.635	-0.625	-0.303	-0.371	-0.351
	(1.89)	(1.52)	(0.66)	(0.56)	(0.54)	(0.26)	(0.32)	(0.30)
Constant	-14.406	-16.102	-3.481	4.397	4.341	5.810	2.975	2.934
	(2.29)	(1.87)	(0.38)	(0.39)	(0.38)	(0.47)	(0.23)	(0.23)
Obs	97	86	84	83	83	79	79	79
Adj R-sq.	0.44	0.40	0.45	0.45	0.44	0.46	0.45	0.45

Note: Absolute values of t-statistics are in parentheses.

TABLE F.2B

REGRESSIONS EXPLAINING INVESTMENT (DEPENDENT VARIABLE: AVERAGE RATE OF INVESTMENT, RELATIVE TO GDP (1960-1989); OPENNESS INDICATOR: DUMMY VARIABLE FOR OPENNESS)

Independent Variables	Regression (10B)	(11B)	(12B)	(13B)	(14B)	(15B)	(16B)	(17B)
LGDP60	4.246	4.776	3.490	2.857	2.927	2.629	2.878	2.985
	(4.09)	(3.94)	(2.72)	(1.90)	(1.91)	(1.59)	(1.69)	(1.73)
LSEC60	1.094	0.230	0.049	-0.011	0.008	0.592	0.409	0.423
	(1.71)	(0.30)	(0.07)	(0.01)	(0.01)	(0.70)	(0.46)	(0.47)
GOV		-0.127	-31.617	-31.519	-31.160	-31.946	-30.491	-32.144
		(1.05)	(2.37)	(2.32)	(2.28)	(2.08)	(1.95)	(2.01)
INFLAT		-0.004	-0.002	-0.002	-0.019	-0.037	-0.032	-0.046
		(0.77)	(0.43)	(0.33)	(0.40)	(0.75)	(0.63)	(0.80)
REVCOUP			-4.862	-4.159	-3.992	-3.176	-2.879	-2.487
			(1.59)	(1.28)	(1.21)	(0.89)	(0.80)	(0.67)
ASSASSIN			4.113	4.379	3.820	5.184	5.498	5.278
			(0.48)	(0.50)	(0.43)	(0.57)	(0.61)	(0.58)
WARS			-0.175	-0.185	-0.[illegible]8	-0.269	-0.270	-0.264
			(1.03)	(1.08)	(0.9[illegible])	(1.45)	(1.45)	(1.40)
POLRIGHT				-0.444	-0.389	-0.177	-0.192	-0.210
				(0.76)	(0.64)	(0.28)	(0.30)	(0.32)
INFLATSD					0.004	0.009	0.007	0.011
					(0.37)	(0.72)	(0.60)	(0.77)
TOT						-14.374	-17.811	-20.325
						(0.35)	(0.43)	(0.48)
DENS							0.002	0.003
							(0.67)	(0.74)
DRELIEFS								0.201
								(0.53)
OPENIND	1.719	1.280	1.309	1.167	1.336	1.747	1.521	1.533
	(1.13)	(0.75)	(0.75)	(0.66)	(0.73)	(0.89)	(0.76)	(0.76)
Constant	-17.470	-17.291	-5.615	0.814	0.069	0.585	-1.305	-2.224
	(2.52)	(1.90)	(0.58)	(0.07)	(0.01)	(0.04)	(0.09)	(0.16)
Obs	89	79	77	76	76	73	73	73
Adj R-sq.	0.43	0.41	0.45	0.45	0.44	0.46	0.45	0.45

Note: Absolute values of t-statistics are in parentheses.

TABLE F.2C

REGRESSIONS EXPLAINING INVESTMENT (DEPENDENT VARIABLE: AVERAGE RATE OF INVESTMENT, RELATIVE TO GDP (1960-1989); OPENNESS INDICATOR: DURATION OF PERIOD OF OPENNESS)

Independent Variables	Regression (10C)	(11C)	(12C)	(13C)	(14C)	(15C)	(16C)	(17C)
LGDP60	2.999	3.435	2.459	2.277	2.089	1.726	1.851	1.894
	(3.25)	(3.13)	(2.18)	(1.77)	(1.61)	(1.19)	(1.24)	(1.26)
LSEC60	0.588	-0.073	-0.314	-0.253	-0.359	0.124	0.025	0.041
	(1.01)	(0.11)	(0.47)	(0.37)	(0.51)	(0.16)	(0.03)	(0.05)
GOV		-0.018	-20.545	-21.512	-21.051	-22.765	-21.831	-23.662
		(0.18)	(1.70)	(1.75)	(1.72)	(1.66)	(1.56)	(1.66)
INFLAT		-0.001	0.000	0.000	0.042	0.033	0.035	0.019
		(0.16)	(0.02)	(0.02)	(1.03)	(0.74)	(0.77)	(0.39)
REVCOUP			-4.838	-4.946	-5.472	-5.239	-5.097	-4.731
			(1.80)	(1.72)	(1.87)	(1.62)	(1.56)	(1.43)
ASSASSIN			5.079	5.022	6.283	7.920	8.014	7.849
			(0.66)	(0.65)	(0.80)	(0.97)	(0.98)	(0.95)
WARS			-0.064	-0.066	-0.081	-0.171	-0.169	-0.158
			(0.43)	(0.44)	(0.54)	(1.06)	(1.05)	(0.97)
POLRIGHT				-0.026	-0.090	-0.087	-0.097	-0.136
				(0.05)	(0.17)	(0.16)	(0.17)	(0.24)
INFLATSD					-0.010	-0.008	-0.008	-0.005
					(1.03)	(0.75)	(0.78)	(0.42)
TOT						5.674	3.822	1.944
						(0.15)	(0.10)	(0.05)
DENS							0.001	0.002
							(0.41)	(0.49)
DRELIEFS								0.261
								(0.76)
OPENDUR	0.266	0.270	0.265	0.270	0.287	0.259	0.255	0.263
	(4.76)	(4.33)	(4.25)	(4.08)	(4.21)	(3.63)	(3.54)	(3.60)
Constant	-9.277	-11.141	-1.113	0.362	1.503	4.187	3.220	2.702
	(1.49)	(1.37)	(0.13)	(0.03)	(0.14)	(0.35)	(0.26)	(0.22)
Obs	91	81	79	78	78	75	75	75
Adj R-sq.	0.54	0.51	0.56	0.56	0.56	0.55	0.54	0.54

Note: Absolute values of t-statistics are in parentheses.

TABLE F.2D

REGRESSIONS EXPLAINING INVESTMENT (DEPENDENT VARIABLE: AVERAGE RATE OF INVESTMENT, RELATIVE TO GDP (1960-1989); OPENNESS INDICATOR: INTENSITY OF TARIFF PROTECTION)

Independent	Regression							
Variables	(10D)	(11D)	(12D)	(13D)	(14D)	(15D)	(16D)	(17D)
LGDP60	3.305	3.838	1.844	0.605	0.746	1.099	1.277	1.130
	(3.15)	(3.12)	(1.47)	(0.40)	(0.49)	(0.67)	(0.76)	(0.66)
LSEC60	1.858	0.816	0.575	0.584	0.642	0.656	0.504	0.496
	(2.69)	(0.92)	(0.70)	(0.70)	(0.76)	(0.77)	(0.55)	(0.54)
GOV		-0.118	-37.020	-38.395	-38.145	-35.371	-34.207	-32.381
		(1.03)	(3.00)	(3.11)	(3.07)	(2.67)	(2.52)	(2.30)
INFLAT		-0.006	-0.003	-0.002	-0.030	-0.049	-0.046	-0.030
		(1.17)	(0.58)	(0.41)	(0.71)	(1.09)	(1.00)	(0.55)
REVCOUP			-3.704	-2.634	-2.354	-2.661	-2.492	-2.900
			(1.31)	(0.87)	(0.77)	(0.83)	(0.76)	(0.86)
ASSASSIN			8.025	8.828	7.960	7.096	7.299	7.672
			(1.01)	(1.11)	(0.98)	(0.87)	(0.88)	(0.92)
WARS			-0.399	-0.432	-0.415	-0.444	-0.440	-0.446
			(2.49)	(2.69)	(2.54)	(2.78)	(2.73)	(2.74)
POLRIGHT				-0.694	-0.584	-0.148	-0.158	-0.155
				(1.19)	(0.96)	(0.22)	(0.24)	(0.23)
INFLATSD					0.007	0.011	0.011	0.007
					(0.67)	(1.05)	(0.96)	(0.53)
TOT						-15.379	-17.251	-13.095
						(0.40)	(0.44)	(0.33)
DENS							0.002	0.001
							(0.48)	(0.39)
DRELIEFS								-0.213
								(0.56)
TAROP	-0.461	-0.457	-0.479	-0.478	-0.492	-0.564	-0.558	-0.573
	(3.41)	(3.15)	(3.58)	(3.49)	(3.53)	(4.04)	(3.95)	(3.96)
Constant	-7.792	-7.667	10.720	22.552	21.346	17.992	16.534	17.851
	(1.02)	(0.80)	(1.09)	(1.77)	(1.65)	(1.29)	(1.15)	(1.22)
Obs	78	69	69	68	68	66	66	66
Adj R-sq.	0.50	0.49	0.56	0.57	0.57	0.57	0.57	0.56

Note: Absolute values of t-statistics are in parentheses.

TABLE F.2E

REGRESSIONS EXPLAINING INVESTMENT (DEPENDENT VARIABLE: AVERAGE RATE OF INVESTMENT, RELATIVE TO GDP (1960-1989); OPENNESS INDICATOR: INTENSITY OF TARIFF PROTECTION)

Independent	Regression							
Variables	(10E)	(11E)	(12E)	(13E)	(14E)	(15E)	(16E)	(17E)
LGDP60	2.563	2.501	0.596	-0.625	-1.327	-1.418	-1.200	-1.218
	(1.60)	(1.37)	(0.32)	(0.30)	(0.58)	(0.60)	(0.50)	(0.50)
LSEC60	1.640	1.294	1.205	1.200	1.185	1.233	0.947	0.960
	(1.71)	(1.27)	(1.25)	(1.22)	(1.20)	(1.23)	(0.87)	(0.86)
GOV		-0.112	-34.399	-34.290	-35.017	-32.358	-30.702	-31.465
		(0.91)	(2.54)	(2.52)	(2.56)	(2.16)	(2.01)	(1.93)
INFLAT		-0.005	-0.002	-0.002	0.036	0.037	0.042	0.037
		(0.94)	(0.49)	(0.30)	(0.75)	(0.73)	(0.81)	(0.61)
REVCOUP			-2.679	-1.658	-2.003	-3.204	-2.883	-2.749
			(0.87)	(0.51)	(0.61)	(0.92)	(0.82)	(0.74)
ASSASSIN			8.012	8.776	10.881	11.402	12.026	12.109
			(0.92)	(1.00)	(1.18)	(1.22)	(1.27)	(1.26)
WARS			-0.266	-0.313	-0.352	-0.344	-0.347	-0.348
			(1.54)	(1.77)	(1.91)	(1.87)	(1.87)	(1.85)
POLRIGHT				-0.861	-1.054	-0.887	-0.894	-0.885
				(1.26)	(1.45)	(1.16)	(1.16)	(1.12)
INFLATSD					-0.009	-0.009	-0.011	-0.009
					(0.79)	(0.77)	(0.84)	(0.64)
TOT						21.770	17.024	15.419
						(0.49)	(0.38)	(0.33)
DENS							0.003	0.003
							(0.70)	(0.71)
DRELIEFS								0.066
								(0.15)
TARIMP	-118.356	-122.796	-99.920	-114.302	-120.295	-136.262	-128.255	-125.488
	(2.40)	(2.38)	(1.99)	(2.20)	(2.28)	(2.55)	(2.33)	(2.13)
Constant	-3.262	0.235	16.078	28.845	34.501	35.208	33.240	33.173
	(0.31)	(0.02)	(1.20)	(1.73)	(1.89)	(1.87)	(1.73)	(1.70)
Obs	51	48	48	47	47	45	45	45
Adj R-sq.	0.26	0.24	0.31	0.31	0.30	0.29	0.28	0.25

Note: Absolute values of t-statistics are in parentheses.

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