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THE FORGOTTEN RATIONALE FOR POLICY REFORMS: THE PRODUCTIVITY OF INVESTMENT PROJECTS

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THE FORGOTTEN RATIONALE FOR POLICY REFORM:

THE PRODUCTIVITY OF INVESTMENT PROJECTS*

Jonathan Isham and Daniel Kaufmann

Using economic rates of return from World Bank-funded investments, we investigate how country characteristics and policies that influence aggregate performance affect investment productivity. Controlling for other characteristics, countries with undistorted (distorted) macroeconomic, exchange rate, trade and pricing policies have highly productive (unproductive) investments. No type of project--in tradable or non-tradable sectors--can be "insulated" from poor policies, where returns on investments are about ten percentage points lower. Productivity increases when policies improve within a country. Projects are also affected, non-linearly, by the size of the public investment program where policies are undistorted. The results offer new evidence on benefits from policy reform and challenge conventional cost-benefit analysis.

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I. Introduction

The last four decades of developing country experience should persuade: policies do matter for economic growth. Since 1960, the most successful economies have tended to maintain undistorted domestic prices, a stable macroeconomic framework, open trade regimes, and steady investments in people and selected public investments [World Bank 1991].

While pointing in one direction, this experience leaves plenty of room for interpretation among policy makers and scholars over the relative importance of other country characteristics and economic policies, the evidence on causality, and the types of policies that matter most [Summers and Pritchett 1993]. Because of endogeneity concerns, a common conclusion from the empirical evidence on aggregate performance is that 'policies matter', but the relative importance of policies is not well known [Temple 1998].[1]

In many ways, the lively ongoing debate on the possible sources of economic growth has obscured one of the key rationales for policy reform: increasing investment productivity. The aggregate performance of publicly- and privately-financed investment projects--along with the performance of firms, farms, and private entrepreneurs--will over the long-term determine a country's growth rate. Insofar as project investment performance is a contributor to economic growth, the effect of the policy environment on project performance suggests the overall importance of policy reform.

In this paper, we use data on economic rates of return (ERRs) from a set of 1,276 public and private investment projects to present new evidence on the importance of the policy environment for

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[1] Theoretical and empirical analyses that specify channels through which national policies may affect long-run growth rates [e.g., Lucas 1988; Romer 1986, 1990; Barro 1990, 1991; King and Rebelo 1990; and Mankiw, Romer, and Weil 1992] are often contradictory as well as econometrically inconclusive [Levine and Renelt 1992, Fagerberg 1994].

the productivity of investment projects. This unique data set has a number of advantages. It has a wide coverage across countries and over time; the indicator of investment performance at the project level was calculated according to a relatively uniform methodology; and it measures productivity from an economic standpoint. Most importantly, by using a microeconomic unit of observation as the dependent variable, the potential problem of reverse causality prevalent in the empirical growth literature is absent. Consequently, these data, along with selected case studies, provide insights on how policies that produce poor aggregate performance affect returns to investment at the micro level--insights that are lost in aggregate statistical analysis.

The approach of this paper is as follows. Section II presents three case studies that illustrate the linkage between the policy environment and investment productivity. Section III discusses the selection of these projects and suggests a framework for how country characteristics and policies that produce poor aggregate performance may reduce project productivity. Section IV summarizes the available data and presents two summary tables that illustrate the correlations between policies and investment productivity across different sectors. Section V formally examines to what degree the policies that matter for economic growth affect investment returns, controlling for other country characteristics, and addresses the potential problem of sample selection bias. Section VI provides new evidence about the effect of changes in policies. Section VII investigates the effects of public investment on the productivity of investment projects, emphasizing the differential effects of the public investment program in settings with undistorted policies. Section VIII concludes with a discussion on the implications of these results.

II. Case Studies: Illustrations of the policy-investment productivity nexus

The following examples illustrate how investment projects will tend to perform poorly when market incentives are inappropriate and when complementary public investments are absent. By contrast, competitive domestic environments allow investments--in the hands of resourceful managers and entrepreneurs--to thrive.

- In 1973, the Jamaican government launched two development projects: construction of rural infrastructure and rehabilitation of the main (publicly owned) sugar refining factories. An overvalued exchange rate and a restrictive trade regime during most of the 1970s--including import and price controls as well as licensing and marketing restrictions--led to critical shortages in imported inputs. Only a fraction of the planned feeder roads were completed because of shortage of trucks and spare parts; the design and execution of a water supply system was delayed because of a lack of equipment (compounded by the absence of qualified project personnel). Private investment in the sugar industry was crowded out by growing public ownership and operation of the sugarcane industry. Supply of sugarcane declined due to ineffective public cooperatives and mandated low producer prices. Production of sugar halved: the efficiency of the sugar processing factories deteriorated because of equipment shortages as well as lack of maintenance and poor management.

- During the late 1970s, a multi-million dollar investment in a private meat production company in Sudan was designed to process cattle for export and local consumption. The firm planned to purchase 40,000 head of cattle per year and export 80 percent of production. Export demand did not materialize because of an overvalued currency. The firm's potential revenues were

further lowered by the introduction of export taxes. Domestic sales were subject to newly introduced price controls--although the firm paid market-clearing prices for non-regulated inputs. The firm tried to circumvent wholesale price restrictions by setting up its own retail shops, but the required licenses were never granted. Inappropriate incentives were compounded by inadequate public services: the state-owned electricity company was unable to meet production requirements. The firm purchased a standby generator, but it was unable to purchase enough diesel fuel due to the very limited administrative allocation of foreign exchange. Purchases of cattle for processing never reached 10 percent of capacity, and the firm made steady losses until it closed in the early 1980s.

- In the late 1970s, Tomás Gómez produced leather shoes in two rooms in Santiago, Chile. At the time, internal competition in the industry was fierce, so he had to concentrate on efficient production and domestic marketing; the overvalued exchange rate and the high tariffs on competing imports discouraged the export of shoes. Following the external trade liberalization of the early 1980s, potential importers who visited his shop were impressed by his quality and cost. Mr. Gómez secured orders and devoted 20 percent of his shoe production to exports. He grew rapidly and efficiently, fulfilling increasingly larger export orders. By 1991 he exported 80 percent of his production at $2.5 million equivalent per year, almost one-tenth of overall Chilean exports of shoes. And he employed 350 workers in a large and modern factory.[2]

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[2] Industry and economywide studies of the Chilean economy mirror Gómez' experience [Liu 1993]. Following the adaptation of far-reaching macroeconomic and trade reforms, the average productivity of manufacturing firms increased as inefficient firms exited, more efficient firms entered, and surviving firms increased their productivity.

III. A Framework for the policy-investment productivity nexus

A. The "Investor's" Decision-Making Function

How can the causal mechanisms suggested by these case studies--from economy-wide policies to investment productivity--be tested with data from public and private investment projects financed by the World Bank Group? To answer this, first we need to understand the decision-making process of the investor, since only under certain conditions may the data at hand provide an empirical test for the effects of economic policies on investment productivity. Indeed, if the World Bank were a risk-neutral maximizer of investment payoffs, we would expect that the rates of return to private and public investments that it finances would be uncorrelated with any information that is known *ex ante*: at the margin, expected returns across countries would be equalized.

However, the World Bank is by no means a typical commercial bank: financial profit maximization is not its most important objective. The World Bank Group, a cooperative institution with 182 member governments as shareholders, pursues objectives consistent with socio-economic development in its client countries, the emerging and transition economies. Accordingly, the World Bank has financed investments across sectors in almost every country in the developing world. A justification of "horizontal equity" has often been used to justify a modicum of lending to countries with a poor policy environment; in such cases, the value of a continued "client relationship and dialogue" has also been emphasized. The existence of a sizeable number of investment projects in settings with poor economy-wide policies provide a source of *ex ante* cross-country (and across time) variance in the expected returns to investments. Since the recipient countries of World Bank-funded investments not only have different policy environments but also significant variations in other country characteristics, *ex ante* rates of return do vary.

Furthermore, variance in policy and project performance may arise because unanticipated changes in the policy environment often occur during the five to eight years that typically elapse from project appraisal to project completion. This additional source of variance, in *ex post* economic rates of return, can be tested against the different quality in the policy environment even if the *ex ante* rates of return and policy environment had been similar at "entry".

Thus, this dual combination--of the Word Bank's objective to lend throughout the developing world and the fact that unanticipated changes in policy and investment performance do occur-- allow us to test whether *ex post* economic rates of return of investment projects are associated with country characteristics and policies which affect aggregate performance.

B. How country characteristics and policies may affect investment productivity

Let us first consider selected country characteristics that are the cornerstones of so-called 'old' and 'new' growth theories and of recent cross-country empirical studies: levels of physical capital, labor supply, and human capital [Solow 1956; Barro 1991; Mankiw, Rower and Weil 1992]; terms of trade shocks [Easterly, Kremer, Pritchett and Summers 1993]; and political and social institutions [Knack and Keefer 1995, 1997; Temple and Johnson 1998; Rodrik 1997, 1998]. First, because of decreasing marginal returns, one would expect these rates of return to investment projects to be negatively associated with the economy-wide capital-labor ratio. Second, controlling for the economy-wide capita-labor ratio, one might expect the rates of return to be increasing in levels of human capital.[3] Third, external shocks might affect average investment productivity through terms of trade changes. Fourth, countrywide 'rules of the game' that improve the transparency and

[3] We note here that the empirical evidence from cross-country growth regressions on the effect of human capital is ambiguous, as shown in Pritchett (1997).

accountability of economic transactions should improve the overall returns to investment.

More fundamentally for our inquiry, how might the economy-wide policies that influence aggregate performance [Easterly and Rebelo 1993; Fischer 1993; Sachs and Warner 1995] affect the performance of these investments? Let us first briefly consider the various stages of investment execution. Distorted economy-wide policies are hypothesized to affect project performance from the design stage until the project is fully completed and operating. Specifically, poor economic policies adversely affect investments at three crucial stages: i) during project identification and preparation, through the wrong choice of output and scale--and of types of inputs and capital, including import and capital/labor intensities; ii) during project implementation, through restricted access and higher costs of inputs and capital investments; and, iii) during the project's operational life, through lower-than-anticipated demand for output as well as constrained access and higher costs of working capital and foreign exchange for inputs.[4]

It is helpful to synthesize these operational mechanisms which are at play during the various stages of project implementation into a simple dual distinction. *A priori*, therefore, we suggest that the linkage between country-wide policies and microeconomic productivity (as measured by project-level ERRs) operates through two channels: distortion of output choice and underutilization of capacity.

First, the *choice of output* is more likely to be incorrect when significant distortions are present. Consider an agriculture project, for example. Inappropriate (low) pricing signals and/or lack of actual demand for rural produce that would require transportation via feeder roads would

[4] For a presentation of the myriad of operational mechanisms whereby economic policies affect the execution of projects in the social sectors, see Kaufmann and Wang [1995].

make it likely that the wrong two-lane trunk road is selected for construction instead. By contrast, a solid policy framework, with appropriate agricultural incentives, would promote the selection of a rural feeder road that meets market demand and is economically productive. The likelihood of inappropriate investment output selection is compounded in economies where administrative controls in the distribution of inputs and capital goods (and/or relative price distortions in input costs) are prevalent.

Administrative controls and relative price distortions on inputs and capital goods can, *inter alia*, also affect *capacity utilization* of the project. This is the second channel through which distortions can affect ERRs: compared with the optimum attainable output capacity *ex ante*, such distortions during project execution can result in a lower-than-anticipated project capacity once project execution is completed. Further, the subsequent utilization of such (lower-than-designed) actual project capacity may also be lower, due to higher than anticipated costs of (or restricted access to) inputs or working capital, as well as shortfalls in effective demand. The notion advanced here departs from the neoclassical assumption of full employment and output: adjustment to economy-wide distortions at the project level may well take place on the quantity axis, and not merely on the price axis.

While there is no systematic data base on project level capacity utilization for World Bank projects, many *ex post* evaluation reports of unsuccessful projects--including the first two case studies presented above--do suggest a link between poor policies and capacity underutilization. Rigorous project evaluation methodologies do take into account the differences between socio-

economic and financial prices[5] on projects' net present values and ERRs [Little and Mirrlees 1991]. But these standard shadow price adjustments are akin to Y-efficiency corrections--i.e., accounting for the first mechanism described above, namely distorted output choice which is equivalent to a movement *along* the production possibility frontier (PPF). Implicit in this methodology is the neoclassical assumption of 'full' output, where the emphasis is placed on the 'wrong' choice of output for a project, resulting in a lower-than-anticipated social value.

However, the reductions of output illustrated in the first two case studies and in the second mechanism presented above are consistent with X-efficiency losses instead--i.e., an inward movement *within* the PPF associated with underutilization of project capacity, and not a movement *along* the PPF. In such cases, distorted incentives and a weak public investment program directly affect project performance by reducing output rather than by affecting output choice. Thus, even if correct shadow prices on had been used in the *ex ante* calculation of ERRs, the likelihood of underutilization of capacity in project execution would have underplayed.

These are the mechanisms whereby economic policies may affect project performance. As indicated, there is no readily available direct data on project-level capacity utilization or prices for a large number of projects. Yet the empirical variations in economic rates of returns across many projects, combined with the particular selection process for World Bank investments, permit us to use microeconomic performance data to compare how selected country characteristics and policies do affect investment productivity.

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[5] For example, in adjusting between actual and shadow exchange and interest rates, formal and informal (opportunity cost) wages, administrative and border prices, and in netting taxes and other transfers.

IV. Data and Basic Statistical Results

A. Project data

From the World Bank's Operations Evaluation Department (OED) and the evaluation unit of the International Financial Corporation (IFC), we assembled a data set of public and private sector projects in 61 developing countries, implemented from the late 1960's into the early 1990's. The data include reestimated economic rates of return (ERRs)--as well as other project specific information[6]--from 1,163 investment projects financed by the Bank and implemented by public agencies in developing countries and from 113 private projects financed by the IFC. The analysis in this paper includes all projects in tradeable sectors--agriculture, industry, and tourism--and non-tradeable sectors--transport, infrastructure, energy, water, and urban--for which such ERRs have been calculated and for which a minimum set of country-specific policy indices was available.[7]

The re-estimated ERR of each project is measured via the World Bank's cost-benefit methodology, about two-to-three years after the completion of World Bank funding for project implementation. It makes use of actual data on costs incurred during project implementation as well as recurrent costs and benefits that have already taken place, as well as projections for future streams of costs and benefits. According to this methodology, the discounted stream of project costs and benefits is evaluated at shadow (or border) prices. Given these adjustments, the rates of return do

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[6] For an analysis on the divergence between *ex ante* and *ex post* ERRs, see Pohl and Mihaljek [1992].

[7] Kaufmann and Wang [1995] examine the performance of social sector projects--which receive a binary 'satisfactory/unsatisfactory' rating from the Operations Evaluation Department but no ERR--as the dependent variable in a Probit specification. They find that the probability of project failure in the social sectors is also positively and significantly associated with policy distortion indicators such as the fiscal deficit, the foreign exchange parallel market premium, and the degree of price distortions.

differ somewhat from the financial rates of return that a private investor would calculate. Table I presents the summary statistics, including the number of countries and periods covered for each variable.

B. Data on Country characteristics and policy performance.

Indices of country characteristics and policy performance were gathered from independent sources (also summarized in Table I: see the appendix for detailed descriptions of the data sources). Country characteristic data incorporated into this analysis--based on the framework discussed above--include the capital/labor ratio, years of education, terms of trade changes; and a set of institutional indicators.[8]

The policy indices used in this analysis were: *black market premium* (the average annual mark-up of the parallel market rate for foreign exchange over the official exchange rate); *fiscal deficit of the central government as a share of GDP; index of trade restrictiveness* (based upon specific policy criteria such as tariffs and non-tariff barriers); *index of pricing distortions in tradable goods* (measuring the deviation of the domestic price levels from international price equivalencies for final tradable goods); and *real interest rate.*

Quantifying macroeconomic and trade regimes can be a delicate and inconclusive exercise [Rodrik 1994, Pritchett 1996]. Separately and together, however, these five indicators do capture major policy distortions in each economy. The black market premium reflects distortions in the trade, pricing, and exchange rate regime, as well as macroeconomic instability and capital account restrictions [Barro and Sala-i-Martin 1995; Dornsbush 1990; Kaufmann and O'Connell 1997]; the fiscal deficit is an indicator of macroeconomic instability.

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[8] In addition, GDP growth and the degree of project complexity--as discussed below--are also incorporated into our econometric framework.

C. Basic Evidence: Economic Policies and Average ERRs

Average ERRs, disaggregated by sector (within the larger public sector data set) and type of policy distortion, are presented in Table II. The differences between investment efficiency in undistorted and a distorted policy environments can be very large. The (Pearson) correlation coefficients between the policy index and ERRs (not shown) are highly significant, with very few exceptions (for example, the relationship between the real interest rate and the ERR of projects in non-tradeables).

In most cases, when classifying by a single policy distortion indicator, average ERRs of projects implemented under a distorted policy regime are at least five percentage points lower than those of projects implemented under an undistorted regime. In addition, each of the five policy distortion indices appears to be significantly associated with performance across the various sectors--although to different degrees. Further, the sensitivity of public sector projects to policy distortions is at least as significant as for private sector projects[9]. And we underscore that the large reported differences in ERRs between distorted and undistorted policy regimes may even be underestimated when using these averages: the standard evaluation methodology at the World Bank and the IFC

[9] Recognizing that different distortion measures do reflect partly overlapping policy distortions, the types of policy variable combinations was circumscribed to those where indices measured different types of distortions--thus, for instance, indices of trade openness and of distortions in the price of tradeables are not introduced simultaneously, and neither is the fiscal deficit and the real interest rate. Note that these reestimated ERRs are not a true *ex post* rate of return: the stream of project benefits is only flowing for a few years by the time the calculation of a reestimated rate of return is performed. We conducted an analysis of possible measurement bias with the available subsample of seventy public projects with true *ex post* evaluations, which had been undertaken five-to-eight years after project completion. The reestimated ERR and the ex post ERR were found to be very highly correlated(r = .9), yet the average *ex post* ERR.--11 to 12 percent-- was 3-to-4 percentage points below the average reestimated ERR. Since the *ex post* ERR is a better approximation of the true economic value of the project, this suggests that, on average, a project implemented in a distorted policy framework will have a true ERR lower than 10 percent.

assigns any project with an ERR below -5 percent a value of exactly -5 percent. About 13 percent of all observations in this data set have ERRs with this value, and they tend to be relatively more concentrated in settings with poor policies.

A country that mismanages its exchange rate is also likely to exhibit macroeconomic instability as well as trade and pricing distortions: it is therefore relevant to assess the *combined* effect of policy distortions on ERRs. Average ERRs, disaggregated by various combinations of policy distortions, are presented in table III.[10] Multiple policy distortions, when compared with an undistorted policy environment, can make a difference of over 10 percentage points. These large differences between investment efficiency in undistorted and distorted environments (measured through multiple indicators, as compared with the effect of single indicators) suggest independent contributions by different types of distortions.

V. The Controlled Effect of Economic Policies on Investment Returns

A. Specifications with other country characteristics and policy variables.

The significant differences in average ERRs under different economic policies presented in Table II do not control for other country characteristics. These correlations between policies and investment performance could reflect the effects of other country characteristics which are correlated with the policies being considered. In order to account for these other potential determinants of investment productivity and to explore the relative importance of policies, a set of multivariate econometric specifications was estimated. As explained above, the ERR data are censored at -5 percent, so the Tobit procedure is required to generate consistent estimates.

We first tested ten econometric specifications: a pair for each of the five policy variables.

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In addition to one of the five policy indicators, the first specification in each pair includes years of education and terms of trade changes and a dummy variable for the degree of institutional complexity of the project (for subsectors regarded by evaluation units as more complex, such as integrated rural projects). The second specification in each pair adds the economy-wide capital/labor ratio and the average rate of GDP growth during the three years prior to project completion (to control for overall economy-wide dynamism). Since policies may affect capital intensity and overall GDP growth of an economy, the estimated policy coefficients in these specifications indicate the direct impact of policies on ERRs, net of the indirect impact of policies through capital intensity and GDP growth.[11]

The econometric results are presented in Table IV. First, what is the effect of other country characteristics? Across specifications, the capital/labor intensity significantly affects ERRs in the expected direction. More complex projects are also significantly less productive.[12] Neither years of education nor terms of trade changes have a significant, substantial impact.[13] We also tested (not shown here) a large set of country-level institutional indicators (for example, from Knack and Keefer [1995] and Mauro [1995]): among these, only country-wide civil-liberties

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[11] When policies affect both the capital/labor ratio and GDP growth, the estimates on policy variables will tend to be overestimated in the first of each pair of specifications in Table IV and underestimated in the second. More precisely, let the set of equations for determining ERRs be:

$ERRS = \beta^*Pi + \delta^*Xi + \alpha^*Zi + \varepsilon i;$

$Zi = \gamma^*Pi + \upsilon i$

where P = policy variables, X = exogenous country- and project-specific inputs, and Z = capital/labor ratio and GDP growth. The estimate of the direct impact of policies (β) will be overestimated when Z is omitted; the direct and indirect impact of policies when Z is included is $\beta+\alpha^*\gamma$.

[12] This evidence is consistent with Blanchard and Kremer [1997], who find that an index of sectoral complexity is negatively and significantly associated with output growth.

[13] We find the same results on education using the *World Development Report 1991* data (see appendix) and the education series developed by Barro and Lee [1993]. But a sample selection bias may be at play, since Bank/IFC projects in countries with lower skill levels may tend to compensate by allocating additional World Bank staff and external consultants in sectoral analysis [World Bank 1995] and in project design and supervision.

systematically affect project performance [Isham, Kaufmann, and Pritchett 1997].[14]

When controlling for these other country characteristics, the results in Table IV suggest that policies are critical determinants of project performance. Relatively large changes in single policy indices are associated with statistically significant differences in ERRs from 3-to-7 percentage points. Based on the coefficients on each of the indices, specific policy changes are associated with increases of average ERRs as follows. Lowering the black market premiums from 120 percent to 20 percent is associated with an ERR increase of over 5 percentage points[15]; moving from a very restrictive trade regime (rated as a 1) to a fairly open one (4) is associated with an ERR increase of about 7 percentage points. A difference in the fiscal deficit (as a share of GDP) of eight percentage points--for example, between 2 and 10 percent of GDP--is associated with an ERR increase of almost 3 percentage points. A large difference in the index of distortion of tradable is associated with an ERR increase of about 3 percentage points. And a dummy variable for a positive vs. negative real interest rate is associated with an ERR increase of 1.3-2.4 percentage points (significant in only the first specification of the pair).

If different economic policies have an independent contribution to investment productivity,

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[14] Tables showing the econometric results with these institutional variables are available from authors. See Isham, Kaufmann, and Pritchett [1997] for a detailed discussion of the effects of civil liberties on project performance. In addition, based on the suggestion of an anonymous referee, we verified that inflation is not significant in these specifications and does not alter the basic results.

[15] Three econometric notes. First, unless otherwise noted, all continuous independent variables in these and subsequent specifications are three-year averages, including the ERR evaluation year and the two previous years. Alternative specifications with evaluation year data do not alter the results. Second, the parallel rate premia variable in all specifications is linear up to a premia of 500 percent. To prevent outliers from driving the results, higher values are equated to 500 percent plus a logarithmic transformation of the difference between the real value and 500 percent. Equally robust results were estimated from alternative specifications with different transformations of the black market premia, including: (i) any value above 200 percent equaled to 200 percent; (ii) truncating sample for values higher than 200 percent; and (iii) any value above 500 percent equaled to 500 percent. Third, in order to maintain the same sample size across specifications, we imputed the variable means for missing values of trade openness and tradable price distortions and then included a 'missing variable' dummy for each of these series. This procedure produces consistent estimates for these variables without throwing away observations.

the overall impact of policy distortions would be underestimated in the single-policy specifications in Table IV. We thus introduce a number of policy variables simultaneously into a multivariate policy specification; this can also suggest which policy indices dominate in their impact on ERRs.

These results are presented in Table V. With the exception of the real interest rate dummy, policy indices appear to have a significant independent (and additive) effect. For example, in estimations including the capital/labor ratio and GDP growth as independent control variables, a one hundred percentage point reduction in the black market premium coupled with a moderate opening up in the trade regime (e.g., from 1 to 3 or from 2 to 4) is associated with an improvement in ERRs of 9 percentage points, holding other factors constant. These estimated magnitudes are not altered when country fixed effects are included in the specification as additional controls (capturing other country-specific conditions, see column 2). The combination of fiscal deficit and trade variables (columns 3 and 4) also suggest significant and independent effects, although the implied effects of the changes in the policy parameters are not as large: ERRs of about 5-6 percentage points higher are associated with substantial policy changes in this combination[16].

B. Possible Sample Selection Bias.

These seemingly strong results could potentially be undermined by sample selection bias. This sample of projects financed by the World Bank Group is neither random nor necessarily representative of all investment projects in any given country. Consider what may occur in countries where the World Bank project presence is not large relative to overall investment--and where the

[16] Specifications including country fixed effects are estimated only for the policy indices that vary from year to year: the black market premia, the trade openness variables, and the fiscal deficit variable. Segmented samples and specifications including year fixed effects--not presented here--were also tried to test whether year-effects or structural breaks between time periods were apparent. They reveal no significant difference in the behavior of the policy variables over different time periods.

Bank is not a residual lender. Given its special lending role, the World Bank in such cases may have attempted to 'skim-and-insulate': it could have identified the best possible projects and then try to insulate them from national policy and institutional deficiencies. By contrast, in countries where the Bank project presence is large, one could expect that projects financed by the World Bank would exhibit closer to average performance. In such cases, insulating projects from policy inadequacies would be less feasible.

Thus, we might expect that the World Bank 'project presence' would be inversely related to ERRs. If project presence were to be negatively related to the quality of the policy framework, the impact of policies on ERRs may have been overestimated in the specifications above. Sample selection bias --in an upward direction for the estimates of policy effects-- would arise if settings where the Bank can skim and-insulate also happen to have better economic policies.

To test for possible mis-specification due to this bias, we constructed a World Bank 'project presence' variable: the Bank's accumulated project disbursements as a share of the total capital stock. Using this variable (a single observation for each country), we tested for mis-specification in two ways. First, this variable was included as an additional independent variable in the primary set of Tobit estimations (Annex table A1, column 1). Second, the project presence variable was also used to truncate the sample for low and high values of World Bank presence. After removing the outliers, we tested whether the policy coefficients behaved differently for the remaining sample, where the Bank presence was within a 'normal' range. In all cases (specifications in columns 2-4, for left-, right- and double-tail truncations, respectively), the robustness of the policy coefficients was maintained. In specifications including the other main policy variables utilized in our analysis, the results---not reported here--are also similar.

We also carried out a second test for possible biases arising from the Bank's project selection

process. Most projects in this data set, in addition to receiving reestimated ERRs, had calculations carried out of their expected rates of return (AERR) before project implementation. Projects with high AERRs signal anticipated 'skimming' in investment selection; by contrast projects with low AERR's suggest an expected role as lender of last resort.

We truncated the project sample to exclude outlier observations: those with very low AERRs and/or with very high AERRs[17]. We found (Annex table A2) that the relationship between policies and reestimated ERRs was not statistically different in the truncated samples. This suggests that the likelihood of 'skimming' in some countries and/or 'lending-as-a-last-resort' in others do not bias the economic policy coefficients.

C. The relative importance of policy distortions

While the empirical magnitude of the effects of distortions on the efficiency of investments detailed in this section is very large, a substantial share of the variation in ERRs cannot be attributed to measured statistical differences in these measured policy distortions. Even after incorporating a number of policy variables into the econometric analysis, much of the variability in ERRs remains unexplained: the adjusted R-squares in ordinary least squares specifications equivalent to these Tobit specifications do not exceed 15 percent with country fixed effects excluded. The adjusted R-squared increased to 0.65 when country dummies are included, suggesting that unidentified country characteristics (which may also include unmeasured policy distortions) are important.

The relative importance of policies--and their explanatory limits--are suggested by a comparison of the probabilities of success and failure in Table VI. Under a relatively good policy environment (as measured by a single policy variable), the probability of a 'flop' project--with a

[17] We thank Eduardo Engel for this suggestion.

negative ERR--is reduced to only one-third the probability of a more distorted regime. And when the probability is estimated under a good policy environment measured through the quality of two policy variables instead (fiscal deficit *and* trade openness), the probability of a flop is only about one-eighth that under a more distorted policy regime. By contrast, the probability of a 'very successful' project --ERR greater than 20 percent--can be between one-and-a-half and twice as high under a relatively good policy environment, as measured by single or multiple variables. Thus, economic policies can make a very large difference in project performance.[18]

VI. How *Changes* in the Policy Environment Affect Investment Returns in a Country.

The analysis above indicates that the quality of the policy framework can make a large difference for project productivity. But these results do not necessarily imply that a major policy overhaul will immediately yield a vastly improved average ERR. Indeed, it is often argued that given the nature of project selection and implementation--and the cost and time of restructuring investments--many benefits of policy reform may not be apparent in the short term (in addition to economy-wide institutional deficiencies that take time to address).

In fact, these data suggest that within a few years significant payoffs to policy improvements are possible. Table VII illustrates that on average countries which move from an inappropriate to an adequate policy environment are more likely to end up with much higher ERRs

[18] Just as the explained variance in the regression analysis explaining ERRs was not high, the analysis of probability of a "flop" project is revealing regarding the limits of the quality of economy-wide policies as explanatory factors: even under better policy conditions there is still a 20 to 30 percent probability that the project will not be evaluated as 'satisfactory'. The importance of other factors affecting investment performance ought to be emphasized, and is analyzed in a later section on the public investment program. Further, we run estimations adding institutional variables (such as Berri's institutional quality index, yet it did not add to the explained variance (nor did it affect the policy coefficients). [Background table available upon request].

than countries in which policies do not improve. Projects whose preparation began when policies were distorted (i.e. the black market premium greater than 30 percent) but completed the investment phase under a less distorted policy framework (the black market premium was very low) were found to have an average ERR of 17.8 percent. By contrast, the evidence indicates that countries in which the policy framework deteriorates during project execution will experience a substantial drop in investment productivity. Projects that began preparation when policies were not distorted --black market premium less than 30 percent-- but were completed when the black market premium was higher, had an average ERR of only 13.2 percent.

To test econometrically this effects of a policy improvement during project implementation we modified the basic multivariate analysis to control for initial conditions of the black market premium (Table VIII). Also controlling for fixed country effects and for initial conditions the statistical robustness of the relationship between policies and ERRs is maintained: economic reforms within a country seem to yield investment productivity payoffs within a few years.

This relationship between the ERRs and the black market premium--a proxy of macroeconomic and trade distortions-- obviously cannot capture the variety and complexity of policy reform measures that are required to improve investment productivity. Nevertheless, the results do suggest that when policies improve high payoffs can be expected in the short-to-medium term. Conversely, deterioration in the policy framework can be very costly, even in the short term.

VII. The Effect of the Overall Public Investment Program on Investment Returns

In underscoring the importance of undistorted economic policies in empirically explaining project investment failures, it was also noted that such policies only partially account for the variation in performance of such investments; other factors are also likely to be very important.

One such likely determinant is the nature of the public investment program in a country. In the developing world, governments have been responsible for the provision of investments in many sectors, a key one has been basic infrastructure services--in transport, energy, and agriculture [World Bank 1994b]. The economic justification for such public investments are familiar. These services enjoy a substantial public good component, their production and provision are often subject to externalities and/or large economies of scale, and commercial financing for such large scale undertaking is often constrained. Thus, the private sector has been less likely to provide these public investments in many poor countries, or has tended to do so in sub-optimal amounts.

Certain individual projects, particularly in tradeable sectors such as agricultural and industry, depend on a minimum amount of public infrastructure (e.g., trunk and feeder roads, port facilities, and telecommunications). Public investments may enhance the productivity of these individual projects in tradable sectors by reducing operating costs, increasing demand for their products, and diminishing downside risks; where these services are absent, the economic efficiency costs can be large.[19] Yet as the public sector extends itself into lower priority areas (where the public good component is nonexistent and/or the private sector can provide these services more effectively), productivity for individual investments may not be enhanced. The complementarities between public and private investments are circumscribed. Maintaining an appropriate balance between the shares of public and private investments in total investment is also important. Public investments in certain priority areas are complementary to the efficiency of individual investments; in other areas, they may supplant private investments.

A. Basic statistical results of the effect of the public investment program on ERRs.

[19] See Lee and Anas [1995] for documentation of the costs of under-provision of public infrastructure services on manufacturing enterprises in Nigeria

Data for agricultural and industrial projects demonstrate the importance of overall public investments for investment productivity in the tradable sectors. The productivity of individual private and public tradable projects increases significantly as the share of public investments in GDP grows--but only up to a point. Figure 1 depicts simple range averages from the raw data[20]: the average ERR for investment projects increases by about five percentage points as the share of overall public investment in GDP increases from 5 to almost 10 percent. However, as the share of overall public investment in GDP increases beyond ten percent, the average ERR eventually declines. The data plotted in figure 1 suggests that the relationship between overall public investment and the productivity of tradable projects is particularly strong for projects implemented in a relatively undistorted policy framework. The ERR of projects implemented under an undistorted environment is on average about 13 percent in countries where the share of public investment in GDP is five percent or less, while the average ERR exceeds 19 percent when the share of public investment in GDP is on average 9.5 percent. But as the share of public investment in GDP exceeds ten percent, investment productivity declines -- to an average ERR of about 15 percent.[21]

These data also suggest the importance of maintaining an appropriate balance between public and private investment shares (figure 2). In economies with undistorted policies, the average ERR of tradable projects increases from 14 to 20 percent as the share of public investment in total investment rises to about 40 percent. Yet again, increasing the share of public investments in total above this range substantially reduces project productivity.

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[20] For figures 1 and 2, the points represent ERR averages for each segment.

[21] This (average) turning point should not be interpreted, however, as a precise benchmark for policy in an individual country setting; they only suggest that beyond a certain point public investment expenditures do not increase the ERR of individual tradable investment projects.

B. Econometric Results

To test the significance of these basic statistical relationships, we conducted restricted Tobit analysis--with spline functions [Green 1990]--for the ratio of public investment in GDP and for the ratio of public investment in total investments. ratio. The results (Table IX) indicate the statistical significance of the relationships depicted in figures 1 and 2.

The overall public investment program of a country appears to affect strongly the productivity of individual projects, particularly so in settings where the economic policy environment is relatively undistorted. When the policy environment is distorted, the ERR of tradable projects will be very low regardless of the relative size or shares of the public investment program (columns 2 and 6). By contrast, in an improved economic policy environment, increasing the size of public investment up to about 9.5 percent of GDP has a statistically significant positive effect; but increasing the size further has a significant negative effect (columns 3 and 4). Likewise, increasing the share of public investments in total investment up to about 40 percent has a statistically significant positive effect; but increasing the share further has a significant negative effect (columns 7 and 8). When the private sector is crowded out by a bloated public investment program, the productivity of marginal public investments can be very low indeed.

Overall, these results--as well as illustrative cases studies such as the Jamaican sugar processing projects -- suggest two complementary and powerful aspects of policy reform. The best public investment program or 'balance' cannot compensate for poor macroeconomic, trade and pricing policies. Indeed, undistorted policies are necessary for high productivity of projects in the tradeable sectors. Yet in themselves they may not always be sufficient: they need to be complemented by an adequate public investment program. In some sense, the quality of the public

investment program may be seen as another policy variable--one that can also subject to significant distortions (under-investment, over-investment, and/or low quality and poor choices in such public investment program). As such, a good policy environment requires more than correct macro-fundamentals and relative pricing: it also requires an appropriate public investment program. Thus, there is an appropriate role for the state in emerging economies, transcending good economic policy-making in a narrow sense.

VIII. Conclusion

The evidence presented here elucidates the much-debated and ambiguous empirical evidence on the link between policies and aggregate performance. We establish a very strong statistical association between a country's policy environment and investment project performance. All types of projects--in the tradable and non-tradable sectors, with public or private financing--are adversely affected by distortions in the macroeconomic, trade, and pricing regimes. Jointly such policies, when distorted, can lower the economic returns on investments by about ten percentage points. That difference in investment productivity, if economy-wide, can add up to a very significant difference in the aggregate growth rate of the country.

We find that within a country, improvements in the policy framework do result in improved productivity; conversely, policy reversals lower investment productivity rapidly. The sizeable effects of the quality of economy-wide policies on investment project performance is not affected by inclusion of a host of control variables, such as capital/labor ratio, human capital, project complexity, terms of trade changes, and other institutional variables. Neither the significance or magnitude of the robust economic policy coefficients is affected by various sample selection tests

either. We suggest possible mechanisms whereby policies affect investment performance.[22]

The performance of projects in the tradeable sectors is related to the size of public investment in a non-linear fashion. A balanced public investment program complementing the requirements of individual project investments enhance project-level productivity significantly where macro-economic and trade policies are undistorted. Yet where economic distortions prevail, economic rates of return are likely to be low irrespective of the size and nature of the overall public investment program.[23]

The implications for investors are straightforward. They would generally fare better by staying away from settings with poor economic policies, even if it is an under-invested setting: the negative effects of poor policies are likely to dwarf the positive benefit of (apparent) higher marginal productivity of "first advantage" movers in a setting with low capital/labor ratio. However, if improved economic policies are evident (and likely to be sustained) the payoffs from investing in new projects can be rather large. Furthermore, a country with an appropriately balanced public investment program complementing entrepreneurial growth will be more attractive to investors, as long as such country exhibits undistorted macro-economic policies.

While the adverse impact of poor economic policies on investment performance is not a

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[22] In addition to the evidence presented here, Kaufmann and Wang [1995] present mechanisms linking economic policies and the productivity of investments in the *social sectors,* and Burnside and Dollar [1997] give aggregate evidence that World Bank-investment loans are effective only in countries with good policy environments.

[23] We indicated that the mechanisms whereby bad policies affect investment performance have not been accorded sufficient emphasis and suggested two mechanisms that lower returns : inappropriate output choice and underutilized capacity. We noted that insufficient account is often taken of the likelihood of shortfalls in the 'quantity' axis. While we lack direct data to indicate the relative importance of each dimension in the link between distorted policies and economic returns of projects, one piece of data suggests: those few projects for which a financial rate of return was also calculated (alongside the ERR) tell us that the linkage between economic policies and financial returns are no different than the relationship between policies and economic returns. Thus, there is little evidence that shadow price adjustments are driving these results, providing a hint about the possible importance of adjustments along the quantity axis instead. Undoubtedly, more research is needed to explore analytically and empirically these complex mechanisms whereby the quality of economy-wide policies affect project performance.

major new insight (private investors world-wide have known this for a long time), the magnitude and significance of these new empirical results need underscoring. Studying the World Bank's own expected rate of returns to planned investments prior to project implementation suggest that there was *some* sensitivity towards the effect of policies; on average it was expected that a project implemented in a setting with undistorted policies may end up with an ERR of about one-to-three percentage points higher (than in a distorted policy setting). Yet we find that this pales in comparison with the *actual* differentials attributable to economic policies after project execution is completed--estimated at about six-to-ten percentage points. Part of this difference is accounted by unanticipated policy deterioration during project execution, which tended to occur on more than one-third of the settings where the project was prepared under initially auspicious policy conditions. Still, in the majority of the cases the existing policy environment prior to the project start would have constituted a fairly reliable predictor of the future quality of policies during project implementation. Thus, in hindsight, the likelihood and incidence of poor economic policies may have been insufficiently accounted for when appraising projects prior to their execution.

Thus, investors from institutions like the World Bank and other similar developmental agencies, where some non-financial considerations may also play a role, should recognize that lending in settings with poor policies are likely to result in significantly lower socio-economic returns. Thus, higher selectivity, minimizing investment loans to countries with poor economic policies, as well as increasingly shifting towards non-lending activities (particularly those geared to help improve and sustain a better policy framework) would be called for in such countries--a direction to which the World Bank has already been moving towards, and where more general consensus is emerging.

And the findings also suggest further room for hope: donor financing in countries where the policy

climate is improving is likely to pay off, since an heretofore neglected rationale for supporting structural reforms is that they raise the productivity of public and private investments.

The IRIS Center, University of Maryland

The World Bank

Appendix

A. Data Sources

Descriptions of all data used in this analysis are listed in the following subsections. Unless otherwise noted, the data source is 'World Development Report 1991: Supplementary Data;' which includes more detailed descriptions and original sources.

Policy and investment variables

Parallel or black market premium: the yearly mark-up of the parallel market rate for foreign exchange over the official exchange rate. Calculated as BLACK = [(BMER-OER)/OER]*100 where BMER is the black market exchange rate and OER is the official end of period exchange rate. Source: BLACK in 'World Development Report 1991: Supplementary Data.'

Index of trade restrictiveness: based on specific policy criteria such as tariffs and non-tariff barriers. Index scaled from (1) to least restrictive (5). Source: HALTHOM1.

Fiscal deficit of the central government as a share of GDP: derived directly from tables in country reports from the IMF. Source: International Monetary Fund.

Index of pricing distortions in tradable goods: weighted average of mean price distortion in the period 1973-85 and of its standard deviation. Source: DOLLAR4

Real interest rate: inflation (change in the CPI over the same year) subtracted from the nominal interest rate (according to availability in order of preference among T-bill rate, money market rate, lending rate deposit rate, discount rate). Source: REAL4.

Public investment/GDP: ratio of public sector investment to GDP. Source: INVPUB4, PUB_GDP.

Public investment/total investment: ratio of public sector investment to total private and public

sector investment. Source: INVPUB4, INVFPR4, PUB_GDP, PRI_GDP.

Structural and Dynamic Variables:

National level of education: estimated average years of education of the population of working age group (15 to 64). Based on UNESCO data on enrollment rates for the period 1960-88 and on mortality and birth statistics. Source: EDT4

Terms of trade changes: calculated from exports at current prices/exports at constant prices divided by imports at current prices/imports at constant (1980) prices. Source: TOT4

Institutional complexity: a dummy variable for subsectors regarded by evaluation units as more complex, including integrated rural projects. Source: Authors' calculations, based upon sectoral information provided by the Operations Evaluations Department, World Bank.

Capital/labor ratio: estimates of the capital stock for were constructed by using estimates of constant dollar investment figures from standard World Bank sources; annual estimates of the labor force were interpolated from standard World Bank data. Source: KO2, LABOR4.

GDP growth: calculated from GDP at constant 1980 prices, U.S. dollars. Source: GDPKD.

World Bank Project Presence: calculated as the World Bank's accumulated project disbursements as a share of the total capital stock. Source: World Bank data, KO2.

Rates of Return

Economic Rates of Return: Internal rate of return of project when the net present value is set to zero, evaluated at shadow/border prices. Public and private projects. Source: Operations Evaluation Department; International Financial Corporation. (OED will review specific requests for the use of its data on a case-by-case basis. The private

data is not publicly provided in order to protect the confidentiality of IFC's private clients).

B. Countries

All countries with at least one project used in this analysis are listed below. Countries with an asterisk were used for the regression models.

Algeria*
Argentina*
Bangladesh*
Benin
Bolivia
Brazil*
Burkina Faso
Burundi
Cameroon*
Central African Republic
Chile*
Colombia*
Costa Rica*
Côte d'Ivoire*
Egypt*
El Salvador
Ethiopia
Gabon
Ghana
Guatemala
Guyana
Haiti
India*
Israel
Indonesia*
Jamaica*
Kenya*
South Korea*
Sri Lanka*
Madagascar
Malawi*
Malaysia*
Mali
Mauritania
Mauritius*
Mexico*
Morocco*
Nicaragua
Nigeria*
Nepal
Pakistan*
Panama
Peru*
Philippines*
Rwanda
Senegal
Singapore
Sudan
Syria
Tanzania*
Thailand*
Togo
Tunisia
Turkey*
Uganda
Uruguay
Venezuela*
Yugoslavia
Zaire
Zambia*
Zimbabwe*

Kaufmann: The World Bank

Isham: The IRIS Center at the University or Maryland

References

Barro, Robert, 'Government Spending in a Simple Model of Endogenous Growth,' Journal of Political Economy, LCVIII (1990), 103-123.

_____, 'Economic Growth in a Cross Section of Countries,' Quarterly Journal of Economics, CVI (1991), 407-443.

Barro, Robert and Jong-Wha Lee, 'International Comparison of Educational Attainment,' Journal of Monetary Economics, XXXII (1992), 363-394.

Barro, Robert and Xavier Sala-i-Martin. .Economic Growth, (New York, NY: McGraw-Hill, 1995).

Blanchard, Olivier and Michael Kremer, 'Disorganization,' Quarterly Journal of Economics, CXII (1997), 1091-1126.

Burnside and Dollar, 'Aid, Policies, and Growth', Working Paper, Policy Research Department, TheWorld Bank, June 1997.

Easterly, William, Michael Kremer, Lant Pritchett and Lawrence H. Summers, 'Good Policy or Good Luck? Country Growth Performance and Temporary Shocks,' Journal of Monetary Economics XXXII (1994), 459-484.

Easterly, William and Sergio Rebelo, 'Fiscal Policy and Economic Growth,' Journal of Monetary Economics XXXII (1994), 417-458.

Fischer, Stanley, 'The Role of Macroeconomic Factors in Growth: an Empirical Investigation,' Journal of Monetary Economics XXXII (1994), 485-512.

Fagerberg, Jan, 'Technology and International Differences in Growth Rates,' Journal of Economic Literature, XXXII (1994), 1147-1175.

Gittinger, J. Price, Economic Analysis of Agricultural Projects (Baltimore, MD: The Johns Hopkins University Press, 1982).

Green, William, Econometric Analysis (New York, NY: Macmillan, 1990)

Isham, Jonathan and Daniel Kaufmann, 'Does Policy Based Lending Affect the Productivity of Investment Projects,' RAL III background paper. World Bank, Country Economics Department, Washington, D.C., 1992.

Isham, Jonathan, Daniel Kaufmann, and Lant H. Pritchett, 'Civil Liberties, Democracy, and the Performance of Government Projects ,' World Bank Economic Review, XI (1997), 219-242.

Isham, Jonathan, Deepa Narayan, and Lant H. Pritchett, 'Does Participation Improve Performance: Establishing Causality with Subjective Data,' World Bank Economic Review, IX (1995), 175-200.

Kaufmann, Daniel and Stephen A. O'Connell: 'The Macroeconomics of Delayed Exchange Rate Unification' in M. Kiguel et al. Eds., Parallel Exchange Rates in Developing Countries, 1997.

Kaufmann, Daniel and Yan Wang, 'Macroeconomic Policies and Project Performance in the Social Sectors,' World Development, XXIII (1995), 751-765.

Knack, Stephen and Philip Keefer, 'Institutions and Economic Performance: Cross-Country Tests Uing Alternative Institutional Measures,' Economics and Politics, VII (1995), 207-227.

King, Robert G. and Sergio Rebelo, 'Public Policy and Economic Growth: Developing Neoclassical Implications,' Journal of Political Economy, LCVIII (1990), 126-150.

Lee, Kyu Sik and Alex Anas, 'The Costs of Infrastructural Deficiencies in Nigeria,' World Bank, Infrastructure and Urban Development Department, Washington. D.C., 1990.

Levine, Ross and David Renelt, 'A Sensitivity Analysis of Cross-Country Growth Regressions,' American Economic Review LXXXII (1992), 942-63.

Little, I.M.D. and J.A. Mirrlees, 'Project Appraisal and Planning Twenty Years On,' Proceedings of the World Bank Annual Conference on Development Economics 1990, (1991) 351-82.

Liu, Lili, 'Entry-exit, Learning and Productivity Change,' Journal of Development Economics XLII (1993), 217-242.

Lucas, Robert E., Jr., 'On the Mechanics of Economic Development,' Journal of Monetary Economics, XXII (1988), 3-42.

Mankiw, N. Gregory, David Romer and David N. Weil, 'A Contribution to the Empirics of Economic Growth,' Quarterly Journal of Economics CVII (1992), 407-37.

Mauro, Paolo, 'Corruption and Growth,' Quarterly Journal of Economics CX (1995), 681-712.

Pohl, Gerhard and Dubravko Mihaljek, 'Project Evaluation and Uncertainty in Practice: A Statistical Analysis of Rate-of-Return Divergences of 1,015 World Bank Projects' World Bank Economic Review VI (1992), 255-77.

Pritchett, Lant, 'Measuring Outward Orientationin LDCs: Can it be Done?,' Journal of Development Economics 49 (1996),: 307-335.

Pritchet, Lant, 'Where Has All the Education Gone?,' Policy Research Working Paper (1997), the World Bank.

Rodrik, Dani, 'Trade and Industrial Policy Reform in Developing Countries: A Review of Recent Theory and Evidence,' Handbook of Development Economics vol. III, J. Behrman and T.N. Srinivasan, eds., (Amsterdam: North-Holland, 1995).

Rodrik, Dani, 'Where Did All the Growth Go? External Shocks, Social Conflict, and Growth Collapses', NBER Working Paper Series, National Bureau of Economic Research, Inc., January 1998.

Romer, Paul M., 'Increasing Returns and Long-Run Growth,' Journal of Political Economy XCIV (1986), 1002-37.

_____, 'Endogenous Technological Change,' Journal of Political Economy XCVIII (1990), 71-102.

Sachs, Jeffrey and Andrew Warner, 'Economic Reform and the Process of Global Integration,' Brookings Paper on Economic Activity, (Washington, DC: The Brookings Institute, 1995).

Squire, Lyn and Herman G. van der Tak, Economic Analysis of Projects, (Baltimore, MD: The Johns Hopkins University Press, 1970).

Summers, Lawrence H. and Lant H. Pritchett, 'The Structural Adjustment Debate,' American Economic Review LXXXIII (1993), 383-89.

Temple, Jonathan, 'The New Growth Evidence,' forthcoming in Journal of Economic Literature.

Temple, Jonathan and Paul A. Johnson, 'Social Capability and Economic Growth',

forthcoming in Quarterly Journal of Economics.

World Bank, World Development Report, (New York: Oxford University Press, 1991).

_____, 'World Development Report 1991: Supplementary Data,' mimeo, Office of the Vice President, Development Economics, Washington, D.C., 1991.

_____, '1992 Evaluation Results,' Operations Evaluations Department, Washington, D.C., 1994a.

_____, World Development Report, (New York, NY: Oxford University Press, 1994b)

_____, 'Economic and Sector Work and Results on the Ground,' Operations Policy Department, Washington, D.C., 1995.

Table I

Summary Statistics

	N	Mean	Standard Deviation	Minimum	Maximum	Number of Countries	Years
Dependent Variable							
Ex post ERR	1625	15.9	15.1	-20	155	61	1974-1990
Policy performance data							
Black market premium[a]	1516	45.6	87.2	-7.8	508.2	60	1974-1990
Fiscal deficit	820	-3.30	4.99	-25.28	8.40	35	1974-1990
Index of trade restrictiveness	531	1.66	0.86	1	5	36	1974-1987
Index of price distortions	1254	100.27	1.20	96.19	102.2	58	1974-1985[c]
Real interest rate[b]	778	-1.96	15.25	-92.03	87.8	33	1974-1988
Standard independent variables							
Capital/labor ratio (log)	856	8.24	1.01	5.71	10.74	55	1974-1987
Education years of working age	856	4.39	2.08	0.39	11.22	55	1974-1987
Dummy for project complexity	1486	0.21	0.41	0	1	61	1974-1987
Change in terms of trade	1242	0.97	7.27	-24.24	54.18	61	1974-1987
GDP growth	1282	3.69	3.32	-16.61	21.96	57	1974-1987
Additional independent variables							
Total investment (%)	1243	9.3	4.4	0.9	34.5	60	1974-1988
Public investment/GDP investment (%)	1235	42.3	16.3	7.4	93.2	60	1974-1988
Black market premium at project approval	1577	22.3	14.5	1.0	161.0	60	1961-1983
World Bank presence (as % of overall investment)	1332	0.066	0.040	0.001	0.233	56	1974-1987[c]

Notes: See appendix 1 for data descriptions and sources. a) See footnote 14 in text for description of black market premium. b) Real interest rate dummy (= 1 if real interest rate >0) used in analysis. c) One observation per county for time period.
Source: Authors' calculation

Table II

Economic Policies and the Economic Rate of Return (ERR) of Projects

Single Policy Distortions

Average ERR (%)

	All Projects	Public Projects	of which			Private Projects
			agriculture	industry	non-tradable sectors	
Overall average ERR	16.0	16.2	14.3	13.6	18.1	14.0
Policy Distortion Index						
1. Trade restrictions						
Highly restrictive	13.2	13.6	12.2	insf	14.6	9.5
Somewhat restrictive	15.0	15.4	15.5	insf	16.0	10.7
Non-restrictive	19.0	19.3	14.3	insf	24.3	17.1
2. Exchange rate overvaluation: black market Premiums:						
High (≥200%)	8.0	7.2	4.0	insf	11.4	insf
Medium (20-200%)	14.5	15.0	12.9	9.7	17.1	10.3
Low (<20%)	17.5	12.7	16.2	15.9	19.2	15.2
3. Real Interest rate						
Negative	15.0	15.4	12.7	12.7	17.9	11.0
Positive	17.3	17.5	17.0	17.8	17.9	15.6
4. Fiscal deficit						
High (≥8%of GDP)	13.4	13.7	11.7	10.3	16.6	10.7
Medium (4-8%)	14.8	15.1	12.2	21.0	16.8	12.2
Low (<4%)	17.8	18.1	18.6	14.1	18.2	14.3
5. Price distortion index of tradable goods:						
High distortions	15.6	15.9	13.1	14.0	18.4	11.0
Low distortions	17.5	17.5	17.0	16.5	18.1	17.2

Notes: Average reestimated economic rate of return of public and private projects, classified by single policy distortion.
'Insf' denotes insufficient number of observations (less than 10) to make inferences
Source: Authors' calculations

Table III

Economic Policies and the Economic Rates of Return (ERR) of Projects: Combined Policy Distortions

	Average ERR (%)			
	All projects	All public projects	Public agriculture	Public non-tradable sectors
Overall average	16.0	16.2	14.3	18.1
Combined policy distortion indices				
1. Trade restrictions, black market premium, and real interest rate				
Highly distorted	9.7	10.0	5.6	14.2
Somewhat distorted	15.7	16.1	16.7	15.8
Non-distorted	19.5	19.7	14.2	25.0
2. Fiscal deficit and price distortion index of tradable goods				
Highly distorted	14.8	15.0	15.3	15.8
Somewhat distorted	16.2	16.2	14.7	17.4
Non-distorted	17.7	18.0	18.4	18.6
3. Fiscal deficit and trade restrictions				
Highly distorted	8.7	9.1	6.9	12.7
Somewhat distorted	15.0	15.3	15.2	15.7
Non-distorted	20.0	20.8	15.0	28.1

Notes: Average reestimated economic rate of return of public and private projects, classified by multiple policy distortions.
'Highly distorted' categories include all observations with high distortions for each of the single policy indices; 'non-distored' include all observations with low distortions for each of the single policy indices; 'somewhat distorted' include all remaining observations with non-missing observations for each of the single policy indices.

Source: Authors' calculations.

Table IV

Econometrics of ERRs: Single Policy Variable Tobit Specifications

Independent Variables	Parallel rate premium		Trade Openness		Fiscal Deficit		Distortions in tradable prices		Real interest rate dummy	
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Intercept	19.7	33.0	10.8	24.9	16.9	31.8	-207.0	-158.4	15.3	26.6
Policy variable a/	-0.055	-0.049	2.53	2.18	-0.33	-0.34	-2.26	-1.93	2.48	1.30
	(6.1)***	(5.1)***	(2.8)***	(2.4)**	(2.7)***	(2.9)***	(4.0)***	(3.3)***	(2.1)**	(1.1)
Capital/labor ratio (log)	-	-2.04	-	-2.07	-	-2.37	-	-2.29	-	-1.88
		(3.0)***		(2.7)***		(3.4)***		(3.4)***		(2.6)***
Years of education	-0.30	-0.18	-0.03	0.43	0.28	0.80	-0.66	-0.09	0.00	0.48
	(1.0)	(0.6)	(0.1)	(1.3)	(0.9)	(2.4)**	(2.1)**	(0.3)	(0.0)	(1.4)
Project complexity	-2.74	-3.16	-3.50	-3.80	-3.43	-3.68	-3.54	-3.93	-3.82	-3.90
	(2.0)**	(2.3)**	(2.6)***	(2.8)***	(2.5)***	(2.7)***	(2.6)***	(2.9)***	(2.8)***	(2.8)***
Terms of trade improvement	0.02	0.00	0.00	-0.01	0.01	-0.02	0.1	0.08	0.04	0.01
	(0.2)	(0.1)	(0.0)	(0.2)	(0.2)	(0.2)	(1.3)	(1.0)	(0.5)	(0.1)
GDP Growth	-	0.34	-	0.49	-	0.64	-	0.29	-	0.69
		(1.6)		(2.3)**		(3.1)***		(1.4)		(3.4)***
Log likekihood	-2526	-2519	-2534	-2526	-2540	-2528	-2522	-2515	-2541	-2532
No. Of Observations	656	656	656	656	656	656	656	656	656	656

Notes: Dependent variable is reestimated economic rate of return (ERR) for public and private projects. Numbers in parentheses are t-statistics
Significance levels: ***=99 percent; **=95 percent; *=90 percent
a/Each pair of columns includes a different policy variable, as indicated

Sources: Authors' calculations.

Table V

Econometric Tobit Analysis of ERRs: Combined Policy Variable Specifications

Specification	(1)	(2)	(3)	(4)
	Black market Premiums, trade openness, and interest rate	(1) and country fixed effects	Fiscal deficit and distortion in tradables	Fiscal deficit and trade openness
Independent variables				
Intercept	30.2	67.7[a/]	-134.2	27.9
Black market Premium	-0.046	-0.038	-	-
	(4.9)***	(2.1)**		
Trade openness	2.09	2.34	-	1.7
	(2.3)**	(1.9)*		(1.9)*
Real interst rate dummy	-0.41	-1.46	-	-
	(0.3)	(0.9)		
Distortion in tradables	-	-	-1.71	-
			(2.9)***	
Fiscal deficit	-	-	-0.22	-0.32
			(1.8)*	(2.7)***
Capital/labor ratio (log)	-2.09	-5.11	-2.46	-2.28
	(2.9)***	(1.6)	(3.6)***	(3.3)***
Years of education	0.07	-0.75	0.10	0.66
	(0.2)	(0.4)	(0.3)	(1.9)*
Institutional Complexity	-3.1	-2.82	-3.79	-3.6
	(2.3)**	(2.4)**	(2.8)***	(2.6)***
Terms of trade improvement	0.02	-0.01	0.06	-0.04
	(0.2)	(0.2)	(0.7)	(0.5)
GDP growth	0.16	0.02	0.29	0.45
	(0.8)	(0.1)	(1.4)	(2.1)**
Country fixed effects	No	Yes***	No	No
Log likelihood	-2514	-2481	-2514	-2523
Number of Observations	656	656	656	656

Notes: Dependent variable is reestimated economic rate of return (ERR) for public and private projects.
Numbers in parentheses are t-statistics.
Significance levels: ***= 99 percent; ** = 95 percent; *= 90 percent
A/ Intercept maintained by omitting one country dummy.

Source: Authors' calculations.

Table VI

Policies and the Probability of Project Success/Failure

	Probability of 'flop' project a/	Probability of 'unsatisfactory' project	Probability of 'satisfactory' project	Probability of 'very successful' project
	Pr (ERR≤0)	Pr (ERR≤10)	Pr (ERR≥10)	Pr (ERR≥20)
Policy Variable				
I. Black market Premium				
When Premium ≤30%	7.3%	28.1%	71.9%	29.9%
When Premium > 30%	18.5%	45.4%	54.6%	16.2%
II. Fiscal deficit				
Low deficit (≤4% GDP)	4.9%	24.1%	75.9%	31.6%
High deficit (> 4% GDP	13.3%	36.0%	64.0%	21.6%
III. Trade openness				
Few restrictions (index >=3)	4.0%	21.2%	78.8%	30.3%
Substantial restrictions (index >=3)	13.0%	36.4%	63.6%	20.9%
IV. Combined policy distortions: fiscal deficit and trade openness				
Low deficit and few restrictions	1.9%	22.6%	77.4%	35.9%
High deficit and substantial restrictions	16.3%	41.6%	58.4%	17.7%

Notes: a/ Each cell figure represents the share of 'flop' projects in all projects that were implemented under a given regime. For example, the first cell indicates that in regimes with low black market premium, 6.8 percent of implemented projects are 'flops'.
b/ Includes 'flops' as well as projects whose ERRs were positive but did not exceed 10 percent. The three columns are neither mutually exclusive nor all-inclusive.
Source: Authors' calculations.

Table VII

The Impact of Changes in the Policy Regime on ERRs

	Black market premium at project completion [b/]		
Black market premium before project start [a/]	High premium at project completion (>30%)	Low premium at project completion (<=30%)	All projects
High initial premium (>30%)	11.7	17.8	14.1
Low initial premium (<=30%)	13.2	17.7	17.7
All projects	12.3	17.7	16.4

Notes: Average reestimated ERRs from public and private sector projects in each cell.
a/ Initial black market premium (three-year average) at the year of project appraisal. Appraisal takes place toward the end of the project preparation process, usually about a year before implementation begins.
b/ Three-year average of black market premiums preceding time of project completion.
Source: Authors' calculations.

Table VIII

ERRs and Policy Reforms: Controlling for Initial Conditions

	Not controlling for initial policy conditions	Black market premium change during project implementation
Intercept	87.5	82.4
Black market premium at project evaluation	-0.046	-
	(2.5)**	
Black market premium at project appraisal	-	-0.031
		(1.0)
Premium change since project appraisal	-	-0.047
		(2.5)**
Capital/labor ratio	-6.8	-6.2
	(1.8)*	(1.6)
Education years	-1.6	-1.7
	(0.9)	(1.0)
Project complexity	-2.8	-2.7
	(2.0)**	(2.0)*
Terms of trade Change	0.02	0.02
	(0.2)	(0.2)
GDP growth	0.06	0.07
	(0.2)	(0.5)
Country fixed effects	Yes***	Yes***
Log likelihood	-2368	-2369
No. Of Observations	624	624

Notes: Dependent variable is reestimated economic rate of return (ERR) for public and private projects (with black market premium data available at project appraisal and evaluation). The intercept was not suppressed in these specifications; a country dummy was omitted.
Numbers in parentheses are t-statistics.
Significance levels: ***=99 percent; **=95 percent; *=90 percent

Source: Authors' calculations

Table IX

Public Investment and the ERR of Tradable Projects

	Public investment/GDP				Public investment/total investment				
	All		Low premium		All		Low premium		High premium
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	4.6	12.6	6.9	11.1	7.0	9.1	5.5	11.4	7.3
Public investment a/	1.22	0.65	1.23	1.12	0.26	0.28	0.35	0.31	-0.08 c/
	(2.7)***	(3.1)***	(2.4)**	(2.2)**	(2.2)**	(2.4)**	(2.8)***	(2.4)**	(0.9)
High public investment b/	-1.61	-0.76	-2.06	-1.95	-0.60	-0.52	-0.69	-0.68	-
	(2.3)**	(1.1)	(2.4)**	(2.3)**	(3.5)***	(3.1)***	(3.5)***	(3.5)***	
Black Market Premium	-	-0.059	-	-	-	-0.057	-	-	-
		(5.4)***				(5.2)***			
Terms of trade change	-	0.06	-	0.02	-	0.06	-	0.03	0.26
		(0.5)		(0.2)		(0.6)		(0.2)	(1.1)
Project complexity	-	-2.47	-	-2.34	-	-2.54	-	-2.73	-0.86
		(1.7)*		(1.4)		(1.7)*		(1.6)	(0.3)
Years of education	-	-0.09	-	-0.50	-	-0.09	-	-0.66	1.43
		(0.2)		(1.2)		(0.2)		(1.5)	(1.9)**
Log likelihood	-1607	-1588	-1255	-1253	-1601	-1584	-1252	-1249	-336
Number of observations	422	422	321	321	422	422	321	321	101

Notes: a/ For public investment /GDP, the segment up to 9.5% of GDP; for public investment/total investment, the segment up to 40% of total investment.
b/ For public investment/GDP, the segment exceeding 9.5% of GDP; for public investment /total investment, the segment exceeding 40% of total investment.
c/ This specification (in column 9) is linear, not kinked, since there were no significant breaks in the relationship between public investment and ERRs in regimes with high black market premium sample.
Numbers in parentheses are t-statistics.
Significance levels: ***=99 percent; **=95 percent; *=90 percent.

Source: Authors' calculations.

Table A1

Selection Bias Test Using World Bank Project Presence

	Bank presence as independent variable	Truncating data if Bank presence <=0.05	Truncating data if Bank presence >0.12	Truncating data if Bank presence <=0.05,>0.12
Specification	(1)	(2)	(3)	(4)
Intercept	47.5	34.2	34.6	37.3
Parallel rate premium	-0.045	-0.053	-0.049	-0.056
	(4.8)***	(3.9)***	(6.1)***	(4.3)***
World Bank project presence	-80.55	-	-	-
	(3.9)***			
Capital/labor ratio (log)	-3.20	-2.34	-2.18	-2.65
	(4.3)***	(2.5)**	(3.1)***	(2.6)**
Years of education	0.26	0.33	0.15	0.30
	(0.8)	(0.9)	(0.5)	(0.8)
Project complexity	-3.35	-4.09	-2.71	-3.42
	(2.5)**	(2.3)**	(1.9)*	(1.8)*
Terms of trade improvement	0.04	-0.02	-0.01	0.01
	(0.5)	(0.2)	(0.1)	(0.1)
GDP growth	0.25	0.30	0.30	0.23
	(1.2)	(1.0)	(1.4)	(0.8)
Log likelihood	-2512	-1495	-2432	-1409
No. Of Observations	656	395	631	370

Notes: Dependent variable is reestimated economic rate of return (ERR) for public and private projects
Numbers in parentheses are t-statistics
Significance levels: ***=99 percent; **=percent; *=90 percent.
Source: Authors' calculations.

Table A2

Selection Bias Test Using Appraisal Economic Rates of Return

Sample truncation based upon appraisal economic rates of return (AERR)				
	No truncation	Left truncation: AERR<15%	Right truncation: AERR>40%	Double truncation: AERR<15% and >40%
Intercept	33.5	35.0	27.0	27.8
Black market premium	-0.049	-0.056	-0.050	-0.059
	(5.0)***	(4.6)***	(6.2)***	(5.8)***
Capital/labor ratio	-2.09	-2.05	-1.29	-1.13
	(3.0)***	(2.4)**	(2.2)**	(1.6)
Education years	0.18	0.03	0.07	-0.10
	(0.5)	(0.1)	(0.2)	(0.3)
Project complexity	-3.20	-3.39	-3.62	-4.05
	(2.3)**	(2.0)**	(3.1)***	(2.9)***
Terms of trade change	0.01	0.01	0.02	0.05
	(0.1)	(0.1)	(0.3)	(0.5)
GDP Growth	0.35	0.54	0.20	0.33
	(1.6)	(2.0)**	(1.1)	(1.6)
Log likelihood	-2461	-1933	-2175	-1666
No. Of Observations	640[a/]	495	597	452

Notes: Dependent variable is reestimated economic rate of return (ERR) for public and private projects.
a/ 640 projects with recorded expected rates of return.
t-statistics are in parentheses
***: 99% confidence level
**: 95% confidence level
*: 90% confidence level

Source: Authors' calculations.

Background Table: Additional Controls--Institutional

	Parallel Rate Premium		Trade Openness		Fiscal Deficit		Price Distortions	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Policy Variable	-0.049	-0.055	2.18	2.05	-0.34	0.27	-1.93	-1.57
	(5.1)***	(2.7)**	(2.4)**	(2.1)**	(2.9)***	(2.0)*	(3.3)***	(2.2)**
Quality of Institutions[a]	-	-1.2	-	-0.9	-	-1.3	-	-0.7
		(1.5)		(1.1)		(1.6)		(0.8)
Other Controls (as in table IV in text)[b]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

[a] Institutional Quality variable form Beri (as used by Knack and Keefer).

[b] Additional controls include (log) capital/labor ratio, education, project complexity, terms of trade, and GDP growth. See table IV, columns 2,4,6, and 8 in text. Also, for other controls, see other econometric tables in text.