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Project Completion Report Analysis:

Implications for the Portfolio[§]

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Abstract

This investigation builds on the Alvarez et al. (2021) Project Completion Report (PCR) analysis and its aim is to assess the implications of that study for the current portfolio of projects under execution at the Inter-American Development Bank (IDB). We use the sample of PCRs which reached operational closure (CO) in 2017 and 2018 to estimate the impact that design and execution performance characteristics of projects played in the likelihood of ending as successful and/or effective. Based on the estimated coefficients, we construct risk curves to isolate the effect specific characteristics have on the likelihood of a project being classified as unsuccessful/ineffective. We then use the estimated coefficients and, using the actual values for the current portfolio of projects in execution, identify the fraction of the portfolio that is at risk of ending as unsuccessful/ineffective projects. According to our analysis, of the 249 projects assessed, 39 have a 50% or less chance of being successful. Thirteen (13) projects have less than a 10% chance. For about 70% of the projects analyzed, given the characteristics they exhibit, the likelihood that they end up successful has already been curtailed. The type of analysis presented here can help IDB Management identify key performance indicators to keep track of during execution to periodically assess the level of risk it is willing to accept in terms of projects ending unsuccessful/ineffective as rated by the current PCR methodology.

JEL classifications: O1; O12; O19; O22

Keywords: Development Effectiveness; Quality-at-entry; Project Performance

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Introduction

This investigation builds on the Alvarez et al. (2021) Project Completion Report (PCR) analysis and its aim is to assess the implications of that study on the current portfolio of projects under execution. That is, we attempt to identify projects currently under execution that, based on defined design and execution performance characteristics discussed in Alvarez et al. (2021), are more likely to be classified as unsuccessful and/or ineffective projects when assessed by the PCR methodology. To this effect, we follow two stages.

In a first stage, we use the sample of PCRs with CO reached in 2017 and 2018 to estimate the impact that design and execution performance characteristics of projects played in the likelihood of ending as successful and/or effective. Based on the estimated coefficients, we construct "risk curves" to isolate the effect specific characteristics have on the likelihood of a project being classified as unsuccessful/ineffective.

In the second stage, we use the estimated coefficients from the first stage and, using the actual values for the current portfolio of projects in execution, identify the fraction of the portfolio that is in risk of ending as unsuccessful/ineffective projects.

As one interprets these results, it is worth bearing in mind that the key assumption is that the underlying structure (the data generating process) in place that yielded the results of the first stage is the same for the second stage.

First Stage: Risk Curves

The first step is to estimate the marginal contribution of key design and execution characteristics on the likelihood of project success/effectiveness as rated by OVE. Table 1 below presents Probit regression results for OVE's rating of success and effectiveness for the sample of 82 projects with CO in 2017 and 2018 for which estimation was feasible. Although the number of observations used in the estimation is small, it is notable that many of the coefficients are highly significant, estimated with good precision (low robust standard errors), and are fairly stable across different model specifications (with and without controlling for sector).

In terms of design project characteristics, of note is the importance of the quality of the results matrix at entry in explaining project success and effectiveness and the quality of the Evaluation Plan for a project's effectiveness. A robust Evaluation Plan is likely to facilitate the demonstration of attribution, thus enhancing effectiveness.

As far as execution performance, the importance of limiting the shared cancelled from the originally approved amount is unequivocally confirmed. The less time a project spends classified

as in alert or problem in its first three years of execution, the more likely it will be successful. The more a project adheres to the execution of outputs included in the start-up matrix registered in PMR, the more likely it will be successful and effective. Finally, the higher the cost share from outputs that are not achieved at the end of execution, the less likely the project will be rated as effective by OVE.

Table 1. Regression Results (OVE) – Probit Average Marginal Effects

	(1)	(2)
	OVE Rating >=Partly Successful	OVE effectiveness (>=satisfactory)
All - Original DEM score	0.052	-0.032
	(0.06)	(0.05)
RM quality	0.202**	0.161*
	(0.09)	(0.09)
Evaluation	-0.059	0.071**
	(0.04)	(0.04)
N. components	-0.062*	-0.090**
	(0.04)	(0.04)
N. months overrun	-0.005	-0.002
	(0.00)	(0.00)
Performance Index - Alert/Problem Ratio 3 first years	-0.385***	-0.054
	(0.14)	(0.16)
Share outputs 1st matrix discontinued	-0.335*	-0.413**
	(0.18)	(0.18)
Cost share from outputs last matrix not achieved	-0.123	-0.312***
	(0.15)	(0.12)
Cancelled Share from approved amount	-1.797***	-1.060***
	(0.41)	(0.38)
N. of obserbations	82	82

Robust Standard errors are presented in parenthesis. *, **, *** depict statistical significance at 0.10, 0.05, and 0.01, respectively.

With the estimated coefficients in hand we proceed to trace out the predicted risk curves for the key execution performance determinants: (i) Disbursement Share Canceled; (ii) Share of Outputs of 1st Results Matrix Discontinued; (iii) Cost Share from Outputs of Last Results Matrix not Achieved; and (iv) SPI Alert/Problem Index (first 3 years of execution).

Given that there are likely collinearities across these variables, figures 1 to 4 presented below are constructed based on regression estimates where each of these execution variables was included by itself along with the remaining right-hand variables. In turn, each figure presents three lines. The solid line represents the predicted impact on the success/effectiveness of a project given a change in the execution variable under consideration with all other variables assessed at their mean value. The dotted (- - - -) line is analogous to the solid line, except that all other variables are assessed at their top value. One can think of this curve as the success/effectiveness upper possibilities curve as the execution variable being assessed is varied. The intermittent dotted line (-.-.-.-), traces the predicted impact of changes in the execution variable when all other variables take on the lowest value in our sample. In the annex we present the solid line with its 90% confidence interval shaded in grey. The uncertainty around the predicted curve comes from the imprecision of the estimated coefficients as denoted by their standard errors. As more observations (OVE validated PCRs) become available, it is expected that this uncertainty can be reduced in future.

Figure 1. Disbursement Share Cancelled

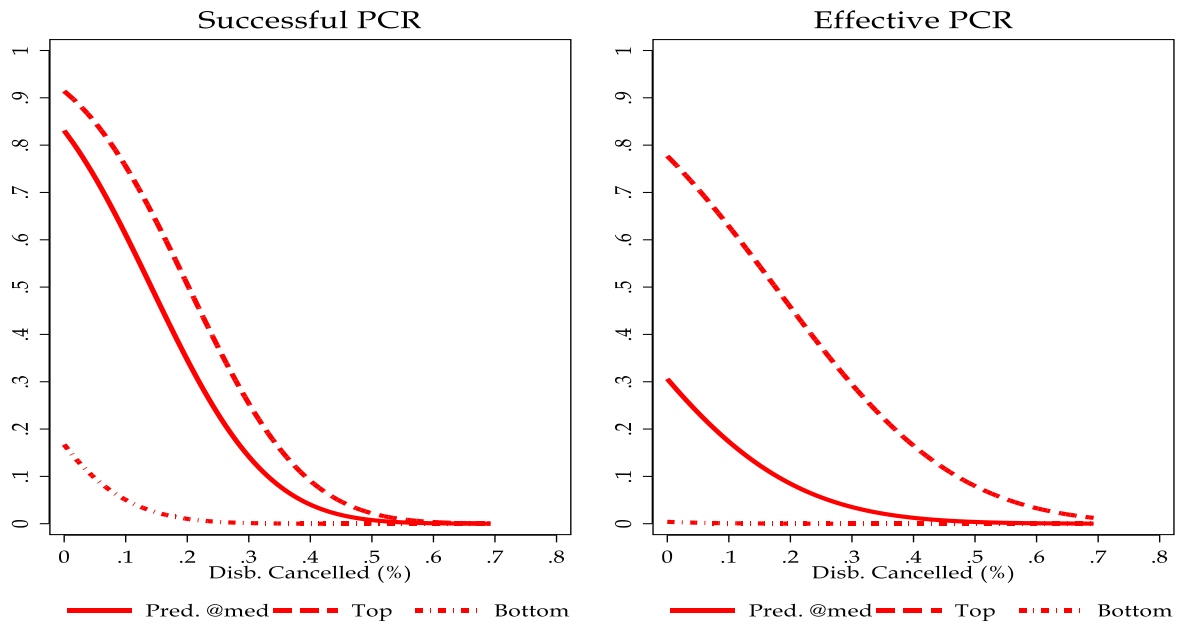


Figure 1 shows in the y-axis the likelihood of a project being successful/effective and on the x-axis the percent (%) of the original loan amount that is cancelled. As can be seen there is a very steep drop in the likelihood of success as the cancelled share increases. All else equal, if a project has suffered a cancellation amounting to 30% of its original loan amount, it's likelihood of being rated as successful by OVE is about 20%. The likelihood of being rated effective is also affected, but not as sharply.

Figure 2. Share of Outputs of 1st Results Matrix Discontinued

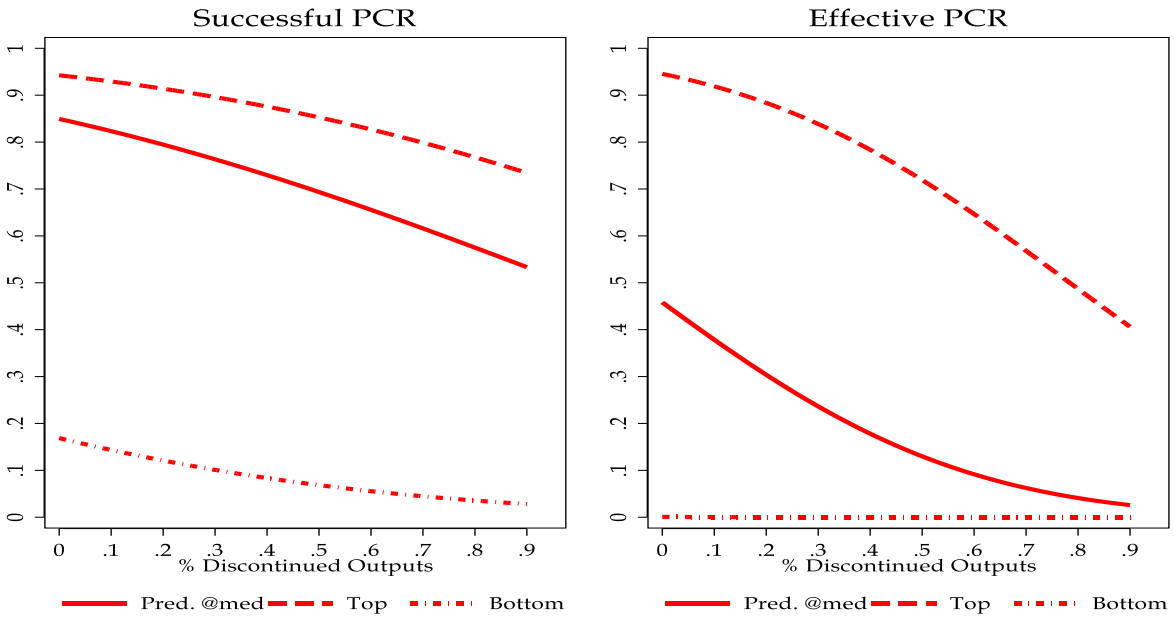
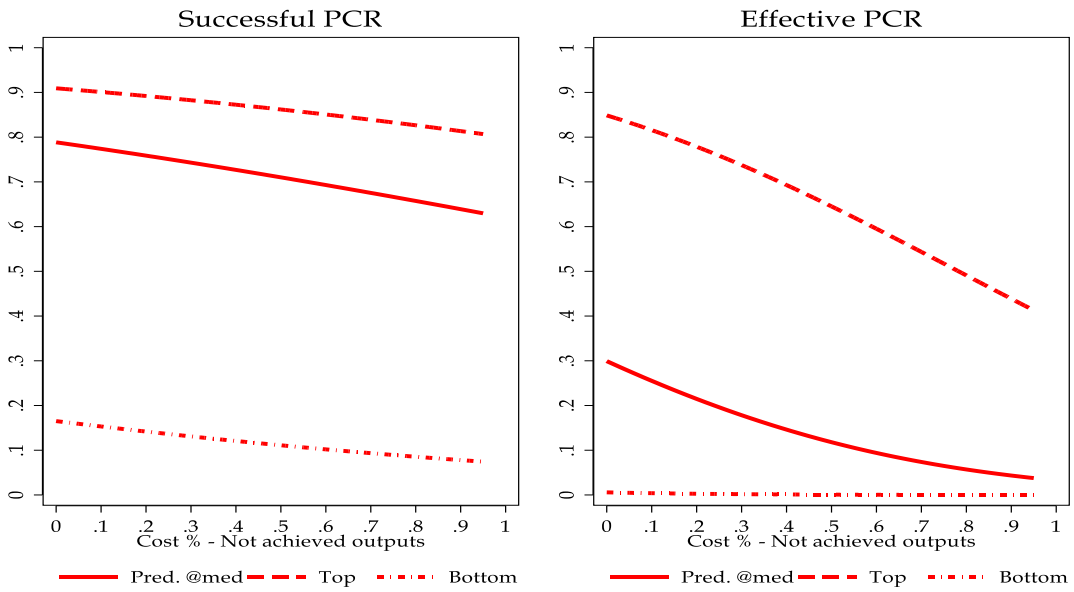


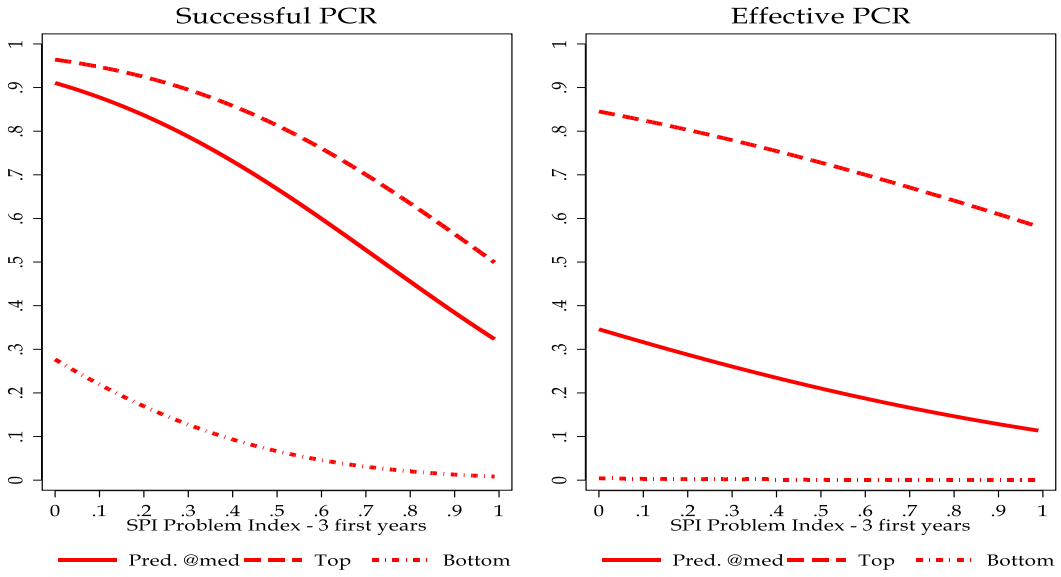
Figure 2 above and Figure 3 below show that the impact of discontinued outputs and its cost share, respectively, is less drastic than that of cancellations. However, these estimates need to be taken with caution, as the method used to estimate this variable is not as precise as one would hope for. For instance, if the exact drafting of an output changed from the first to the last matrix but in fact it was still for all intents and purposes the same output, the method used would classify it as a discontinued output.

Figure 3. Cost Share from outputs of last matrix that were not achieved.



Finally, Figure 4 presents the impact on the success/effectiveness of a project of being classified as in Alert/Problem. A project that was classified as in Alert/problem for the full of its first three years in execution will, all else equal, be rated as successful by OVE less than 40 percent of the time.

Figure 4. SPI Alert/Problem Index (3 first years)



Finally an interesting aspect to note is that having top marks in other project characteristics, such as the quality of the results matrix and the evaluation plan, does appear to ameliorate the impact of poor execution to some extent, as denoted by the dotted line.

Second Stage: Implications for Portfolio in Execution.

To assess the implications of the analysis presented above, based on PCR outcomes, to the current portfolio in execution we first need to define the sample of projects in execution for which the analysis is relevant and can justifiably be applied.

Table 2 presents the number of investment (INV) projects in execution by modality type. Given that the regression analysis is solely based on Specific Investment Operations (ESP), the first cut narrows the sample to the 397 ESP, which account for close to 70% of the portfolio. We then apply the following filters:

- The project has met eligibility
- The project has not been reformulated
- The project has at least 3 annual PMR reports
- The project has a DEM (3 projects approved before 2008 do not have a DEM)
- The project has not canceled more than 70% of the original amount (for projects that cancel more than 70%, no PCR is prepared)

After applying these filters, we are left with 249 ESP projects.

Table 2. Investment Projects in Portfolio by Modality.

Operation Modality	N	Freq.	Cum.
Contigent Loans for Natural Disasters - CND	1	0.18	0.18
Specific - ESP	397	69.65	69.82
Global Credit Operations - GCR	36	6.32	76.14
Multiple Works - GOM	112	19.65	95.79
Intermediate Response Facility - IRF	1	0.18	95.96
Results Based Loans - LBR	7	1.23	97.19
Multiphase Operations - PFM	9	1.58	98.77
Project Preparation and Execution Facility - PPE	1	0.18	98.95
Sustainable Energy Facility - SEF	1	0.18	99.12
Reimbursable Technical Cooperation - TCR	5	0.88	100
Total	570	100	

We then proceed to generate the relevant variables for these 249 projects. Table 3 presents summary statistics for these.

Table 3. Summary Statistics

	N	Mean	SD	Max.	Min.	p25	p50	p75
DEM Score	249	8.79	0.87	10	4.0	8.4	8.9	9.3
Results Matrix Score (DEM)	249	2.80	0.32	3.0	1.2	2.7	3.0	3.0
Evaluation Score (DEM)	249	5.65	1.50	7.5	2.1	4.6	5.4	7.1
Number of Components	249	3.12	1.29	9	1	2	3	4
Loan Approved Amount (US$ million)	249	75.93	88.70	700	5	25	50	90
Alert/Problem Index (3 first years)	249	0.19	0.25	1	0	0	0	0.33
Share Loan Cancelled	249	0.03	0.12	0.98	0	0	0	0
Share Outputs Discontinued (1st Matrix)	249	0.06	0.13	0.94	0	0	0	0.06
1[Approved year >=2012]	249	0.91	0.28	1	0	1	1	1
CSD	249	0.20	0.40	1	0	0	0	0
IFD	249	0.28	0.45	1	0	0	0	1
INE	249	0.28	0.45	1	0	0	0	1
INT	249	0.04	0.19	1	0	0	0	0
SCL	249	0.21	0.41	1	0	0	0	0
CAN	249	0.20	0.40	1	0	0	0	0
CCB	249	0.13	0.34	1	0	0	0	0
CID	249	0.28	0.45	1	0	0	0	1
CSC	249	0.39	0.49	1	0	0	0	1

With these variables in hand and with the estimated coefficient from Table 1 we estimate the distribution of projects in the portfolio that fall under the different brackets for predicted probability of project success/effectiveness.

Table 4 presents the distribution of projects that fall in the different brackets for share of original loan amount cancelled. The Table also includes the predicted probability of success and effectiveness, estimated from the analysis conducted in the first stage for PCRs with CO in 2017-2018. All else equal, of the sample of 249 projects assessed in this part of the exercise, 18 projects have a probability of 0.5 or bellow of being rated as successful by OVE when they reach CO. This is purely on account of having at least 20% of their original loan amount canceled. Similarly, the same 18 projects have a 10% or less chance of being effective.

Table 4. Impact of Disbursement Share Cancelled on likelihood of Success/Effectiveness

Disbursement cancelled	Predicted Probability for a Successful PCR	Predicted Probability for an Effective PCR	Number of projects with this characteristic in current portfolio
0	0.8	0.3	221
0.1	0.7	0.2	10
0.2	0.5	0.1	2
0.3	0.2	0.1	7
0.4	0.1	0.0	4
0.5	0.0	0.0	2
0.6	0.0	0.0	3
0.7	0.0	0.0	0

Table 5 presents an analogous estimation but for the impact of the share of outputs discontinued. The likelihood of success is somewhat inelastic to the discontinuation of outputs. However, the effectiveness of over 70 projects in execution has likely been lowered due to outputs being discontinued. As before, these estimates need to be taken with caution, as the method used to estimate this variable is not as precise as one would hope for. The precision of the method used is only around 87%.

Table 5. Impact of Share of Outputs Discontinued on Likelihood of Success/Effectiveness

Share of outputs discontinued	Predicted Probability for a Successful PCR	Predicted Probability for an Effective PCR	Number of projects with this characteristic in current portfolio
0	0.8	0.5	176
0.1	0.8	0.4	23
0.2	0.8	0.3	29
0.3	0.8	0.3	10
0.4	0.7	0.2	6
0.5	0.7	0.2	1
0.6	0.7	0.1	0
0.7	0.6	0.1	1
0.8	0.6	0.1	0
0.9	0.6	0.0	2
1	0.5	0.0	1

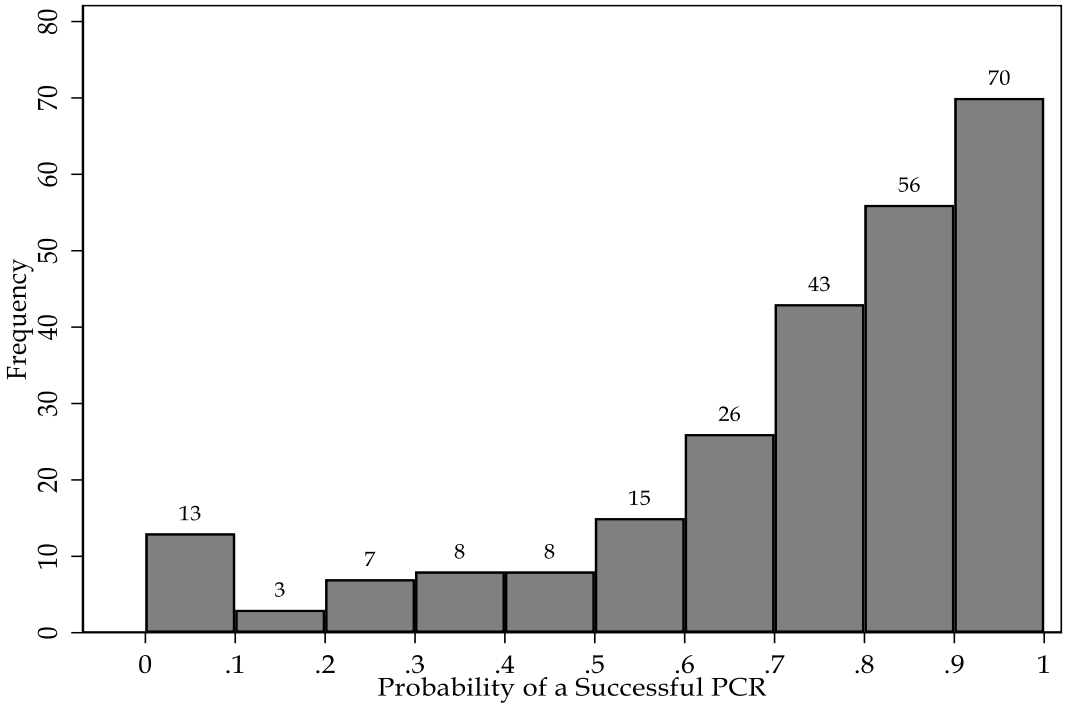
Table 6 presents the impact of being in Alert/Problem on the likelihood that a project in the portfolio will be Successful/Effective. The likelihood that a project will be successful drops to 10% if the project has been in Alert/Problem for the first three years of its execution life.

Table 6. Impact of Alert/Problem on Likelihood of Success/Effectiveness.

Alert/Problem Index (3 first years)	Predicted Probability for a Successful PCR	Predicted Probability for an Effective PCR	Number of projects with this characteristic in current portfolio
0	0.9	0.3	143
0.3	0.8	0.3	76
0.7	0.6	0.2	26
1	0.3	0.1	4

Finally, we use the variables summarized in Table 3 and the regression coefficients of Table 1 to predict the probability of success (Figure 5) and of Effectiveness (Figure 6) for the 249 projects in the portfolio analyzed in this inquiry.

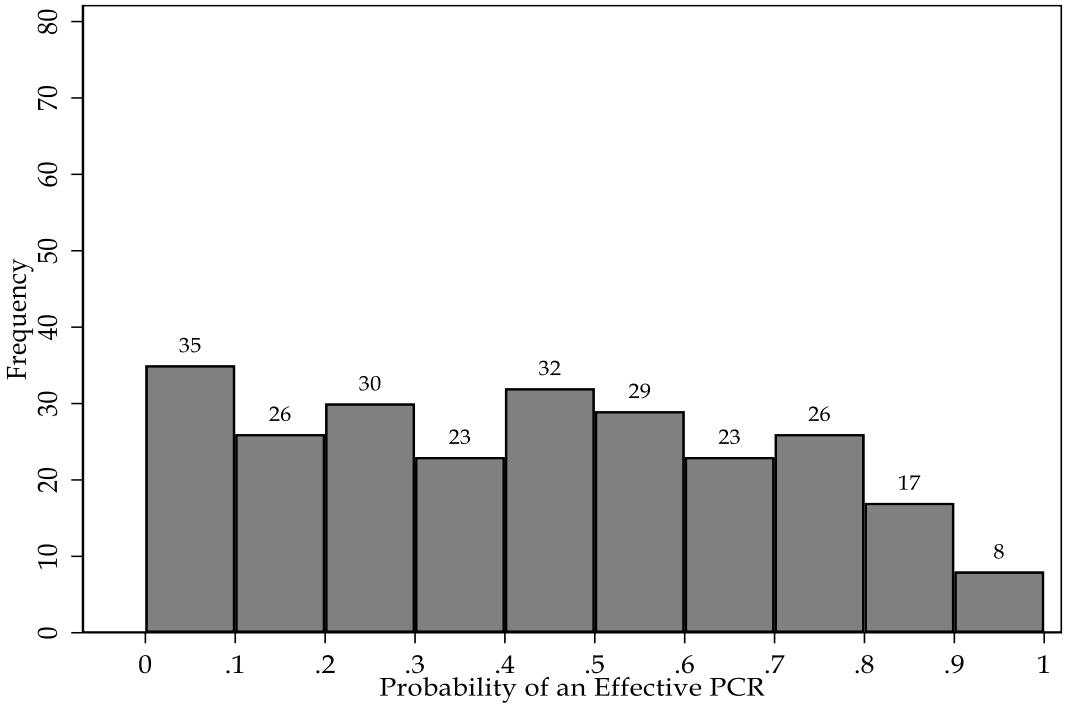
Figure 5. Predicted Probability of Success



According to our analysis, of the 249 projects assessed, 39 have a 50% or less chance of being successful. Thirteen (13) projects have less than a 10% chance. For close to 72% of the

projects analyzed, their chance to end up successful has already been diminished due to the estimated influence of the factors assessed in the regression analysis presented in Table 1.

Figure 6. **Predicted Probability of Effectiveness**



In terms of project effectiveness, figure 6 shows that only around 40% of projects examined have a 50% or higher probability of being effective.

Concluding remarks

The type of analysis presented here can help Management identify key performance indicators to keep track of during execution to periodically assess the level of risk it is willing to accept in terms of projects ending unsuccessful/ineffective.

Management might decide to adopt specific measures to counteract in cases where the risk of having a project end as unsuccessful/ineffective is higher than a pre-established threshold. For instance, if a project cancels over 30% of its loan amount, a trigger for an automatic reformulation might be activated. Similarly, for a project that discontinuous a certain share of its outputs, where the vertical logic that underpins the results chain has clearly been affected. Or, when a project has been in alert/problem for a significant amount of its execution period.

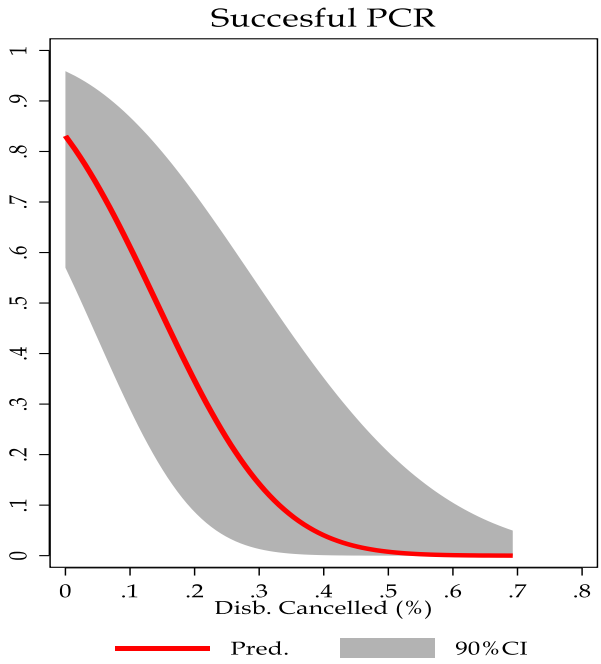
Finally, assuring the highest quality during the design stage, including the quality of the results matrix, the evaluation plan, and limiting undue complexity can counteract somewhat the effects of poor execution performance, but not sufficiently to override it.

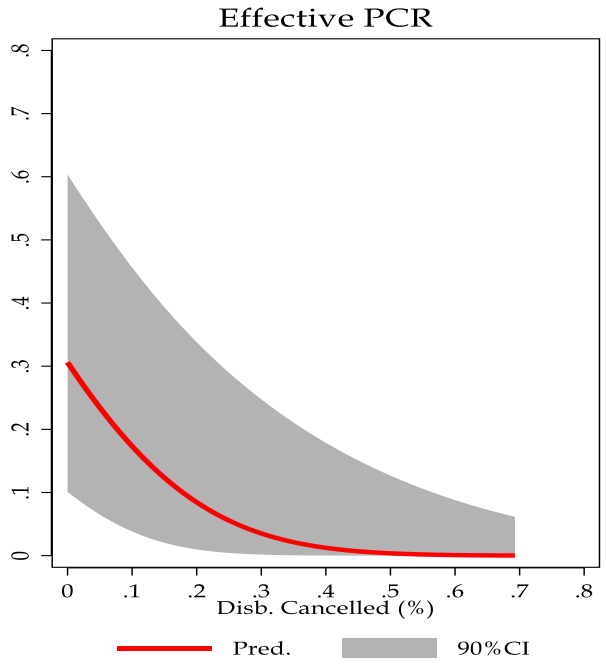
References

Alvarez, C., Leonardo Corral, Ana Cuesta, José Martinez, & Cesar Montiel. (2021). PCR Analysis: Factors Behind Project Success and Effectiveness. Inter-American Development Bank IDB-TN-02135.

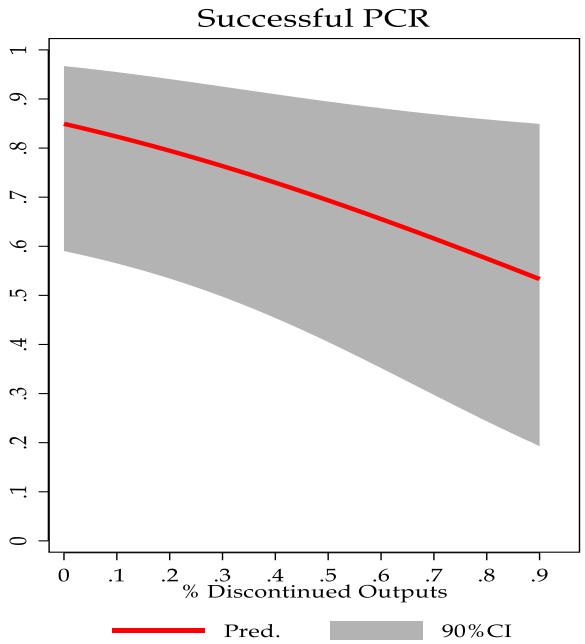
Annex: Prediction at Median with Confidence Intervals.

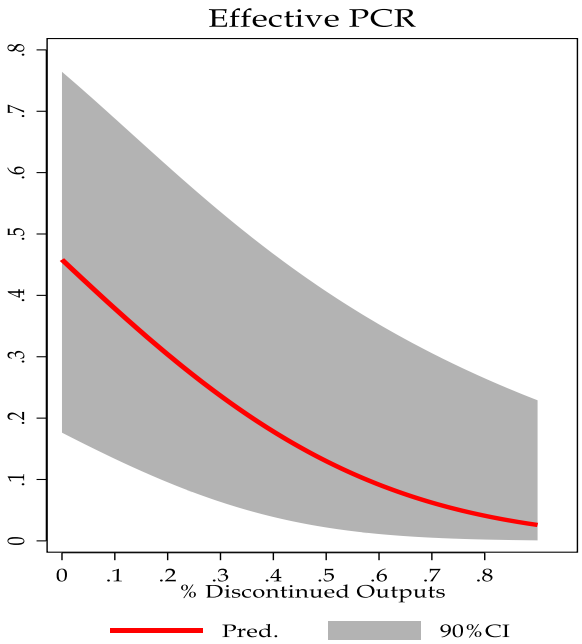
1. Disbursement Share Cancelled – Probit Prediction



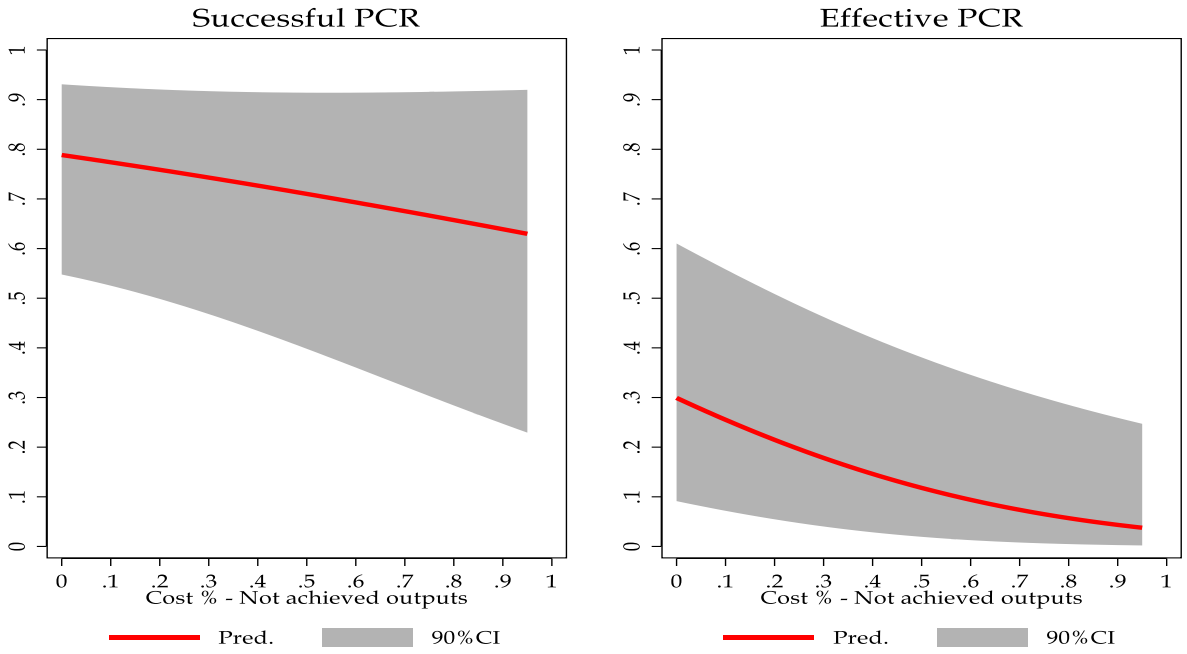


2. Share outputs 1st matrix discontinued





3. Cost share from outputs last matrix not achieved



4. SPI Alert/Problem Index (3 first years)