# The Economic Rate of Return of World Bank Projects

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## I. Introduction and Motivation

The recent discussion on the effect of the composition of government expenditure on growth has pointed at public spending on particular projects that remove bottlenecks for growth as a tool to spark virtuous circles of growth-debt burden reduction. The economic rate of return of these projects would be significantly higher than that of alternative uses of public funds and the economic analysis of projects should be the device to do the screening. Going beyond the rate of return estimation for individual projects, and extending the approach to public expenditure programs can have impacts on growth through various channels.

The channels through which the economic analysis of projects may affect growth are both macro and micro. At the macro level, the economic analysis of projects of the whole public investment program will lead to increased productivity of public capital. Since the contribution of capital to growth depends on its productivity, then higher productivity of capital will imply higher growth rates. Harberger's (2004) simple example illustrates an order of magnitude of the potential gains: if public investment is 5 percent of GDP, and the rate of return of public investment increases from 4 to 10 percent as a result of better project evaluation of expenditure programs, then the growth rate would be permanently higher by 3 tenths of one percent per year.

At the micro level, there is substantial evidence that projects that have good economic analysis will have less implementation problems and better quality of project outcomes. Belli and Prithcett (1995) showed that if the economic analysis of the Staff Appraisal Report was poor, the probability of the project being rated unsatisfactory three years after becoming effective was seven times higher than those projects with good economic analysis. Vawda, et. al. (2001) provided evidence that, in education projects, project rated poorly in economic analysis at preparation were four times more likely to have an unsatisfactory implementation than those with good analysis.

Despite the alleged benefits of economic analysis, its practice in the Bank is loosing ground. This short note presents some stylized facts of the evolution of the economic rate of return (ERR) of World Bank projects and proposes a work program oriented to revive the practice and enhance the quality of economic analysis in the World Bank. The note is divided in three sections. The first one presents stylized facts of the ERR across time and across sectors. The second one presents some of the main objection and possible explanations for the disuse of the method. The third one proposes the work program.

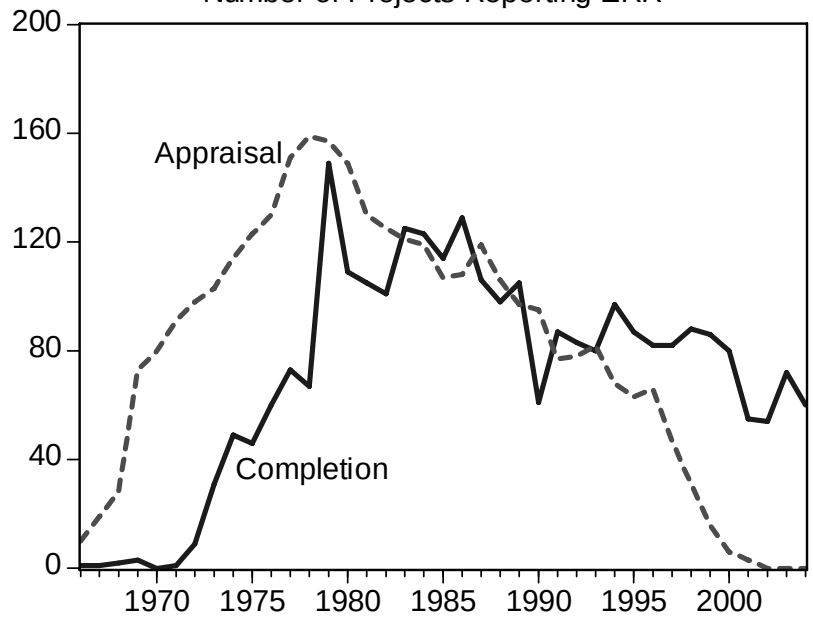
[1] PRMED. The author thanks Xiaohan Hu for helpful research assistance.

## II. The data: trends and levels of the Economic Rate of Return (ERR) of Bank Projects

The database consists of the full sample of projects during 1961-2004 of the OED database. For the purposes of this note, the projects were classified into 16 different sectors[2] and six different regions[3].

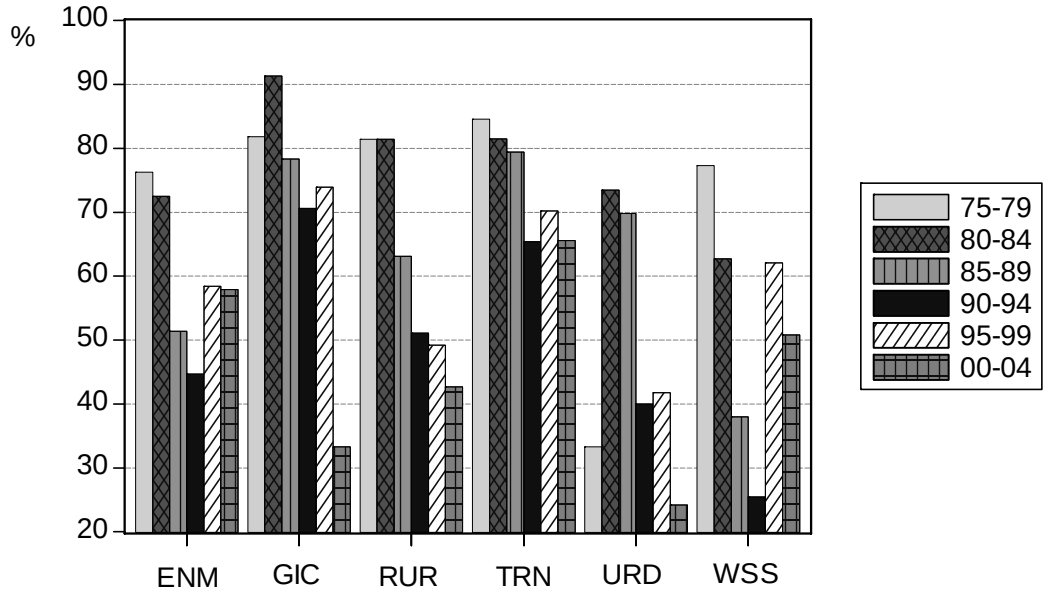
The number of projects reporting the ERR calculation has fluctuated, reaching a peak in the 1975-1980 period (Figure 1 ) The fraction of the projects showing the ERR calculation has fallen substantially from 70 percent in the late seventies to about 25 percent in 2002-2004. Though this could partially be explained by the decrease of the relative importance of the infrastructure projects, a glance at the composition of Bank projects by sector indicates this hasn't changed very much (Appendix 1, Table A.1.a). Instead, most of the fall is due to the simple lack of reporting of this exercise. For instance, while more than 80 percent of the transport (TRN) sector loans reported ERR during the seventies and eighties (Figure 2 and Appendix 1), in the 2000-2004 period the ratio fell to 66 percent (reaching a trough of 50 percent in 2002). While over 80 percent of the rural (RUR) projects reported an ERR calculation during the seventies, around 40 percent of them showed that result during 2000-2004 (Figure 2)

Figure 1
Number of Projects Reporting ERR




[2] *Economic Policy (ECP), Education (EDU), Energy and Mining (ENM), Environment (ENV), Financial Sector (FIS), Global Information and Communications Technology (GIC), Health, Nutrition and Population (HNP), Poverty Reduction (POR), Private Sector Development (PSD), Public Sector Governance (PSG), Rural sector (RUR), Social Development (SOD), Social protection (SOP), Transport (TRN), Urban Development (URD), Water supply and Sanitation (WSS)
[3] AFR, EAP, ECA, LCR, MNA, SAR.

Figure 2
Evolution of the Fraction of Projects Reporting ERR
(classified by sector)




Source: Appendix1

Table 1 summarizes the median of the ERR of World Bank projects, classified by sector and region, during the period 1980-2004. Appendix 2 presents the medians, means, standard deviations, and number of observations for different sample periods (1961-2004, 1980-2004, and 2001-2004). The specific sample periods were chosen for comparison purposes with previous work on the ERR on WB projects (Estache and Liu, 2004) and international estimates of the financial rate of return (Ibbotson Associates, 2002) to be presented in the next section. The number of projects concentrates mostly in six sectors ; Energy and Mining (ENM), Global Information and Communication (GIC), Rural Development (RUR), Transportation (TRN), Urban Development (URD), and Waster Supply and Sanitation (WSS). In Education, the OED database contains very few education projects reporting an ERR, which contrasts with Vawda et.al's claims about the rising practice of economic analysis in the Education sector.[4] This should serve as a word of caution about the quality of the data reported in the database.

[4] Vawda et.al. mention that 41 percent of the Education projects approved in fiscal year11998 included a cost-benefit analysis. Later on the authors state that "...To decide whether a particular education project is something on which society should spend its scarce investment resources , a project economic analysis should include a rate of return estimate." (pg. 10). Hence, the large number of education projects including a cost benefit analysis contrasts with the small number of the education loans reporting the ERR.

**Table 1**
**Median ERR by sector of loan and region 1980-2004**

| Sector* | AFR | EAP | ECA | LCR | MNA | SAR | World |
|---|---|---|---|---|---|---|---|
| ECP | 18 | | | | | 13 | 15 |
| EDU | | | | | | 19 | 19 |
| ENM | 11 | 15 | 15 | 10 | 13 | 16 | 14 |
| ENV | 18 | 23 | 15 | 28 | | 16 | 18 |
| FIS | 110 | | 13 | 20 | 30 | 40 | 29 |
| GIC | 18 | 17 | 27 | 16 | 29 | 17 | 19 |
| HNP | 0 | 21 | | 69 | | | 21 |
| POR | | | | | | | |
| PSD | 27 | | 31 | 18 | | | 30 |
| PSG | | 35 | | | | | 35 |
| RUR | 9 | 14 | 14 | 13 | 15 | 15 | 14 |
| SOD | | | | 20 | | | 20 |
| SOP | 27 | 27 | | | | | 27 |
| TRN | 23 | 22 | 23 | 21 | 24 | 26 | 22 |
| URD | 18 | 17 | 11 | 17 | 15 | 18 | 17 |
| WSS | 6 | 9 | 10 | 9 | 10 | 8 | 9 |
| Overall median | 14 | 16 | 15 | 15 | 15 | 16 | 15 |

*Economic Policy (ECP), Education (EDU), Energy and Mining (ENM), Environment (ENV), Financial Sector (FIS), Global Information and Communications Technology (GIC), Health, Nutrition and Population (HNP), Poverty Reduction (POR), Private Sector Development (PSD), Public Sector Governance (PSG), Rural sector (RUR), Social Development (SOD), Social protection (SOP), Transport (TRN), Urban Development (URD), Water supply and Sanitation (WSS)

Source: Appendix 1: calculations based on OED data.

The statistics reported in Appendix 2 for several sample periods illustrate two major features of the data that will determine the choice of variables and statistics for the analysis: 1) the substantial difference between the mean and the median indicates the existence of outliers; while the average of the ERR of all the WB loans is 19 percent, the median is 15 percent., with the discrepancy increasing during the most recent sample period (2001-2004) as mean and median rose to 27 percent and 21 percent, respectively. This fact indicates that the appropriate statistic for comparisons is the median. And, 2) the rates of return at appraisal are significantly higher than those at completion: the median ERR at appraisal is 21 percent while at completion it is 15 percent. This fact suggests it is more realistic to work with the ERR at completion, as the ERR computed at appraisal shows a systematic upward bias.

The difference between the ERR at appraisal and at completion reflects the resolution of uncertainty. The ERR at completion is estimated, on average, six years after the appraisal date. Naturally, more information is available at the evaluation at completion and the ideal indicator of comparison is probably the ERR at completion within a confidence interval for the ERR estimated at appraisal. Unfortunately, this sensitivity analysis seems to be done infrequently, or at least the results of the sensitivity (or risk) analysis is not included in the OED database..

The difference between the rates estimated at appraisal and at completion could be explained by cost overruns, or delayed implementation of the project. However, a previous study (Pohl and Mihaljeck, 1992), based on the same OED database but for a different sample period (1974-1987), examined the determinants of this discrepancy using a series of project-specific factors, a set of country-specific variables, and a set of dummy variables reflecting the region and the sector of the loan. This evidence, retaken by Little and Mireless (1990), shows the little relevance of project-specific variables (overruns and delay in implantation), and the relatively higher importance of the regional dummies, as well as the sector dummies. The first ones showed the positive bias was larger in Asian countries while the second ones showed how transport and energy projects has a significant positive bias relative to other projects.

Table 2 presents the excess of the ERR at appraisal with respect to the at completion estimation[5], by region and by sector, limited to the sectors to where there were at least 10 observations. In the longer sample (1980-2004), Energy and Mining (ENM) and Waters Supply and Sanitation (WSS) projects register the largest optimism bias, of 25 and 33 percent. On a regional basis, Africa projects report ERR at appraisal that exceed by 50 percent the ERR at completion. In the shorter sample, 2001-2004, Urban Development (URD) and Transport (TRN) projects reveal the largest bias, of 78 percent and 28 percent respectively (Appendix 3 ). By regions, Africa shows the largest discrepancy, of 23 percent, while SAR shows a negligible bias and ECA shows a "pessimism bias".

Table 2
Discrepancy between ERR at Appraisal and at Completion-"optimism bias"* 1980-2004 (percent)

| By Region | | By Sector | |
|---|---|---|---|
| AFR | 50 | ENM | 25 |
| EAP | 25 | GIC | 11 |
| ECA | 34 | RUR | 56 |
| LCR | 33 | TRN | 16 |
| MNA | 31 | URD | 18 |
| SAR | 37 | WSS | 33 |

*Defined as the ratio of ERR at appraisal to ERR at completion, minus one

To avoid the "optimism bias" the current note focuses on the ERR computed at completion. Several points are worth noting from Table 1. First, there is homogeneity in the ERR medians across different regions, with a range from 14 percent to 16 percent. This is surprising, given that the ERR depends on project-specific and country-specific characteristics, as described later.
Second, the dispersion of the ERR estimates is very different across the regions, with ECA's standard deviation being almost three times the value of LAC's (Appendix 1)

[5] The excess is defined as the ratio of ERR at appraisal to the ERR at completion, minus one.

Third, by sector of lending, there is a wide dispersion in the ERR, from a low of 9 percent in water and sanitation (WSS), to a maximum of 35 percent in Public Sector Governance (PSG). However, given the reduced number of observed ERR in some of the sectors, the most reliable estimates of the median are in the following sectors: Energy and Mining (13.6), Information and Communication (19.0), Rural (13.5), Transport (22.5), Urban Development (17.0), and Water and Sanitation (9.0).

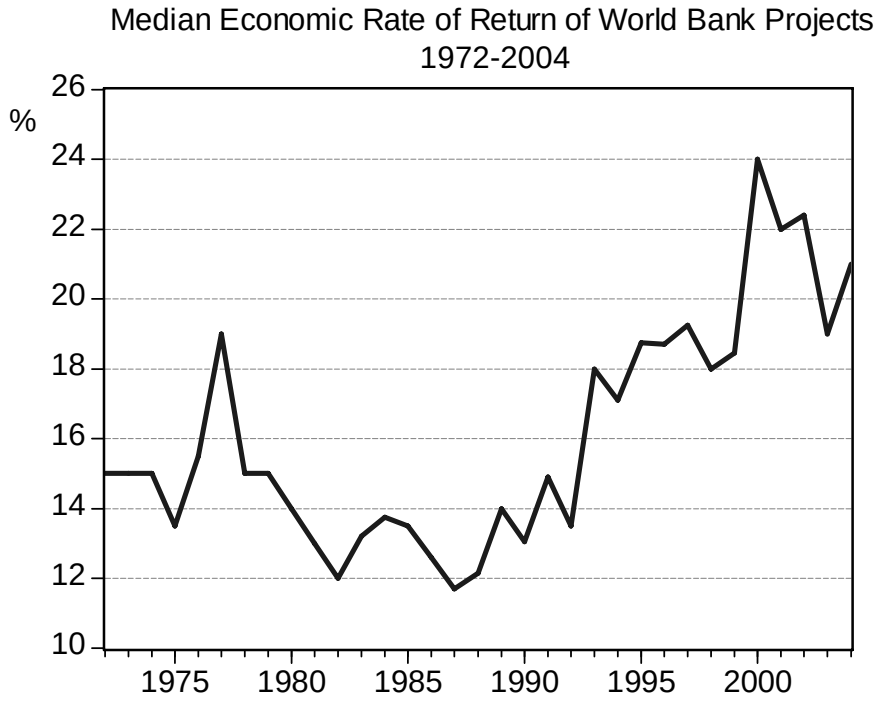
When a shorter time period is chosen (2001-2004) to compare these results with a recent exercise (Estache-Liu, 2004), the following results are notable: First, an increase in the median ERR for all the Bank projects to 21 percent. Second, an increase in the ERR dispersion, as measured by the standard deviation. The coefficient of variation (standard deviation/median) rose from 1.5 to 2.2. Third, most ERR by sector[6] show significant increases: Energy and Mining (22.0), Rural (17.0), Transport (25.0), Urban Development (13.2) and Water and Sanitation (18.3). Fourth, the dispersion of ERR increased as the standard deviation in the more volatile region (ECA) is almost 10 times the value of the standard deviation of the less volatile region (EAP).

The rise in the ERR between the two sample periods suggests the relevance of examining the change through time of the ERR. The evolution of the ERR since 1972 (Figure 3) shows that until the mid eighties it was a stationary variable around 14 percent with a slightly decreasing trend. In the late eighties, however, a reversal in the trend took place and the ERR has been rising. Besides the slope (direction of change in the series), there is also a change in the level, most apparent in 1993 and 2000. Both effects can be verified by statistical means (Appendix 4) that allow verification of the structural change in the level after 1992, with the series becoming stationary around that new level.

Can the change in the ERR from around 14 percent to around 21 percent be accounted for? Is this the result of a methodological changes or of changes in fundamentals? A previous paper on the determinants of the ERR in World Bank projects (Isham and Kaufman, 1999) might still be useful to answer these questions. That paper showed a strong statistical relationship between the ERR and policy variables, concluding that "…moving from a very restrictive trade regime to a fairly open one is associated with an ERR increase of about 7 percentage points. A difference in the fiscal deficit of eight percentage points…is associated with an ERR increase of almost 3 percentage points." Based on these estimates, the magnitude of the change in the ERR due to the improved policy setting may be inferred. On the trade openness, we consider a moderate opening happened during the last decade: between the late eighties and early 1990s , the average tariff of developing countries fell from 37 percent to 25 percent. In the following decade, it fell even more to 14 percent. So, considering the opening a moderate one (equivalent to the first period's) the fall may be considered as a moderate one. accounting for 3.5 percentage points increase in the ERR. The fall in the deficit was from 4.7 percent in the period 1985-1992 to around 4.0 percent in 1993-2004, accounting for .3 percentage points. Combined, the two policy changes would imply an increase of about 4 percentage points, or about sixty percent of the observed increase in the ERR. A preliminary statistical exercise to update this research (Appendix 1) leads to similar conclusions.

[6] Those that have 10 or more ERR

Figure 3




Source: Calculation based on OED database

This research also found a non-monotonic relationship between public investment and ERR: initially, larger investment shares of gdp are associated with higher ERR, but beyond certain points, the relationship turns negative. Rising public investment during the seventies and eighties coincide with falling ERR, while in the nineties rising ERR coincide with falling public investment. This suggests that public investment would be over the threshold limit postulated by Isham-Kaufman.

**The ERR of Bank projects compared to several benchmarks**

The ERR of Bank projects seems high when compared with the 12 percent rule of thumb used in the traditional project evaluation as the cutoff rate. Previous authors (Devarajan et.al.) noted that average economic rates of return of Bank projects were too high to represent the marginal project.[7] The critical question posed by them, however, was whether the projects were the best available projects to finance.

[7] Devarajan et.al. report an average ERR for 1993 of 21 percent. Here we report a median of 18 percent for the same year.

To answer this question, it is useful to compare the ERR with estimates of the cost of capital around the world. For this comparison, we will use two benchmarks: 1) the social rate of return on infrastructure projects estimated with different methodologies for a sample of developing countries (Canning and Benathan, ); and 2) the cost of capital estimated for a large sample of countries Ibbotson Associates (Ibbotson, 2002). Table 3 summarizes the results, aggregated by region. The comparison with the Canning-Benathan data shows that the Bank's ERR is substantially lower than the social rate of return. A disadvantage of the Canning-Benathan database is the reduced size of the sample (29 to 51 developing countries, depending on the variable).

Table 3
Rate of return estimated by Canning-Benathan

| | Electricity-generating | Paved roads | Total capital |
|---|---|---|---|
| AFR | 46 | 57 | 21 |
| EAP | 42 | 719 | 41 |
| ECA | 32 | 158 | 34 |
| LCR | 25 | 197 | 41 |
| MNA | 40 | 16 | 42 |
| SAR | 27 | 63 | 80 |
| Total | 35 | 76 | 35 |

Source: Medians of the developing countries rate of return reported by CB in Tables 6 and 7

A broader international comparison can be made with the Ibbotson database that includes 145 countries and reports cost of capital estimates using 6 alternative methodologies, though not all are applied in every country.[8] We will use the two models presented for all countries. Table 4 summarizes the comparison. In the longer sample period (1980-2004) there is a significant discrepancy between both variables. In the more recent and shorter sample (2001-2004), ECA, LCR, and MNA report similar levels

[8] Ibbotson uses the following models: 1) A country risk rating model based on a regression between market returns (IFC data) and the credit rating (Institutional Investor). With the estimated regression and the country's credit rating, the expected returns can be estimated. This model has two versions: a linear and a logarithmic. 2) The country-spread model consisting in adding the sovereign spread over the US Treasury bond plus the cost of equity in the US. 3) International CAPM (Capital Asset Pricing Model) 4) a Globally nested CAPM 5)Relative standard deviation model.

| Table 4<br>Comparison between Financial Rate* of Return and World Bank EER | | | |
|---|---|---|---|
| | Financial Rate | WB ERR-sample 80-04 | WB ERR-sample 01-04 |
| AFR | 30.9 | 14.0 | 19.5 |
| EAP | 23.6 | 16.0 | 19.0 |
| ECA | 24.3 | 15.4 | 22.0 |
| LCR | 23.4 | 15.0 | 22.3 |
| MNA | 20.5 | 15.3 | 19.0 |
| SAR | 27.4 | 16.0 | 21.3 |
| Total | 25.0 | 15.0 | 21.0 |
| *Financial rate is the cost of capital estimated by Ibbotson (2002) | | | |

The Ibbotson cost of capital estimates may be assimilated to an expected financial rate of return. The surprising fact is that the financial rate is higher than the Bank's ERR. A recent comparison of financial rates of return with ERR from the European Development Bank (EBRD) showed that economic rates are higher than financial rates by a margin of 43 percent. (Florio, 1999)

As a final benchmark of the WB ERR, Table 5 shows the ERR of the EBRD and the EU as reported by Florio (1999)[9]. The relatively lower ERR reported for EU projects might be due to methodological problems described by Florio and Vigneti (2004) that tend to underestimate the return of the EU projects, such as the non inclusion of a residual value for investment projects or the inclusion of a virtual replacement cost that would allow starting a new project cycle which is equivalent to including a depreciation cost.

| Table 5<br>Average ERR of different Institutions, sample 1988-1997 | | | |
|---|---|---|---|
| | EBRD | WB | EU |
| Energy distribution | 35.7 | 22.9 | 14.2 |
| Energy production | 44.5 | 14.7 | 11.7 |
| Roads and highways | 23.5 | 33.3 | 18.6 |
| Railways and underground | 21.4 | 26 | 16.7 |
| Ports, airports | Na | 23.2 | 17.4 |
| Water supply | 25.9 | 10.7 | 18.9 |
| Telecom services | 38.6 | 24.1 | na |
| Industries | 28.3 | 26.7 | |
| Total | 31.8 | 25.0 | 17.2 |
| Source: Florio (1999) Table 9 | | | |

[9] The WB rate reported by Florio for the WB is the average of all operations. A more accurate comparison would be to consider ECA operations only. Though Table 1 has a different sector classification, it indicates that considering only ECA operations for the WB would not alter significantly these conclusions.

## II. Questions and issues that must be addressed to revive the Economic Analysis in The World Bank

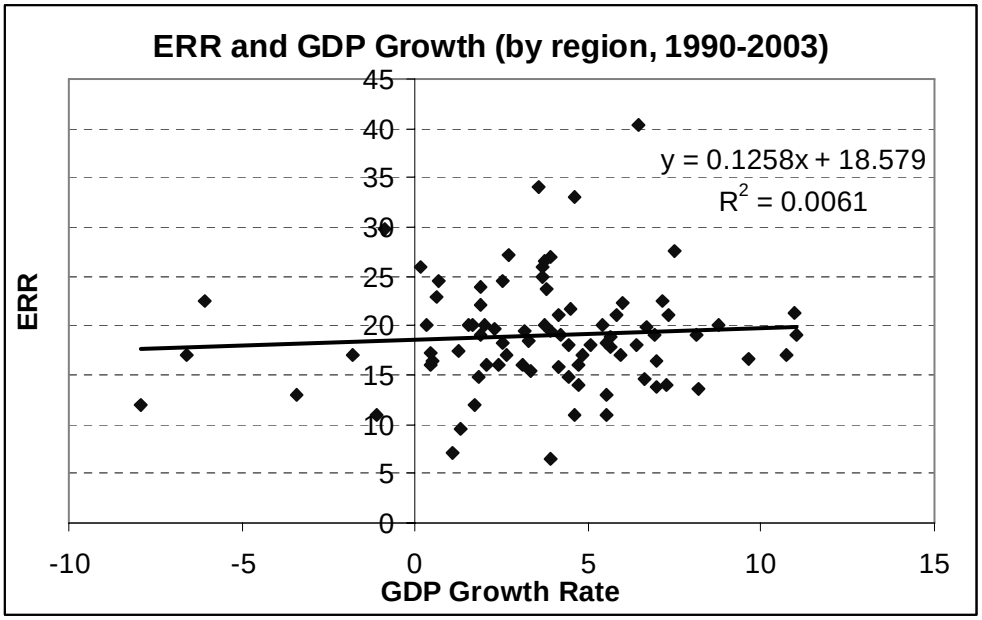
Despite the potential macro and micro benefits of sound economic analysis of Bank projects, there are several factors that lead to skepticism about the practice.

The Bank has a long history in the practice of economic analysis, that has not been free of debate. This history is summarized in papers such as Little-Mireless (1990), World Bank (1992), Jenkins (1997), Devarajan et. al.(1997) and Vawda et.al. (2001). These papers have different views on the usefulness and the quality of the Bank's work.

A. At the macro level

1. An weak relationship of ERR and growth.
Though there is a positive relationship between regional growth and the median ERR (Figure 4), it is not very strong and the causality can go in either in either direction. This preliminary evidence would have to be supported by case studies of countries known for institutional development of economic analysis of public investment. It would be desirable to examine the cases of Chile, the UK, Australia and New Zealand and try to determine how much of their success can be attributed to the project selection mechanisms.

Figure 4




2. Devarajan (1997) questioned the usefulness of the rate of return as a guiding principle for project selection. Based on the hypothesis that resources are fungible, Devarajan suggested focusing on the rationale for public intervention and the fiscal impact of the project. In response to this argument, some argue

Fontaine (2004) that economic analysis of projects should be extended to the overall public investment program, such as in Chile. From the national perspective, what matters is the rate of return of the projects, independently if these are funded with domestic or external funds. Extending the discipline of economic analysis to the overall public investment poses some difficulties..

3. Evaluation of education and health projects is more difficult due to the difficulties in measuring the flow of benefits. Due to this difficulty, until the mid nineties, the Bank's Operational Policy exempted these projects from the general requirement of including cost-benefit analysis in staff appraisal reports. Though this has changed somewhat (Belli, 1996) and Vawda et.al. 2001), it is remarkable the very few education and health projects in the OED database that report ERR, and the practically inexistence of references to economic analysis as a guideline to analyzing public expenditure in the Human Development Network' (see the manual "Preparing PERs for Human Development available at http://hdpers)

B. At the micro or Bank level

1. **Cost of the analysis-** A possible explanation for the abandonment of the economic analysis is its excessive cost. The calculation would compare the cost of doing the analysis with the benefits, analogous to the exercise done by Kilby (1995) to show the impact of supervision on World Bank projects. The cost of the analysis (for instance 8 staff weeks per project) would have an impact on the performance of the project. This better performance translates into a higher rate of return, and this change would have to be applied to the volume of loans. This same exercise can be done at the country level, with the higher rate of return applied to the overall investment program.

2. **Multi-sector loans, DPL, and SWAps-** The shift of Bank operations towards multi-sectoral loans, Adjustment Operations and Development Policy Lending, and Sector Wide Approaches have made irrelevant the estimation of rates of return as guiding principles for project selection. Nevertheless, for the country, the project evaluation and selection based on sound economic analysis is not irrelevant. Therefore, the Bank could insist on the existence of these settings, even if the operation is of the DPL or SWAp type.
3. **Appropriate benchmarks and implications for Bank work (Lending, PER)** Comparing the ERR across multilateral institutions may be informative, as long as the same methodology is applied and other factors are similar (such as the borrowing country or region). In reference to common methodologies, within the Bank it is important to establish if lending operations are following the Operations Policy OP. 10.04 and using the Handbook of Investment Operations. Regarding Public Expenditure Reviews, the manual produced by HD is a step forward in ensuring cohesion of public expenditure analysis. However, economic analysis of projects must be brought to the forefront, and developing a similar tool for INFR could be beneficial. An area that needs attention is the treatment of externalities. In particular, the environmental ones.

## III. Concrete tasks for future work and expected outputs

The economic analysis of projects, at least as captured by the reported ERR, is a practice rapidly falling in disuse. This fact contradicts both the emphasis made on public expenditure to remove growth bottlenecks and the quest for more efficient public spending. The consistent strategy with this approach is to revive cost-benefit analysis and promote its use as the basis for public expenditure appraisal and project selection.

Recommendations and proposals for future work (most of which could be done jointly with OED):

1. Jointly with OED, survey the project evaluation methodology applied to Bank projects. In particular, the sensitivity or risk analysis at appraisal should lead to an upper and lower bounds of the ERR that should be used as a benchmark at completion.
2. Review if there is a gap between the manual (OP) and the practice, and find example of best-practice. Examine PER and find best practice cases. The PERs can be selected from the QAG database of those rated highly satisfactory. Jointly with the sectors (INFR and HD) select best practice cases of projects with EA.
3. Compare methodologies used in different multilateral institutions, in particular the EBRD and the EU to explain differences in the ERR across institutions in projects on the same sectors.
4. Verify the origins of the discrepancy between the ERR at appraisal and at completion. The main task would consist in updating the Pohl-Mihaljek paper on a project- by- project basis. This would require individual project information on cost overruns and delay in implementation.
5. Examine the basis of the upward trend in the ERR. Was there a change in the fundamentals, or any methodological change? Updating the Isham-Kaufman paper would be a cost-effective alternative.
6. Write a paper on documenting or summarizing the the macro evidence on the productivity of public capital in countries that have public expenditure appraisal systems, such as Chile, the UK and New Zealand, among others.
7. Invite specialists on the topic to examine the Bank's experience and current methodology of project appraisal. Reinstate the training in economic analysis of projects that the Bank used to have some years ago.

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# Appendix 1

**Table A.1.a**
**Composition of Bank Projects by Sector**

| | ENM | GIC | RUR | TRN | URD | WSS | OTHERS | Grand Total |
|---|---|---|---|---|---|---|---|---|
| 1975-1979 | 19 | 6 | 34 | 36 | 1 | 5 | 0 | 100 |
| 1980-1984 | 19 | 4 | 43 | 23 | 4 | 7 | 1 | 100 |
| 1985-1989 | 21 | 3 | 44 | 20 | 7 | 5 | 0 | 100 |
| 1990-1994 | 25 | 3 | 42 | 21 | 6 | 3 | 1 | 100 |
| 1995-1999 | 22 | 4 | 31 | 21 | 7 | 10 | 5 | 100 |
| 2000-2004 | 22 | 2 | 29 | 26 | 5 | 9 | 7 | 100 |
| Total | 21 | 4 | 38 | 25 | 5 | 6 | 2 | 100 |

Note: "Others" includes: ECP, EDU, ENV, FIS, HNP, POR, PSD, PSG, SOD, SOP
Source: OED database

Table A.1. b
FRACTION OF PROJECTS WITH REPORTED ERR

| | ENM | GIC | RUR | TRN | URD | WSS | Other | Total |
|---|---|---|---|---|---|---|---|---|
| 1975-1979 | 76.3 | 81.8 | 81.4 | 84.6 | 33.3 | 77.3 | 0.7 | 61.5 |
| 1980-1984 | 72.5 | 91.3 | 81.4 | 81.5 | 73.5 | 62.7 | 1.3 | 58.8 |
| 1985-1989 | 51.4 | 78.3 | 63.1 | 79.4 | 69.8 | 38.0 | 0.8 | 47.9 |
| 1990-1994 | 44.7 | 70.6 | 51.1 | 65.4 | 40.0 | 25.5 | 1.3 | 36.2 |
| 1995-1999 | 58.4 | 73.9 | 49.2 | 70.2 | 41.8 | 62.1 | 3.5 | 32.6 |
| 2000-2004 | 57.9 | 33.3 | 42.7 | 65.6 | 24.2 | 50.8 | 3.2 | 23.8 |

# Appendix 2-
# Mean. Median, Standard Deviation of ERR and number of observations by regions and sector of loan for different sample periods

## A) Full sample 1961-2004

**Mean of ERR 1961-2004**

| | AFR | | EAP | | ECA | | LCR | | MNA | | SAR | | World | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sector | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal |
| ECP | 18.0 | 27.0 | | | | | | 59.0 | | | 12.6 | 11.4 | 15.3 | 36.7 |
| EDU | | 19.0 | | | | | | 20.8 | | 13.0 | 19.0 | | 19.0 | 18.6 |
| ENM | 14.6 | 19.9 | 17.2 | 19.2 | 28.4 | 26.2 | 12.9 | 19.7 | 13.0 | 21.3 | 24.3 | 23.5 | 18.4 | 21.5 |
| ENV | 18.0 | 25.7 | 22.2 | 18.2 | 14.5 | 35.2 | 28.0 | 19.0 | | | 16.4 | 20.5 | 20.0 | 22.2 |
| FIS | 110.0 | 31.7 | | | 17.4 | 28.8 | 20.1 | 20.2 | 31.1 | 15.6 | 39.5 | 18.8 | 30.7 | 23.2 |
| GIC | 20.6 | 22.5 | 19.5 | 19.1 | 31.1 | 32.8 | 16.6 | 20.5 | 26.9 | 23.0 | 22.0 | 20.9 | 21.5 | 22.0 |
| HNP | | | 21.0 | 26.0 | | | 69.0 | 33.5 | | | | | 27.8 | 23.8 |
| POR | | | | | | | | | | | | | | |
| PSD | 26.5 | 31.8 | | | 31.0 | 47.0 | 17.7 | 21.4 | | 29.5 | | | 23.9 | 32.1 |
| PSG | | 44.0 | 95.0 | 162.7 | | | | 39.1 | | | | | 95.0 | 128.1 |
| RUR | 10.3 | 22.7 | 17.5 | 24.4 | 16.0 | 23.4 | 16.1 | 22.5 | 16.7 | 22.7 | 18.2 | 28.0 | 15.2 | 24.0 |
| SOD | | | | | | | 20.3 | 25.9 | | | | | 20.3 | 25.9 |
| SOP | 27.8 | 23.2 | 27.0 | 12.0 | | | | 14.9 | | | | | 27.6 | 20.4 |
| TRN | 25.7 | 30.6 | 24.7 | 27.1 | 23.9 | 27.2 | 26.2 | 30.2 | 28.2 | 29.0 | 24.2 | 26.6 | 25.5 | 29.2 |
| URD | 19.5 | 25.7 | 17.8 | 21.1 | 15.7 | 19.2 | 19.0 | 22.3 | 16.3 | 19.2 | 17.4 | 21.6 | 18.3 | 22.5 |
| WSS | 7.5 | 13.0 | 9.6 | 12.0 | 9.8 | 19.5 | 11.3 | 14.5 | 9.7 | 13.8 | 12.4 | 10.4 | 9.8 | 13.7 |
| World | 16.7 | 24.6 | 19.6 | 24.1 | 21.8 | 25.3 | 18.4 | 23.5 | 17.8 | 22.4 | 20.4 | 25.1 | 18.8 | 24.2 |

**Median of ERR 1961-2004**

| | AFR | | EAP | | ECA | | LCR | | MNA | | SAR | | World | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sector | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal |
| ECP | 18.0 | 27.0 | | | | | | 59.0 | | | 12.6 | 11.4 | 15.3 | 27.0 |
| EDU | | 19.0 | | | | | | 20.8 | | 13.0 | 19.0 | | 19.0 | 19.0 |
| ENM | 10.9 | 17.0 | 14.0 | 16.7 | 15.0 | 17.6 | 11.0 | 16.0 | 12.7 | 16.5 | 15.7 | 17.6 | 13.5 | 16.9 |
| ENV | 18.0 | 25.7 | 22.6 | 16.7 | 14.5 | 35.2 | 28.0 | 18.0 | | | 16.0 | 17.0 | 18.1 | 17.5 |
| FIS | 110.0 | 33.0 | | | 12.2 | 31.5 | 20.0 | 21.0 | 30.0 | 12.0 | 39.5 | 12.0 | 25.9 | 22.8 |
| GIC | 18.1 | 20.0 | 18.0 | 17.0 | 28.0 | 31.0 | 18.0 | 19.0 | 28.0 | 23.0 | 19.0 | 20.0 | 20.0 | 20.0 |
| HNP | | | 21.0 | 26.0 | | | 69.0 | 33.5 | | | | | 21.0 | 22.5 |
| POR | | | | | | | | | | | | | | |
| PSD | 26.5 | 31.0 | | | 31.0 | 47.0 | 17.7 | 21.4 | | 29.5 | | | 29.9 | 29.5 |
| PSG | | 44.0 | 34.5 | 24.0 | | | | 39.1 | | | | | 34.5 | 39.1 |
| RUR | 10.0 | 20.0 | 14.7 | 21.0 | 13.6 | 20.0 | 13.0 | 20.0 | 15.0 | 21.0 | 15.6 | 23.0 | 14.0 | 21.0 |
| SOD | | | | | | | 20.3 | 25.9 | | | | | 20.3 | 25.9 |
| SOP | 26.5 | 17.0 | 27.0 | 12.0 | | | | 14.9 | | | | | 27.0 | 16.0 |
| TRN | 19.0 | 23.0 | 22.5 | 25.0 | 20.0 | 22.0 | 21.0 | 24.0 | 21.0 | 22.0 | 21.9 | 25.0 | 21.0 | 24.0 |
| URD | 18.0 | 22.0 | 17.0 | 19.0 | 10.5 | 17.2 | 17.1 | 18.0 | 15.0 | 20.0 | 16.3 | 20.0 | 17.0 | 20.0 |
| WSS | 8.5 | 12.0 | 9.2 | 9.5 | 10.0 | 13.6 | 8.8 | 13.4 | 10.0 | 10.5 | 8.2 | 9.0 | 9.0 | 12.0 |
| World | 14.0 | 20.0 | 16.6 | 20.0 | 15.0 | 20.0 | 15.0 | 19.5 | 15.4 | 19.0 | 16.0 | 21.0 | 15.0 | 20.0 |

**Standard Deviation of ERR 1961-2004**

| | AFR | | EAP | | ECA | | LCR | | MNA | | SAR | | World | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sector | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal |
| ECP | | 12.7 | | | | | | 45.3 | | | | | 3.8 | 31.8 |
| EDU | | 1.0 | | | | | | 2.5 | | | | | | 3.2 |
| ENM | 16.8 | 12.0 | 12.5 | 9.9 | 74.9 | 29.4 | 11.7 | 14.5 | 22.0 | 17.5 | 30.1 | 18.4 | 33.7 | 17.8 |
| ENV | 8.5 | 14.6 | 12.1 | 6.2 | 20.5 | 23.8 | 8.0 | 4.6 | | | 1.8 | 10.5 | 9.7 | 11.1 |
| FIS | | 14.0 | | | 11.5 | 12.7 | 2.4 | 7.3 | 2.6 | 6.2 | 13.4 | 11.8 | 25.4 | 11.2 |
| GIC | 7.0 | 10.3 | 8.9 | 6.1 | 9.0 | 6.8 | 9.5 | 7.8 | 8.2 | 8.0 | 12.4 | 5.9 | 9.8 | 8.4 |
| HNP | | | 12.7 | 4.9 | | | | 47.4 | | | | | 30.1 | 27.5 |
| POR | | | | | | | | | | | | | | |
| PSD | 4.9 | 9.2 | | | | | 17.3 | | | | | | 10.8 | 10.0 |
| PSG | | | 143.6 | 226.8 | | | | | | | | | 143.6 | 194.4 |
| RUR | 12.7 | 12.1 | 14.7 | 13.4 | 9.0 | 13.1 | 14.7 | 9.0 | 10.0 | 11.0 | 13.1 | 17.2 | 13.5 | 13.2 |
| SOD | | | | | | | 17.9 | 17.8 | | | | | 17.9 | 17.8 |
| SOP | 11.2 | 10.3 | | | | | | | | | | | 9.7 | 9.7 |
| TRN | 25.7 | 32.1 | 14.7 | 13.3 | 13.7 | 14.1 | 19.8 | 18.7 | 24.9 | 17.5 | 18.2 | 11.8 | 21.1 | 23.2 |
| URD | 13.7 | 14.7 | 7.1 | 8.0 | 16.1 | 8.4 | 11.7 | 12.0 | 7.9 | 4.7 | 10.3 | 9.3 | 11.0 | 11.4 |
| WSS | 6.1 | 6.2 | 6.7 | 7.6 | 6.3 | 23.3 | 9.0 | 6.1 | 10.4 | 9.8 | 13.7 | 6.3 | 8.9 | 10.1 |
| World | 19.6 | 21.1 | 18.6 | 25.7 | 43.4 | 20.6 | 16.2 | 14.7 | 18.2 | 14.2 | 19.7 | 16.4 | 22.2 | 19.8 |

Number of Observations

| Sector | AFR | | EAP | | ECA | | LCR | | MNA | | SAR | | World | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Completion | Appraisal | Completion | Appraisal | Completion | Appraisal | Completion | Appraisal | Completion | Appraisal | Completion | Appraisal | Completion | Appraisal |
| ECP | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 2 | 5 |
| EDU | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 0 | 1 | 6 |
| ENM | 76 | 91 | 127 | 136 | 82 | 97 | 123 | 123 | 66 | 70 | 111 | 118 | 585 | 635 |
| ENV | 2 | 2 | 4 | 4 | 2 | 2 | 3 | 3 | 0 | 0 | 5 | 5 | 16 | 16 |
| FIS | 1 | 3 | 0 | 0 | 5 | 4 | 3 | 4 | 3 | 3 | 2 | 3 | 14 | 17 |
| GIC | 29 | 30 | 20 | 23 | 7 | 8 | 15 | 15 | 11 | 11 | 22 | 22 | 104 | 109 |
| HNP | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 3 | 4 |
| POR | 0 | 0 | 0 | 0 | | | 0 | 0 | | | 0 | 0 | 0 | 0 |
| PSD | 2 | 4 | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 5 | 7 |
| PSG | 0 | 1 | 4 | 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 7 |
| RUR | 298 | 370 | 221 | 232 | 83 | 95 | 145 | 179 | 85 | 109 | 203 | 222 | 1035 | 1207 |
| SOD | 0 | 0 | | | 0 | 0 | 2 | 2 | | | | | 2 | 2 |
| SOP | 4 | 5 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 5 | 7 |
| TRN | 235 | 282 | 132 | 140 | 58 | 68 | 153 | 167 | 53 | 63 | 48 | 51 | 679 | 771 |
| URD | 37 | 51 | 27 | 31 | 5 | 5 | 33 | 41 | 17 | 22 | 12 | 16 | 131 | 166 |
| WSS | 44 | 46 | 18 | 25 | 15 | 19 | 37 | 48 | 30 | 34 | 20 | 23 | 164 | 195 |
| World | 729 | 890 | 556 | 599 | 258 | 299 | 517 | 591 | 265 | 314 | 425 | 461 | 2750 | 3154 |

## B) Sample 1980-2004

**Mean of ERR 1980-2004**

| Sector | AFR | | EAP | | ECA | | LCR | | MNA | | SAR | | World | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Completi | Appraisa | Completi | Appraisa | Completi | Appraisa | Completi | Appraisa | Completi | Appraisa | Completi | Appraisa | Completi | Appraisal |
| ECP | 18.0 | 27.0 | | | | | | 59.0 | | | 12.6 | 11.4 | 15.3 | 36.7 |
| EDU | | 19.0 | | | | | | 20.8 | | 13.0 | 19.0 | | 19.0 | 18.6 |
| ENM | 15.7 | 20.5 | 17.5 | 19.5 | 31.6 | 28.1 | 12.5 | 21.6 | 11.8 | 21.6 | 24.6 | 24.1 | 19.0 | 22.4 |
| ENV | 18.0 | 25.7 | 22.2 | 18.2 | 14.5 | 35.2 | 28.0 | 19.0 | | | 16.4 | 20.5 | 20.0 | 22.2 |
| FIS | 110.0 | 31.7 | | | 19.1 | 28.8 | 20.1 | 20.2 | 31.1 | 15.6 | 39.5 | 18.8 | 32.2 | 23.2 |
| GIC | 20.3 | 23.4 | 19.0 | 20.3 | 30.7 | 33.7 | 16.3 | 20.9 | 28.3 | 25.0 | 23.3 | 21.4 | 21.8 | 23.2 |
| HNP | 0.0 | 0.0 | 21.0 | 26.0 | | | 69.0 | 33.5 | | | | | 27.8 | 23.8 |
| POR | | | | | | | | | | | | | | |
| PSD | 26.5 | 31.8 | | | 31.0 | 47.0 | 17.7 | 21.4 | | 29.5 | | | 23.9 | 32.1 |
| PSG | | 44.0 | 95.0 | 162.7 | | | | 39.1 | | | | | 95.0 | 128.1 |
| RUR | 9.8 | 23.3 | 16.9 | 24.2 | 16.1 | 23.5 | 17.2 | 22.6 | 17.2 | 23.4 | 17.2 | 28.2 | 15.0 | 24.3 |
| SOD | | | | | | | 20.3 | 25.9 | | | | | 20.3 | 25.9 |
| SOP | 27.8 | 23.2 | 27.0 | 12.0 | | | | 14.9 | | | | | 27.6 | 20.4 |
| TRN | 28.8 | 34.5 | 25.0 | 28.4 | 26.1 | 29.7 | 27.9 | 34.2 | 31.8 | 32.3 | 25.9 | 28.8 | 27.6 | 32.2 |
| URD | 19.5 | 25.7 | 18.3 | 21.2 | 18.7 | 24.4 | 19.0 | 22.4 | 16.3 | 19.2 | 17.6 | 21.7 | 18.5 | 22.7 |
| WSS | 6.9 | 12.3 | 9.7 | 12.0 | 9.8 | 19.5 | 11.9 | 14.5 | 9.6 | 14.1 | 12.4 | 10.4 | 9.9 | 13.6 |
| Average | 17.0 | 25.7 | 19.4 | 24.4 | 22.9 | 26.5 | 19.0 | 24.8 | 17.9 | 23.2 | 20.2 | 25.5 | 19.0 | 25.1 |

**Median of ERR 1980-2004**

| Sector | AFR | | EAP | | ECA | | LCR | | MNA | | SAR | | World | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Completio | Appraisal | Completion | Appraisal | Completion | Appraisal | Completion | Appraisal | Completion | Appraisal | Completion | Appraisal | Completion | Appraisal |
| ECP | 18 | 27 | | | | | | 59 | | | 13 | 11 | 15 | 27 |
| EDU | | 19 | | | | | | 21 | | 13 | 19 | | 19 | 19 |
| ENM | 11 | 18 | 15 | 16 | 15 | 19 | 10 | 17 | 13 | 17 | 16 | 18 | 14 | 17 |
| ENV | 18 | 26 | 23 | 17 | 15 | 35 | 28 | 18 | | | 16 | 17 | 18 | 18 |
| FIS | 110 | 33 | | | 13 | 32 | 20 | 21 | 30 | 12 | 40 | 12 | 29 | 23 |
| GIC | 18 | 20 | 17 | 19 | 27 | 33 | 16 | 21 | 29 | 24 | 17 | 20 | 19 | 21 |
| HNP | 0 | 0 | 21 | 26 | | | 69 | 34 | | | | | 21 | 23 |
| POR | | | | | | | | | | | | | | |
| PSD | 27 | 31 | | | 31 | 47 | 18 | 21 | | 30 | | | 30 | 30 |
| PSG | | 44 | 35 | 24 | | | | 39 | | | | | 35 | 39 |
| RUR | 9 | 21 | 14 | 21 | 14 | 20 | 13 | 20 | 15 | 21 | 15 | 23 | 14 | 21 |
| SOD | | | | | | | 20 | 26 | | | | | 20 | 26 |
| SOP | 27 | 17 | 27 | 12 | | | | 15 | | | | | 27 | 16 |
| TRN | 23 | 25 | 22 | 27 | 23 | 26 | 21 | 28 | 24 | 26 | 26 | 27 | 22 | 26 |
| URD | 18 | 22 | 17 | 20 | 11 | 26 | 17 | 18 | 15 | 20 | 18 | 20 | 17 | 20 |
| WSS | 6 | 11 | 9 | 10 | 10 | 14 | 9 | 13 | 10 | 10 | 8 | 9 | 9 | 12 |
| Averag | 14 | 21 | 16 | 20 | 15 | 21 | 15 | 20 | 15 | 20 | 16 | 22 | 15 | 21 |

**Standard Deviation 1980-2004**

| Sector | AFR Completio | AFR Appraisal | EAP Completior | EAP Appraisal | ECA Completior | ECA Appraisal | LCR Completior | LCR Appraisal | MNA Completior | MNA Appraisal | SAR Completior | SAR Appraisal | World Total Completior | World Total Appraisal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECP | | 13 | | | | | | 45 | | | | | 4 | 32 |
| EDU | | 1 | | | | | | 3 | | | | | 13 | 3 |
| ENM | 18 | 13 | 13 | 10 | 84 | 32 | 13 | 16 | 22 | 18 | 31 | 19 | 36 | 19 |
| ENV | 8 | 15 | 12 | 6 | 20 | 24 | 8 | 5 | | | 2 | 10 | 10 | 11 |
| FIS | | 14 | | | 13 | 13 | 2 | 7 | 3 | 6 | 13 | 12 | 26 | 11 |
| GIC | 8 | 11 | 10 | 7 | 10 | 7 | 9 | 9 | 9 | 8 | 15 | 5 | 11 | 9 |
| HNP | | | 13 | 5 | | | | 47 | | | | | 30 | 28 |
| POR | | | | | | | | | | | | | | |
| PSD | 5 | 9 | | | | | 17 | | | | | | 11 | 10 |
| PSG | | | 144 | 227 | | | | | | | | | 144 | 194 |
| RUR | 13 | 12 | 15 | 13 | 9 | 13 | 16 | 10 | 10 | 11 | 13 | 17 | 13 | 13 |
| SOD | | | | | | | 18 | 18 | | | | | 18 | 18 |
| SOP | 11 | 10 | | | | | | | | | | | 10 | 10 |
| TRN | 28 | 37 | 15 | 14 | 14 | 15 | 22 | 20 | 28 | 18 | 20 | 11 | 23 | 26 |
| URD | 14 | 15 | 7 | 8 | 17 | 7 | 12 | 12 | 8 | 5 | 11 | 10 | 11 | 11 |
| WSS | 6 | 6 | 7 | 8 | 6 | 23 | 10 | 6 | 11 | 10 | 14 | 6 | 9 | 10 |
| Overa | 21 | 23 | 19 | 27 | 47 | 22 | 18 | 16 | 19 | 15 | 20 | 17 | 24 | 21 |

**Number of Observations 1980-2004**

| Sector | AFR Completio | AFR Appraisal | EAP Completior | EAP Appraisal | ECA Completior | ECA Appraisal | LCR Completior | LCR Appraisal | MNA Completior | MNA Appraisal | SAR Completior | SAR Appraisal | World Total Completior | World Total Appraisal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECP | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 2 | 5 |
| EDU | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 2 | 6 |
| ENM | 63 | 79 | 115 | 122 | 65 | 78 | 85 | 94 | 59 | 62 | 100 | 106 | 487 | 541 |
| ENV | 2 | 2 | 4 | 4 | 2 | 2 | 3 | 3 | 0 | 0 | 5 | 5 | 16 | 16 |
| FIS | 1 | 3 | 0 | 0 | 4 | 4 | 3 | 4 | 3 | 3 | 2 | 3 | 13 | 17 |
| GIC | 22 | 23 | 14 | 17 | 6 | 7 | 9 | 9 | 8 | 8 | 14 | 14 | 73 | 78 |
| HNP | 1 | 1 | 2 | 2 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 4 | 5 |
| POR | 0 | 0 | 0 | 0 | | | 0 | 0 | | | 0 | 0 | 0 | 0 |
| PSD | 2 | 4 | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 5 | 7 |
| PSG | 0 | 1 | 4 | 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 7 |
| RUR | 243 | 309 | 194 | 205 | 75 | 86 | 108 | 140 | 75 | 97 | 180 | 198 | 875 | 1,035 |
| SOD | 0 | 0 | | | 0 | 0 | 2 | 2 | | | | | 2 | 2 |
| SOP | 4 | 5 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 5 | 7 |
| TRN | 162 | 198 | 104 | 112 | 44 | 54 | 107 | 121 | 40 | 50 | 39 | 43 | 496 | 578 |
| URD | 37 | 51 | 26 | 30 | 4 | 3 | 33 | 40 | 17 | 22 | 11 | 15 | 128 | 161 |
| WSS | 36 | 39 | 17 | 25 | 15 | 19 | 32 | 43 | 27 | 31 | 20 | 23 | 147 | 180 |
| Total | 574 | 720 | 481 | 523 | 216 | 254 | 386 | 465 | 229 | 275 | 373 | 408 | 2,259 | 2,645 |

## C) Sample 2001-2004

**Mean of ERR 2001-2004**

| Sector | AFR Completio | AFR Appraisal | EAP Completio | EAP Appraisal | ECA Completio | ECA Appraisal | LCR Completio | LCR Appraisal | MNA Completio | MNA Appraisal | SAR Completio | SAR Appraisal | World Completio | World Appraisal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ECP** | | | | | | | | | | | | | | |
| **EDU** | | **18.5** | | | | | | **20.8** | | **13.0** | **19.0** | | **19.0** | **18.3** |
| **ENM** | **39.2** | **32.2** | **16.4** | **21.1** | **71.4** | **23.1** | **30.5** | **25.8** | **-14.3** | **22.7** | **26.4** | **26.0** | **37.9** | **24.8** |
| **ENV** | | | **31.8** | **21.5** | | **18.4** | | | | | **16.0** | **39.0** | **26.5** | **25.1** |
| **FIS** | | | | | **12.1** | **26.0** | | | **29.2** | **22.8** | | | **17.8** | **24.9** |
| **GIC** | **36.0** | **52.0** | **31.0** | **27.0** | **43.0** | **37.0** | | | | | | | **36.7** | **34.0** |
| **HNP** | | | **30.0** | **22.5** | | | **69.0** | **33.5** | | | | | **33.0** | **22.4** |
| **POR** | | | | | | | | | | | | | | |
| **PSD** | **23.0** | **31.8** | | | | | **17.7** | **21.4** | | | | | **19.4** | **29.7** |
| **PSG** | | | **32.0** | **22.0** | | | | | | | | | **32.0** | **22.0** |
| **RUR** | **18.9** | **21.3** | **20.8** | **24.9** | **17.6** | **29.7** | **22.5** | **22.3** | **18.0** | **21.3** | **19.1** | **19.4** | **19.9** | **23.0** |
| **SOD** | | | | | | | **20.3** | **25.9** | | | | | **20.3** | **25.9** |
| **SOP** | **41.0** | **16.0** | **27.0** | **12.0** | | | | | | | | | **34.0** | **14.0** |
| **TRN** | **36.8** | **62.3** | **21.4** | **25.8** | **23.1** | **31.4** | **40.9** | **42.4** | **32.3** | **37.5** | **50.2** | **36.4** | **32.9** | **40.0** |
| **URD** | **46.5** | **43.8** | **15.2** | **20.7** | **8.6** | **25.9** | **23.6** | **19.0** | **13.1** | **21.9** | | | **21.3** | **29.8** |
| **WSS** | **9.2** | **16.2** | **14.6** | **14.7** | **12.4** | **35.0** | **18.9** | **19.9** | **23.2** | **25.8** | **37.3** | **21.0** | **19.1** | **22.7** |
| **World** | **29.8** | **35.4** | **20.7** | **23.2** | **36.7** | **28.4** | **29.8** | **29.7** | **17.0** | **24.3** | **27.3** | **24.6** | **27.2** | **28.0** |

**Median of ERR 2001-2004**

| Sector | AFR | | EAP | | ECA | | LCR | | MNA | | SAR | | World | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Completio | Appraisal | Completio | Appraisal | Completio | Appraisal | Completio | Appraisal | Completio | Appraisal | Completio | Appraisal | Completio | Appraisal |
| **ECP** | | | | | | | | | | | | | | |
| **EDU** | | **18.5** | | | | | | **20.8** | | **13.0** | **19.0** | | **19.0** | **19.0** |
| **ENM** | **32.6** | **27.5** | **13.5** | **20.4** | **24.5** | **20.5** | **30.5** | **25.8** | **15.0** | **17.0** | **22.3** | **22.1** | **22.0** | **21.0** |
| **ENV** | | | **31.8** | **21.5** | | **18.4** | | | | | **16.0** | **39.0** | **28.0** | **22.7** |
| **FIS** | | | | | **12.1** | **26.0** | | | **29.2** | **22.8** | | | **12.2** | **22.8** |
| **GIC** | **36.0** | **52.0** | **31.0** | **27.0** | **43.0** | **37.0** | | | | | | | **36.0** | **31.0** |
| **HNP** | | | **30.0** | **22.5** | | | **69.0** | **33.5** | | | | | **30.0** | **11.3** |
| **POR** | | | | | | | | | | | | | | |
| **PSD** | **23.0** | **31.0** | | | | | **17.7** | **21.4** | | | | | **23.0** | **25.0** |
| **PSG** | | | **32.0** | **22.0** | | | | | | | | | **32.0** | **22.0** |
| **RUR** | **16.0** | **21.3** | **18.1** | **21.0** | **16.4** | **20.5** | **16.0** | **19.0** | **18.5** | **19.0** | **18.0** | **19.0** | **17.0** | **20.0** |
| **SOD** | | | | | | | **20.3** | **25.9** | | | | | **20.3** | **25.9** |
| **SOP** | **41.0** | **16.0** | **27.0** | **12.0** | | | | | | | | | **34.0** | **14.0** |
| **TRN** | **18.0** | **30.0** | **22.3** | **24.0** | **23.0** | **31.0** | **29.5** | **37.5** | **32.0** | **39.0** | **49.0** | **38.5** | **25.0** | **32.0** |
| **URD** | **46.5** | **37.0** | **12.7** | **22.0** | **8.6** | **25.9** | **23.6** | **19.0** | **12.0** | **22.8** | | | **13.2** | **23.5** |
| **WSS** | **11.5** | **16.1** | **15.0** | **17.4** | **9.0** | **16.2** | **17.5** | **19.0** | **21.0** | **17.0** | **37.0** | **22.0** | **18.3** | **17.3** |
| **World** | **19.5** | **24.0** | **19.0** | **22.1** | **22.0** | **21.0** | **22.3** | **24.5** | **19.0** | **21.1** | **21.3** | **22.0** | **21.0** | **22.5** |

Standard Deviation of ERR

| Sector | AFR | | EAP | | ECA | | LCR | | MNA | | SAR | | World | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal |
| ECP | | | | | | | | | | | | | | |
| EDU | | 0.7 | | | | | | 2.5 | | | | | | 3.4 |
| ENM | 30.9 | 19.0 | 5.1 | 6.7 | 174.0 | 11.7 | 4.9 | 1.8 | 75.4 | 9.8 | 12.7 | 11.8 | 99.2 | 12.1 |
| ENV | | | 5.4 | 7.8 | | | | | | | | | 9.9 | 10.4 |
| FIS | | | | | 0.1 | 19.8 | | | | | | | 9.9 | 14.1 |
| GIC | | | | 4.0 | | | | | | | | | 6.0 | 11.3 |
| HNP | | | | | | | | 47.4 | | | | | 34.6 | 31.6 |
| POR | | | | | | | | | | | | | | |
| PSD | | 9.2 | | | | | 17.3 | | | | | | 12.6 | 9.2 |
| PSG | | | 39.6 | 2.8 | | | | | | | | | 39.6 | 2.8 |
| RUR | 17.3 | 11.8 | 10.4 | 11.2 | 9.2 | 20.1 | 19.1 | 9.2 | 7.1 | 8.2 | 6.2 | 5.3 | 12.3 | 11.7 |
| SOD | | | | | | | 17.9 | 17.8 | | | | | 17.9 | 17.8 |
| SOP | | | | | | | | | | | | | 9.9 | 2.8 |
| TRN | 38.2 | 111.2 | 5.9 | 7.5 | 11.4 | 10.0 | 31.7 | 23.1 | 7.5 | 3.8 | 30.2 | 5.9 | 26.8 | 53.2 |
| URD | 30.4 | 25.7 | 5.9 | 5.1 | | | 14.7 | 2.8 | 3.5 | 5.8 | | | 17.3 | 19.0 |
| WSS | 6.2 | | 6.0 | | 10.3 | | 4.3 | | 6.3 | | 17.9 | | 11.5 | |
| World | 29.3 | 58.3 | 10.1 | 8.6 | 101.5 | 18.0 | 24.6 | 19.2 | 26.0 | 10.5 | 17.7 | 9.8 | 46.8 | 29.6 |

Number of Observations

| Sector | AFR | | EAP | | ECA | | LCR | | MNA | | SAR | | World | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal | Completior | Appraisal |
| ECP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EDU | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 0 | 1 | 5 |
| ENM | 8 | 8 | 9 | 11 | 14 | 16 | 2 | 2 | 3 | 3 | 10 | 9 | 46 | 49 |
| ENV | 0 | 0 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 4 |
| FIS | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 3 | 3 |
| GIC | 1 | 1 | 1 | 3 | 1 | 1 | | | 0 | 0 | 0 | 0 | 3 | 5 |
| HNP | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 3 |
| POR | 0 | 0 | 0 | 0 | | | 0 | 0 | | | 0 | 0 | 0 | 0 |
| PSD | 1 | 4 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 3 | 5 |
| PSG | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| RUR | 9 | 16 | 19 | 19 | 10 | 12 | 15 | 11 | 9 | 12 | 14 | 17 | 76 | 87 |
| SOD | 0 | 0 | | | 0 | 0 | 2 | 2 | | | | | 2 | 2 |
| SOP | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | | 2 | 2 |
| TRN | 13 | 15 | 13 | 16 | 11 | 13 | 15 | 16 | 3 | 4 | 5 | 6 | 60 | 70 |
| URD | 2 | 6 | 3 | 3 | 1 | 1 | 2 | 2 | 3 | 4 | 0 | 0 | 11 | 16 |
| WSS | 4 | 6 | 4 | 4 | 3 | 6 | 4 | 7 | 6 | 7 | 3 | 3 | 24 | 33 |
| World | 39 | 59 | 55 | 62 | 42 | 52 | 43 | 45 | 25 | 32 | 34 | 36 | 238 | 286 |

## Appendix 3

| Discrepancy between ERR at Appraisal and at Completion-"optimism bias"* 2001-2004 | | | |
|---|---|---|---|
| By Region | | By Sector | |
| AFR | 23 | ENM | -5 |
| EAP | 16 | GIC | -14 |
| ECA | -5 | RUR | 18 |
| LCR | 10 | TRN | 28 |
| MNA | 11 | URD | 78 |
| SAR | 3 | WSS | -5 |
| *Defined as the ratio of ERR at appraisal to ERR at completion, minus one | | | |

## Appendix 4
## Stationary tests with structural breaks in the ERR series

The statistical analysis shows that the ERR time series is stationary. The unit root hypothesis is rejected if we allow for structural changes in the test, following Perron(199?). The test is done by a two-step procedure. In the first step, the breaking points where the changes occur are determined and the ERR series is detrended. We run the following two regressions:

$$y_t = \mu + \beta t + \gamma DU_t + \tilde{y}_t \qquad (1)$$

$$y_t = \mu + \beta t + \theta DU_t + \gamma DT_t^* + \tilde{y}_t \qquad (2)$$

where $DU_t$=1 and $DT_t^*$=(t-$T_b$) if t>$T_b$ (0 otherwise), and $\tilde{y}_t$ is defined as the detrended series. $T_b$ is the break date which we choose endogenously by the following method. According to Christiano(1992), we chose $T_b$ as the value, over all possible break points, which maximized the value of t-statistics for testing $\gamma$ =0 in equations (1) and (2). We ran equation (1) first, and found that 1992 was the breaking point where a significant change in ERR levels happened. Then we ran equation (2), assigning $DU_t$=1 if t>1992 and found that 1987 was the year where the slope of ERR trend changed significantly.

The second step tests the unit root hypothesis based on the detrended series $\tilde{y}_t$ from step one, using the break points selected from step one. The test is based on the value of t-statistic for testing $\alpha$ =1 in the following autoregression of $\tilde{y}_t$:

$$\tilde{y}_t = \alpha \tilde{y}_{t-1} + \sum_{j=0}^{k} d_j D(T_b)_{t-j} + \sum_{i=1}^{k} a_i \Delta \tilde{y}_{t-i} + e_t$$

where $D(T_b)_t=1$ if $t= T_b+1$ (0 otherwise). The p value for testing $\alpha =1$ is equal to 0.00, so we reject the hypothesis that ERR is a unit root series.

## Appendix 5

To explain the upward trend in the ERR, we present a simple and preliminary statistical exercise based on previous work on the determinants of the ERR. On one hand, we include policy variables included in the Isham and Kaufman study, and on the other project-specific variables, as well as sector-specific and region-specific dummies, such as in Pohl and Mihaljek. As policy variables, we included the region's openness to trade (OPEN), measured by the ratio of total trade to GDP, and the fiscal balance (FISBAL). The level of investment (INV) was also included, though the ideal variable is public investment that was unavailable for a wide sample of countries. By employing a fixed-effects panel[10] we contemplate the region-specific effects found significant by Pohl and Mihaljek. The ERR at appraisal (ERRAP) was also included to capture some of the project specificity, as in Pohll-Mijaljeck.

Table 3 summarizes the results: openness and fiscal balances are positively correlated with the ERR and ERR appears unrelated to the ERR level. These preliminary findings are similar to Isham-Kaufman's, except for the non-monotonic relationship between investment and the ERR. It is necessary to point that the present estimates are based on total investment (private and public), while the Isham-Kaufman results are based on public investment. The magnitude and sign of the appraisal ERR (ERRAP) is identical to Pohl's estimation.[11] With the coefficients reported in Table 3 we estimate the ERR increase due to the policy changes: between the 1985-1992 and 1993-2004 period the average trade ratio rose from 40 to 54 percent of GDP, yielding an increase of 3.9 percentage points. Together with the change attributable to the fiscal balance improvement (.4) percentage points, the total estimated change in the ERR is about 60 percent of the observed change.

[10] To contemplate the possibility of heterogeneous residual variances across regions and potential correlations in the ERR across the regions, the panel was estimated by Seemingly Unrelated Regression (SUR) methods. The SUR method, however, requires a balanced sample, forcing a shortening of the sample period to 1990-2003. If the SUR method is not imposed, and some if the variables dropped (the fiscal balance is not available for all the regions before 1990 and is sparsely available before that year), then a longer sample may be used (1972-2003).

[11] A different specification of the model without SUR (Table A5-2), allowed the use of a longer data set (since 1972), yielded a negative sign of the investment variable, statistically significant, which is the expected sign given the decreasing marginal productivity of capital.

Table A5-1
Determinants of the Economic Rate of Return

Dependent Variable: ERR
Method: Pooled EGLS (Cross-section SUR)
Sample (adjusted): 1990 2003
Included observations: 14 after adjustments
Cross-sections included: 6
Total pool (balanced) observations: 84
Linear estimation after one-step weighting matrix

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -9.14 | 5.93 | -1.54 | 0.13 |
| OPEN | 0.28 | 0.05 | 5.49 | 0.00 |
| FISBAL | 0.50 | 0.20 | 2.47 | 0.02 |
| ERRAP | 0.43 | 0.10 | 4.42 | 0.00 |
| INV | 0.26 | 0.22 | 1.19 | 0.24 |
| Fixed Effects (Cross) | | | | |
| _AFR--C | -1.65 | | | |
| _EAP--C | -7.30 | | | |
| _LCR--C | 4.83 | | | |
| _MNA--C | -1.47 | | | |
| _SAR--C | 7.67 | | | |
| _ECA--C | -2.07 | | | |

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

| | | | |
|---|---|---|---|
| R-squared | 0.93 | Mean dependent var | 6.45 |
| Adjusted R-squared | 0.93 | S.D. dependent var | 3.92 |
| S.E. of regression | 1.06 | Sum squared resid | 83.47 |
| F-statistic | 117.60 | Durbin-Watson stat | 2.31 |
| Prob(F-statistic) | 0.00 | | |

Unweighted Statistics

| | | | |
|---|---|---|---|
| R-squared | 0.26 | Mean dependent var | 19.04 |
| Sum squared resid | 1947.32 | Durbin-Watson stat | 2.29 |

Open= Exports plus imports (% of GDP)
Fisbal=Fiscal balance (% of GDP)
Errap= ERR at appraisal
Inv = Investment (public and private) as a share of GDP

## Table A5-2
## Determinants of the ERR of the World Bank Projects

Dependent Variable: ERR
Method: Pooled EGLS (Cross-section weights)
Sample (adjusted): 1972 2003
Included observations: 32 after adjustments
Cross-sections included: 6
Total pool (unbalanced) observations: 172
Linear estimation after one-step weighting matrix

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 19.35 | 2.94 | 6.58 | 0.00 |
| OPEN | 0.10 | 0.04 | 2.78 | 0.01 |
| INV | -0.28 | 0.12 | -2.29 | 0.02 |
| Fixed Effects (Cross) | | | | |
| _AFR--C | -4.16 | | | |
| _EAP--C | 3.50 | | | |
| _ECA--C | 1.38 | | | |
| _LCR--C | -0.15 | | | |
| _MNA--C | -1.81 | | | |
| _SAR--C | 2.08 | | | |

| Effects Specification |
|---|
| Cross-section fixed (dummy variables) |

| Weighted Statistics | | | |
|---|---|---|---|
| R-squared | 0.24 | Mean dependent var | 17.75 |
| Adjusted R-squared | 0.20 | S.D. dependent var | 5.77 |
| S.E. of regression | 5.14 | Sum squared resid | 4339.59 |
| F-statistic | 7.28 | Durbin-Watson stat | 1.65 |
| Prob(F-statistic) | 0.00 | | |

| Unweighted Statistics | | | |
|---|---|---|---|
| R-squared | 0.13 | Mean dependent var | 17.09 |
| Sum squared resid | 4351.15 | Durbin-Watson stat | 1.66 |

ERR=Economic Rate of Return (median of the region)
OPEN=Exports plus imports as a % of GDP
INV=Investment as a % of GDP