WPS7726

Policy Research Working Paper 7726

What Difference Does Good Monitoring & Evaluation Make to World Bank Project Performance?

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June 2016

Policy Research Working Paper 7726

Abstract

For more than 20 years, the development community has claimed that monitoring and evaluation helps projects achieve their objectives. This study uses data from 1,300 World Bank projects evaluated between 2008 and 2014 to investigate this suggested link between the quality of monitoring and evaluation and project performance. The propensity score matching results indicate that the quality of monitoring and evaluation is significantly and positively associated with project outcome as institutionally measured at the World Bank. This positive relationship holds when controlling for project manager identity, and is robust to various specification choices. Through a systematic text analysis of the narrative produced by the Independent Evaluation Group to justify its monitoring and evaluation quality rating, the study shows that there are common markers of good quality monitoring and evaluation, such as: clear institutional setup and division of labor around monitoring and evaluation activities; simple monitoring and evaluation framework that is well aligned with clients' existing monitoring and evaluation systems; good integration with operational tasks; and a system that can generate regular and timely reporting, and that is used during and after lending.

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What Difference Does Good Monitoring & Evaluation Make to World Bank Project Performance?

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JEL classification: H43, O19, O01, O12, F61

Keywords: monitoring and evaluation, performance management, World Bank projects

Estelle Raimondo is an evaluation officer in the Independent Evaluation Group. I am particularly grateful to Rasmus Heltberg and Kenneth Chomitz (at IEG) and to Kathy Newcomer (at GWU) for their continuous support during this research and their thorough comments on earlier drafts. I also thank Alex McKenzie for his assistance in retrieving project-level data from the IEG project evaluation database. I am thankful to Marie Gaarder and Nick York (Director at IEG) for their endorsement and to the full IEG team in charge of the Review of Self-Evaluation System for their constant flow of ideas and feedback. The views expressed here are the author's, and do not reflect those of the World Bank, Independent Evaluation Group, Its Executive Directors, or the countries they represent.

1. Introduction

In the ambitious 2030 Agenda for Sustainable Development, the development community has committed to a large number of sustainable development goals and targets. The resolution that seals this renewed global partnership for development reiterates the importance of monitoring and evaluation (M&E) by promoting reviews of progress achieved that are "rigorous and based on evidence, informed by country-led evaluations and data which is high-quality, accessible, timely, reliable and disaggregated" (UN, 2015, parag74).

Over the past 20 years, there has been a growing consensus around the importance of M&E, among development practitioners and academics, to the point that the value-added of M&E is rarely questioned. The World Bank has been a pioneering agency in this regard, insofar as it has performed systematic assessments of its projects since the mid-1970s and has embedded monitoring, self-evaluation, and independent evaluation in its development practice early on in its history. By the early 2000s, most bilateral and multilateral donor agencies had followed-suit, putting in place M&E systems to track performance indicators from the inception to the delivery of outputs and the achievement of outcomes.

Simply put, M&E is expected to improve project performance via two sets of mechanisms. First, and quite prosaically, good M&E provides better evidence of whether a project has achieved its objectives or not. Second, champions of M&E also claim that there is more to M&E quality than simply capturing results. By helping project managers think through their goals and project design, by keeping track of performance indicators, and by including systematic feedback loops within a project cycle, M&E is thought to bolster the quality of project supervision and implementation, and ultimately impact. For example, Legovini, Di Maro and Piza (2015) lay out a number of possible channels that link impact evaluations and project performance, including better planning and evidence-base in project design, greater implementation capacity due to training and support by the M&E team, better data for policy decisions and observer effects and motivation (2015, p. 4).

Measuring the association between M&E and project performance is a salient issue in the development industry, as every year millions of aid dollars are spent on conducting M&E and building M&E capacity. However, it is a particularly challenging question to address. While a number of recent research streams point to the importance of proactive supervision and project management in explaining the variation in project performance (e.g., Denizer et al., 2013; Buntaine & Parks, 2013; Geli et al., 2014; Bulman et al., 2015), to date studies that directly investigate whether M&E quality also makes a difference in project performance are scarce.

The direction of the relationship between M&E quality and project performance is not straightforward to predict. On the one hand, if good M&E simply provides better evidence of whether outcomes are achieved, then the relationship between good M&E and project performance could go either way: good M&E would have a positive relationship with project outcomes for successful projects, but a negative relationship for failing projects. On the other hand, if M&E also improves project design, planning and implementation, then one anticipates that, everything else held constant, projects with better M&E quality are more likely to achieve their intended development outcomes. Finding a systematic positive relationship between M&E quality and project performance would give credence to this argument and justify the added-value of M&E processes. Moreover, one should anticipate that the association between M&E quality and project performance is not proportional. It may indeed take a really high M&E quality to make a significant contribution to project performance. One of the estimation strategies used in this study seeks to capture non-proportionality.

Measuring this association on a large number of diverse projects requires a common measure of M&E quality and of project outcome, as well as a way to control for possible confounders. Given that a robust counterfactual would prove difficult to put in place, this study develops an alternative correlation approach[1] that exploits data on the portfolio of 1,385 World Bank investment loan projects that were evaluated by IEG between 2008 and 2014, and for which both a measure of M&E quality and of project outcome were available.

Because the quality of M&E is a complicated construct and the rating by IEG is a composite measure of several dimensions (design, implementation and use), it is important to unpack possible mechanisms that explain why M&E quality and project outcomes are related. The study thus also includes a systematic text analysis of the narrative produced by IEG to justify its project M&E quality rating. From this text analysis, the paper concludes that projects with high M&E quality have the following markers: a clear institutional setup for M&E from the very beginning of the project, a framework that is well aligned with the client's existing M&E system, and that builds to the extent possible on existing data sources; a process that is well integrated with operational tasks, rather than an add-on; a system that can generate regular and timely reporting, and that is used both while lending and after lending.

In turn, the main quantitative estimation strategy relies on the principle of Propensity Score Matching (PSM). Simply put, PSM consists of creating groups of comparable projects (on a range of

[1] This research started in 2013 and was refined in the framework of the report on self-evaluation systems of the World Bank Group conducted with the Independent Evaluation Group (IEG) in 2015.

dimensions that influence their potential for reaching their development outcomes) but that differ in their quality of M&E. This approach has a number of desirable properties considering the nature of the data.[2] The main assumption underlying this estimation strategy is the following: conditional on the propensity score, each project has the same probability of assignment to treatment. It follows that the expected difference between the two matched groups for a particular propensity score is an unbiased estimate of the average treatment effect on the treated (Rosenbaum and Rubin, 1983).

To control for possible confounding factors, I include a series of country-specific and project-specific factors in the computation of the propensity score, with the assumption that possible confounders are observable. Regressions and propensity score analysis indeed share the common caveat of not being able to control for unobservable factors that would influence both project outcome and M&E quality. The risk of omitted variable bias cannot be avoided, especially concerning the risk of rater effects associated with this type of data. Notwithstanding this limitation, the identification strategy is quite robust, insofar as it includes a number of factors (such as project managers fixed effects and programmatic sector dummies) that control for a range of potential unobserved confounders (e.g., the complexity and the nature of the interventions, leadership skills).

I find that good M&E quality is positively and significantly associated with project outcome rating as institutionally measured within the Bank. Depending on whether the outcome is measured by IEG or by the team in charge of operations, I find that projects with good M&E quality score between 0.13 and 0.40 points higher—on a six-point outcome scale— than similar projects with poor M&E quality. The magnitude of this relationship is on par with the magnitude of the relationship between project outcome rating and the quality of supervision, which was identified in previous research as a key correlate of project outcome (Denizer et al., 2013; Buntaine & Parks, 2013; Geli et al., 2014; Bulman et al., 2015).

The paper is structured in six sections. First it presents an overview of the relevant literature (section2). It subsequently describes the M&E system and process at the Bank, and summarizes the

[2] Most notably, it relaxes the assumption of linearity, which is important when dealing with categorical variables. Moreover, given the multitude of dimensions that can confound the effect of M&E quality on project outcome, including project-level and country-level characteristics, a propensity score approach consists in reducing the multidimensionality of the covariates to a one dimensional score, called a propensity score. Third, there is a range of modeling strategies within the large family of propensity score analyses that allow us to exploit the full graduation of the original six-category outcome as opposed to dichotomizing the outcome into a 'successful vs. non-successful' variable as done in previous work (e.g., Buntaine & Park, 2013; Denizer et al., 2013). Finally, propensity score analysis also focuses the attention on models for treatment assignment, instead of the more complex process of determining outcome. This is particularly compelling in this case as treatment assignment into good quality M&E is the object of institutional and managerial choices at the World Bank, while project outcome is determined by an array of factors in a more anonymous and stratified system (Angrist & Pischke, 2009, p. 84).

results of the systematic text analysis of M&E quality rating, revealing a number of mechanisms that explain what quality M&E involves and why it is possibly linked to project outcome (section 3). Section 4 presents the data and the methodological approach of the quantitative analysis. In section 5, I sum up the results of the analysis, and conclude in section 6.

2. Related Literature

Recently, there has been an increased focus in the development literature on better understanding the project characteristics that explain why some projects are successful and others fail to reach their development objectives (e.g., Denizer et al., 2013; Buntaine & Parks, 2013; Geli et al., 2014; Legovini et al., 2015; Bulman et al., 2015). Bridging the empirical gap around the micro-level factors that determine development project performance is all the more necessary as the evidence points to a situation where project outcome is more likely to be affected by differences across projects within a given country, than differences across countries. For example, Denizer et al. (2013) found that 80% of the variation in Bank project outcomes can be explained by within countries and across projects variations rather than by country characteristics.

Proactive supervision of project implementation has been identified as an important correlate of project success in a number of studies on the Bank. For instance, Denizer et al. (2013) demonstrated that when projects are flagged early on as problem projects, and remedial actions are taken, projects can be turned around and become successful. These findings are echoed in a paper by Buntaine & Parks (2013) that looks specifically at World Bank environmental projects. In that study, the rating of the quality of supervision by project managers is found to be the strongest predictor of project success.

Moreover, the very identity and the track record of project managers has been shown to play a critical role in explaining project outcome. Denizer et al. (2013) showed that when regressing project outcome ratings on a full set of project manager dummies and on a full set of country dummies, project manager effects account for 32 percent of the variation in project outcomes, whereas pure country effects account for only 19 percent of the variation (2013, p. 21). Bulman, Kolma and Kraay (2015) find the same patterns using data on 1,342 projects of the Asian Development Bank. In turn, Geli et al. (2014) found that the track record of the project manager is a better predictor of project outcome rating than prediction made based on self-assessments of project performance during implementation.

However, to my knowledge only one large-N quantitative study has looked at the effect of evaluation on project performance (Legovini et al., 2015). Indeed, hitherto, the literature on this topic had been largely circumscribed to in-depth case-studies and small-N survey-based inquiries.[3] Legovini et al. (2015) specifically look at whether impact evaluations help or hamper the timely disbursement of Bank development loans and grants. Reconstructing a database of 100 impact evaluations and 1,135 Bank projects between 2005 and 2011, the authors find that projects with an impact evaluation are less likely to have delays in disbursements.

In this paper, I build on the existing body of evidence and attempt to investigate more directly the connection between M&E quality and project performance (as opposed to project disbursement). The study also looks at M&E as it is generally practiced at the Bank, as opposed to a particular subset of evaluation, as in Legovini et al. (2015).

3. Monitoring and Evaluation at the World Bank

3.1. M&E institutional process

For the past 20 years, there have been continuous efforts at the Bank and other development agencies to strengthen M&E. The rationale for embedding an M&E framework within each project is that it leads to improvement in the quality of delivery and ultimately results in better outcome by generating feedback loops at each stage of a project's life. While M&E systems and practices have changed incrementally since their inception under McNamara's presidency in the 1970s, the main principles have remained generally the same (OED, 2003).[4]

At the inception of each project, a results-framework is developed. This effort to rationalize project design and to "think hard" about project logic is thought to be a decisive step towards project success. During project preparation, Bank teams work with borrowers to set up Management and Information Systems and gather the necessary baseline information. During implementation, Bank staffs are in charge of conducting bi-annual self-evaluation of the project with an Implementation Supervision report (ISR). In the ISR, the project manager formally takes the pulse of the project, by rating whether the project is likely to achieve its development objective.[5] This embedded monitoring and continuous self-evaluation process is supposed to generate feedback loops into the operation and guide course corrections or more radical changes to the project plan (called restructuring). Upon completion, the project manager is tasked with producing an Implementation Completion Report (ICR), which is meant

[3] For a systematic review of this literature, see Johnson (2009)

[4] The World Bank does not have an official monitoring and evaluation policy. The basic principles underpinning monitoring, self and independent evaluations are captured in an operational policy (OP 13.60) which lays out the general roles of responsibilities between operational team, the independent evaluation group and borrowers in the conduct of M&E activities.

[5] The definition of project outcome retained in this study is consistent with the one defined by IEG as the "extent to which the operation's major relevant objectives were achieved, or are expected to be achieved, efficiently" [5](IEG, 2014).

to offer a comprehensive ex-post self-evaluation of the project implementation and results. The self-evaluation is then validated by IEG.[6]

Starting in 2006, IEG has systematically rated the quality of project M&E with a dual objective: tracking institutional progress on improving M&E (a long-standing commitment of the Bank), and creating an incentive for better performance "that would ultimately improve the quality of evaluations and the operations themselves" (IEG, 2014 p. 49).

3.2. What does good M&E look like?

I start by unpacking the characteristics of good and poor M&E quality trough a systematic text analysis of the narratives produced by IEG to justify its M&E quality rating. The narratives provide an assessment of three aspects of M&E quality: its design, its implementation, and its use. To maximize variation, only the narratives for which the M&E quality was rated as negligible (the lowest rating) or high (the highest rating) were coded. All projects evaluated between January 2008 and December 2014 with an M&E quality rating of negligible or high were extracted from the IEG project performance database. There were 39 projects with a 'high' quality of M&E and 254 projects with a 'negligible' rating. Using the software MaxQDA, a code system was and applied to all of the 293 text segments in the sample.[7]

Figure 1 displays the frequency of M&E design attributes for projects with low and high overall M&E quality. One of the most frequent attributes of good design cited by IEG in the narratives is the presence of a clearly defined plan to collect baseline information. Systems that are in place right from the beginning of the intervention are more likely to be able to collect the baseline information promptly. A related characteristic of good design is the close alignment with the client's existing system (e.g. piggy-backing on routine administrative data collection initiatives). Good design also involves a plan to establish a simple Management Information System (MIS) that is computerized, and allows for timely collection and retrieval of information. Another ingredient of good design is the clear institutional set-up

[6] While IEG covers 100% of the bank's project through these ex-post validation, only about 25% of projects are the object of a full-fledged performance evaluation (project performance assessment report -PPAR) which includes field work and intensive data-collection.. Finally, an even smaller share of projects undergoes a full-fledge impact evaluation, which usually takes the form of an experimental or quasi-experimental design. In this study, to be able to obtain a large number of matches, I only consider IEG's ICRR assessment of project outcome.
[7] The coding system was organized among three master code "M&E design", "M&E implementation" and "M&E use" to reflect IEG rating system. Each sub-code captures a particular characteristic of the M&E process. As is the norm in content analysis, the primary unit of analysis is a coded segment (i.e. a unit of text), that does not necessarily correspond to a number of projects.

with regards to M&E tasks, oftentimes relying on an existing structure within the client country and an oversight body (e.g., a steering committee) in charge of quality control.[8]

Figure 2 displays the frequency of M&E implementation characteristics for projects with low and high overall M&E quality. For projects with high M&E quality, the most salient idea is that M&E implementation is successful because it is integrated into the project, rather than being seen as an ad hoc activity. In addition, having an audit of the data collection and analysis systems is mentioned as increasing the credibility of the data collected.

Conversely, projects with poor M&E implementation tend to have weak monitoring capacity both on the client and on the Bank sides. Delay in the hiring of an M&E specialist, and the lack of staff in the counterpart's government able to perform M&E tasks are frequently cited reasons for poor implementation. Low quality is also associated with methodological issues, such as surveys with a low response rate or the wrong timing.

Finally, as shown in Figure 3, projects with high M&E quality tend to have two main types of usage. First, M&E is used while lending, to help the project team make operational decisions, identify bottlenecks, and take corrective actions. M&E reporting was described as forming the basis of regular staff meetings. Second, M&E is also used outside of lending to inform reforms in multi-year plans of the client government or of the Bank.[9]

4. Data and Estimation Strategy

4.1. Data

IEG (and formerly OED) has been rating project performance since the early 1970s, but it only started measuring the quality of M&E in 2006. The data set of project performance rating was leveraged to extract projects for which a measure of M&E quality was available (N = 1,683). The database contained two types of World Bank lending instruments, investment loan projects and development policy loans (DPL).The two types of loans are quite different, among other things, in terms of length, repartition of roles between the Bank and the clients, and the nature of the interventions. Moreover, over the past two decades, investment lending has represented on average between 75 and 80 percent of all Bank lending. Given the lack of comparability between the two instruments, and the fact that there are many

[8] Projects with low M&E quality tend to have the reverse characteristics: either no clear plan for the collection of baseline data, or a plan that is too ambitious and unfeasible; a results chain that is either absent or very weak; no M&E capacity in the implementing organization and little support by the Bank. M&E activities are ad hoc and not well integrated into operations.

[9] A recurrent statement in the rating of projects with low quality of M&E is that there has been limited use because of issues with M&E design and implementation. Additionally, doubts about the quality of the data, hindered the necessary credibility for usage in decision-making. The reviewers noted some instances where the M&E system was not used at an auspicious moment which led to a missed opportunity for course-correction.

more data points for investment loans, the data set was thus limited to the latter and spans investment projects that have been evaluated by IEG between January 2008 and December 2014.[10] The final sample contains 1,385 rated projects. Table 1 describes summary statistics for the sample.

The dependent variable is a measure of project outcome rated on a six-point scale from highly satisfactory to highly unsatisfactory.[11] Two versions of the dependent outcome variable are included: (y_1) is the rating of project outcome stemming from IEG's independent validation of the project (labeled IEG); (y_2) is the rating of project outcome captured in the self-evaluation of the project by the team in charge of its management and encapsulated in the Implementation Completion Report (labeled ICR). The first outcome variable is used to measure the link between M&E quality and the outcome rating as institutionally recognized by the World Bank Group and as displayed in the corporate scorecard. The second outcome variable is used to measure the association between M&E quality and the way the implementing team measures the success of its project. Since 2006, the methodology has been harmonized between the self-evaluation and the independent validation. That said, the application of the methodology differs, leading to a "disconnect" in rating. A discrepancy in rating is to be expected given the different types of insight into the operation, incentives, and interpretations of rating categories that may exist between self-rating and external validation. The issue of possible biases for both of these measures is discussed below.

The independent (or treatment) variable is the rating of M&E quality done by IEG at the end of the project. The rating is distributed on a Likert-scale taking the value 1 if the quality of M&E is negligible, 2 if modest, 3 if substantial and 4 if high. As shown in the text analysis above, this rating captures the quality of design, implementation and utilization of M&E during and slightly after the completion of the project.

As shown in Figure 4a. and 4b. there is a very strong association between a project's quality of M&E and its outcome rating both when rated by the project team and by IEG, but a number of confounding factors, that need to be controlled, may account for this relationship. To do so, I rely on the

[10] I chose to include a lag time of two years after IEG introduced a systematic rating for M&E (in 2006) to ensure that the rating methodology for M&E had time to be refined, calibrated and applied systematically across projects.

[11] The six-point scale used by IEG is defined as follows: (1) Highly satisfactory: there were no shortcomings in the operation's achievement of its objectives, in its efficiency or in its relevance; (2) Satisfactory: there were minor shortcomings in the operation's achievement of its objectives, in its efficiency, or in its relevance; (3) Moderately Satisfactory :there were moderate shortcomings in the operation's achievement of its objectives, in its efficiency, or in its relevance; (4) Moderately Unsatisfactory: there were significant shortcomings in the operation's achievement of its objectives, in its efficiency, or in its relevance; (5) Unsatisfactory: there were major shortcomings in the operation's achievement of its objectives, in its efficiency, or in its relevance; and (6) Highly Unsatisfactory: there were severe shortcomings in the operation's achievement of its objectives, in its efficiency, or in its relevance.

idea of balancing, which is at the core of Propensity Score Matching (described below). Concretely, the model seeks to factor in the conditioning variables (i.e. covariates) that are hypothesized to be causing an imbalance between projects that benefit from a good quality M&E (treatment group) and projects that do not (comparison group). To estimate the conditional probability of benefiting from a good quality M&E, a number of controls for observable confounders are introduced: project-specific characteristics, country-specific characteristics and institutional factors.

First, the model controls for project-specific factors such as project size. Projects that are particularly large may benefit from higher scrutiny, as well as a higher dedicated budget for M&E activities. On the other hand, while large projects have a potential for higher impact, they are also typically constituted of several moving parts that are more difficult to manage, and may invest more in M&E because the projects needs additional scrutiny and support, in that case projects with good M&E may fare worse. Thus, following Denizer et al. (2013), I measure project size as the logarithm (in millions of USD) of the total amount that the World Bank has committed to each project. I also account for expected project duration, as longer projects may have more time to set up good M&E framework but also more time to deliver on intended outcome.

Additionally, Geli et al. (2014) and Legovini et al. (2015) confirmed the strong association between the project outcomes and the identity of project managers , as well as the level of managerial turnover during the project cycle, estimated to be 0.44 managers per project-year (Bulman et al., 2015). These two factors may influence the quality of M&E, as some project managers have a stronger evaluation culture than others, and as the quick turnover in leadership may be disruptive of the quality of M&E as well as of the quality of the project. Consequently, I add the number of project managers during the life of the project as a control variable. As described below, one modeling strategy also attempts to measure the influence of M&E on project performance within groups of projects that have shared the same project manager at one point during their preparation or implementation. The literature on M&E influence has long highlighted that the quality of M&E depends on the signal from senior management and may differ substantially by sector (now Global Practices). Certain sectors are also known to have better outcome performance for a range of institutional factors. I thus include a full set of sector dummies in the model.

Finally, country-characteristics are also possible confounders. Countries with better governance and implementation capacity are more likely to have better M&E implementation potential. They are also more likely to have successful projects (e.g., Denizer et al., 2013). In order to capture client countries' government effectiveness, the model includes a measure of government's performance and implementing agent performance, both stemming from the project evaluation dataset. It also includes a measure of country-level policy performance, the Country Policy and Institutional Assessment (CPIA) ratings of the World Bank.[12] Given that projects require several years to be fully implemented, the indicator measures the annual average of the CPIA in the given country where the project was implemented, over the years during which the project was underway.

4. 2. Caveats with the data

The inherent caveats with the rating system underlying these data have been addressed in details by Denizer et al. (2013) and Bulman et al. (2015). I share the view that, while there is certainly considerable measurement error in the outcome measures, this dataset represents a meaningful picture of project performance from the perspectives of experienced development specialists and evaluators over a long period of time. That being said, the cautious interpretation of the results ought to be done in light of the following limitations.

One general concern is that IEG and the World Bank share a common, objectives-based project evaluation methodology that assesses achievements against each project's stated objectives (called project development objectives or PDO). However, the outcome rating also takes into account the relevance and efficiency of the project objectives based on the country context.[13] It is thus possible that part of the variation in project outcome ratings is due to differences in ambition or feasibility of the stated PDO, rather than to a difference in the magnitude of the actual outcome. That being said, as explained by Bulman et al. (2015, p. 9), this issue with constructed validity is largely unavoidable given the wide variety of Bank projects across sectors. Ratings on objectives provide a common relative standard that can be applied to very different projects. Finding an alternative absolute standard seems unlikely.

Secondly, the measures of project performance captured in the data set are not the object of outcome or impact evaluations. Rather they are the product of reasonably careful administrative assessments by an independent evaluation unit, which helps to minimize conflict of interest and a natural bias towards optimism inherent in self-evaluations by project managers. The scores provided are proxies for complicated phenomena that are difficult to observe and measure. While there are inherent

[12] CPIA rates countries on 16 criteria in four different clusters: economic management, structural policies, and policies for social inclusion and equity, and public sector management.
[13] The rationale for an objectives-based evaluation model is that the Bank is ultimately accountable for delivering results based on these objectives that were the basis of an agreement between the bank and the client country.

limitations with this type of data, the rating method has been quite stable for the period under observation and it has been the object of reviews and audits. It relies on thorough training of the raters, and is laid out in much detail in a training manual. Moreover, when an IEG staff has completed an ICR review, it is peer-reviewed by another expert, and checked by an IEG coordinator or manager. Occasionally, the review can be the object of a panel discussion. It thus represents the professional judgment of experts on the topic. All in all, the IEG rating carries more institutional credibility due to the organizational independence of the group expertise.

Nevertheless, a third caveat is that using the project performance rating system exposes the research to a number of non-negligible endogeneity issues, as well as rater effects in the process of having a single IEG validator retrospectively rate a project on a range of dimensions. For example, since 2006 IEG guidelines apply a "no benefit of the doubt rule" to the validation of self-evaluations. In other words, IEG is compelled to "downgrade" the outcome rating if the evidence presented is weak.[14] Consequently, IEG project outcome ratings can at time collapse two different phenomena, poor results (i.e., severe shortcomings in the operation's achievements of its objectives) and the lack of evidence that the results have been achieved.

The strategy to partially mitigate these risks of mechanistic relationships between M&E quality ratings and project outcome ratings—the main source of bias that may threaten the validity of the empirical analysis in this paper—relies on the use of a second measure of project outcome, produced by the team in charge of the project. This modeling strategy seeks to reduce the mechanistic link between M&E quality and outcome rating in two ways:

- M&E quality ratings and ICR outcome ratings are not rated by the same raters, thereby diminishing rater effects.
- ICR outcome ratings are produced before a measure of M&E quality exists, as the latter is produced by IEG at the time of the validation.[15]

Nonetheless, this strategy does not resolve an additional source of endogeneity, which stems from the fact that due to possible raters' effects IEG outcome ratings may not be fully statistically

[14] IEG coordinators and managers ensure that the guidelines are applied consistently. For instance, if an IEG validator were to deem the quality of M&E as low, but the outcome rating as high, this would raise a 'red flag' for inconsistency by one of the subsequent reviewers. However, the opposite would not be true, there can be very good M&E quality showing important shortcomings in outcome achievements.

[15] The model relies on the assumption that the ICR outcome rating is not mechanistically related to the M&E quality rating. There is some anecdotal evidence that the ICR outcome raters may at times try to anticipate and game IEG rating. However, there is no evidence that this is done systematically, nor that this is done primarily based on an anticipated measure of M&E quality. That said, this issue definitely adds to the noise in the data.

independent of ICR outcome ratings. It is likely that IEG validators use the ICR rating as a reference point, are generally more likely to adjust the rating by one point.

A better way to sever these mechanistic links would have been to use data from outside the World Bank performance measurement system to assess the outcome of projects or the quality of M&E. However, these data were not available for such a large sample of projects. While the use of a secondary outcome measure does not fully resolve endogeneity and rater effects issues, it constitutes a "second-best" with the available data.

Another caveat relates to the potential for unobserved factors that influence both M&E quality and outcomes and needs to be considered. For instance certain type of projects may be particularly complex and thus inherently difficult to monitor and evaluate, and inherently challenging to achieve good outcomes. The control for sectors may partly capture this inherent relationship, but not fully. Finally, the relatively large sample size subjects the study to a risk of Type I error.

4.3. Estimation strategy

This section describes the three main modeling strategies employed in measuring the link between M&E quality and project outcome.[16]

Propensity Score Matching

The main estimation strategy, Propensity Score Matching (PSM), relies on an intuitive idea: if one compares two groups of projects that are very similar on a range of characteristics but differ in terms of their quality of M&E, then any difference in project performance could be attributable to M&E quality. The PSM estimator can measure the average treatment effect of M&E quality on the treated (ATT) if the following two sets of assumptions are met. First, PSM relies on a Conditional Independence Assumption (CIA): assignment to one condition (i.e. good M&E) or another (i.e. bad M&E) is independent of the potential outcome if observable covariates are held constant.[17] Second, it is necessary to attempt to rule out automatic relations between the rating of M&E quality and the rating of project outcome. Given that IEG might downgrade a project if the self-evaluation does not present enough evidence to support

[16] The data were screened in order to test whether the assumptions underlying ordered logit and propensity score analysis were met. The data were tested for multicolinearity and it was found that the tolerance statistics ranged between [0.4721; 0.96] which is within Kline's recommended range of 0.10 and above (Kline, 2011). The VIF statistics ranged between [1.08; 2.12] which is below Kline's cut-off value of 10.0 (Kline, 2011). I conclude that standards multicolinearity is not an issue in this dataset. While univariate normality is not necessary for the models in use, it brings a more stable solution. It was tested graphically by plotting the kernel density estimate against a normal density. Homoskedasticity is not needed in the models used here.

[17] The original PSM theorem of Rosenbaum and Rubin (1983), defined propensity score as the conditional probability of assignment to a particular treatment given a vector of observed covariates.

its claim of performance due to weak M&E, I use two distinct measures of project outcome, one rating by IEG where the risk of mechanistic relationship is high and one rating by the project team where such risk is low, but where the risk of over-optimistic rating is high.

Based on these assumptions, matching corresponds to a covariate-specific treatment vs. control comparison, weighted conjunctly to obtain a single ATT (Angrist & Pischke, 2009, p. 69). This method essentially aims to do three things: (i) to relax the stringent assumptions about the shape of the distribution and functional forms, (ii) to balance conditions across groups so that they approximate data generated randomly, (iii) to estimate counterfactuals representing the differential treatment effect (Guo & Fraser, 2010, p. 37). In this case, the regressor (M&E quality) is a categorical variable, which is transformed into a dichotomous variable. Given the score distribution of M&E quality centered on the middle scores of "modest" vs. "substantial" the data is dichotomized at the middle cut point.[18] In order to balance the two groups, a propensity score is then estimated, which captures the likelihood that a project will receive good M&E based on a combination of institutional, project, and country level characteristics. Equation (1) represents this idea formally:

$$e(x_i) = \Pr(Z_i = 1 | X_i = x_i) \quad (1)$$

The propensity score for project i (i =1,....., N), is the conditional probability of being assigned to treatment Zi =1 (high quality M&E) vs. control Zi =0 (low quality M&E) given a vector Xi of observed covariates (project and country characteristics). It is assumed that after controlling for these characteristics Xi and Zi are independent. I use the recommended logistic regression model to estimate the propensity score. This first step is displayed in Table 2.

As pedagogically explained by Guo and Fraser (2010) among others, the central idea of the method is to match each treated project $(x_i | w_i = 1)$ to n non-treated projects $(x_i | w_i = 0)$ on the vector of matching variable x_i presented above. It is then possible to compare the average of y of the matched non-treated projects. The resulting difference is an estimate of the average treatment effect on the treated ATT. The standard estimator is presented in equation (2): $\mathrm{ATT} =$

$$E(\hat{Y}_{match,1} | W_{match} = 1) - E(\hat{Y}_{match,0} | W_{match} = 0) \quad (2)$$

The subscript 'match' defines a matched subsample. For $W_{match} = 1$, the group includes all projects that have good M&E quality whose matched projects are found. For $W_{match} = 0$, the group is made up of all projects with poor M&E quality that were matched to projects with good M&E. Different matching

[18] The rating of M&E quality as negligible or modest are entered as good M&E =0 and the rating of M&E quality as substantial or high are entered as good M&E =1.

methods and specifications are used to check the robustness of the results.[19] One issue that can surface is that for some propensity scores there might not be sufficient comparable observations between the control and treatment groups (Heckman et al., 1997). Given that the estimation of the average treatment effect is only defined in the region of common support, it is important to check the overlap between treatment and comparison group and ensure that any combination of characteristics observed in the treatment group can also be found among the projects within the comparison group (Caliendo & Koepenig, 2005). A formal balancing test for the main models is conducted; they all successfully pass the balancing test.[20]

Modeling multivalued treatment effects

An interesting practical question for the Bank is: How good does M&E have to be to make a difference in project outcome rating? To answer this question, I take advantage of the fact that M&E quality is rated on a four-point scale (negligible, modest, substantial and high), which is conceptually akin to having a treatment with multiple dosage. I rely on a generalization of the propensity score matching theorem of Rosenbaum and Rubin (1983), in which each level of rating has its own propensity score estimated via a multinomial logit model (Rubin, 2008). The inverse of a particular estimated propensity score is used as sampling weight to conduct a multivariate analysis of outcome (Imbens & Angrist, 1994; Lu et al., 2001). Here, the average treatment on the treated corresponds to the difference in the potential outcomes among the projects that get a particular level of M&E quality:

$$\mathrm{ATT}_{\widehat{\mathrm{t},\check{\mathrm{t}}}} = \mathrm{E}\{(\mathrm{Y}_{\hat{\mathrm{t}}} - \mathrm{Y}_0 | \mathrm{t} = \check{\mathrm{t}})\} \quad (3)$$

As equation (3) shows, the extra notation required to define the ATT in the multivalued treatment case denotes three different treatment levels: $\check{t}$ defines the treatment level of the treated potential outcome; 0 is the treatment level of the control potential outcome; and t = $\check{t}$ restricts the expectation to the projects that actually receive the dosage level $\check{t}$ (Guo & Fraser, 2010; Hosmer et al., 2013). To compute the propensity score, a multinomial logistic regression combined with an inverse-probability-weighted-regression-adjustment (IPWRA) estimator are used, all available with the Stata command PSMATCH2 and TEFFECTS IPWRA.[21]

[19] I include various types of greedy matching and Mahalanobis metric distance matching. I also use a non-parametric approach with kernel and bootstrapping. These estimation strategies are all available with the Stata command PSMATCH2.

[20] The basic assumptions have all been tested and validated but the results are not reported here for reasons of space.

[21] This estimator is doubly robust and is recommended when there are missing data. Given that the outcome variable is a categorical and necessarily positive variable, the poison option inside the outcome-model specification is used .

Project manager fixed-effects

Another practical question for the Bank is whether the observed association between M&E quality and project outcome rating is a simple proxy for the intrinsic performance of its project managers. As shown above and in past work, the quality of supervision is a strong and significant correlate of project outcome, and one would expect that M&E is a partial determinant of quality of supervision: how well can project managers supervise the operation if they cannot track progress achieved and challenges? Consequently, using a fixed effect for the identity of the TTL instead of an indicator for the quality of supervision, can help solve this correlation issue.

The third modeling strategy is thus to use a conditional (fixed effect) logistic regressions.[22] Essentially, this modeling technique looks at the relationship between the "treatment" (good M&E quality) and a dummy dependent variable (project outcome rating dichotomized as successful or not successful) within a specific group of projects. Here projects are grouped by their project manager identification numbers.

Throughout the paper, the unit of analysis is a project. All specifications include a number of basic controls for the type of agreement, the type of sector and the year of the evaluation. I also include a number of project characteristics such as number of TTLs that were assigned to the project during its entire cycle, the expected project duration and the log of project size, as well as a measure of country government's capacity.

5. Results

I find that good M&E quality is positively and significantly associated with project outcomes as measured institutionally by the Bank. Table 3 documents the role of various project and country correlates in explaining the variation in outcome across projects using OLS regressions.[23] Each panel reports results for both IEG and ICR outcome ratings. When measured with IEG outcome rating, the quality of M&E is significantly positively correlated with project outcome. A one point increase in M&E quality (on a four point scale) is associated with a 0.3 point increase in project performance (on a 6 point scale), the effect is statistically significant at the 1% level. This positive relationship persists when controlling for the quality of supervision and the quality at entry. In that case, a one point increase in M&E quality is

[22] Also described as conditional logistic regression for matched treatment-comparison groups (e.g., Hosmer et al., 2013)

[23] I report the results from simple OLS regressions although an ordered-logit model is more appropriate given that the outcome variable is discrete on a six-point scale. On such a large number of categories, the value-added of recognizing explicitly the discrete nature of the dependent variable is rather limited and results from O-logit regressions are more difficult to interpret than results from OLS regressions. However, as shown in Table 4, the results of the o-logit do not make a difference in terms of size and significance of the effect.

associated with a 0.17 increase in project performance. This magnitude of association is on par with the effect size of the quality of supervision (0.18 points), which was found in previous work to be a critical determinant of project success (e.g., Denizer et al., 2013; Buntaine & Park, 2013). The relationship is also statistically significant at the 1% level. However, when outcome is measured through self-evaluation, this correlation remains positive but its magnitude is rather small (0.12 in model 1 and 0.03 in model 3), and statistically significant only at the 10% level.

Next, I focus on comparing projects that are very similar on a range of characteristics but differ in their quality of M&E. To do so, I rely on several types of propensity score matching techniques, in order to test out a number of estimation strategies and ensure that the results are not merely a reflection of modeling choices. As shown in Table 5 three types of "greedy matching"—with and without higher order and interaction terms—are tested (Model 1,2,3,4 & 6,7,8,9). A non-parametric approach with kernel and bootstrapping for the estimation of the standard error (Model 5 & 10) is also tested. In the left panel these models test the link between M&E quality and project outcome as measured by IEG. Again, PSM results indicate that good M&E quality is strongly and statistically correlated with outcome rating of Bank projects as measured by the organization. The estimated ATT ranges between 0.33 and 0.40 on a six-point outcome scale, depending on the matching technique. The estimate is statistically significant and robust to specification variations.

The association between M&E quality and project outcome ratings remains positive and statistically significant at the 1 percent level in the right panel, where the outcome is measured through self-evaluation, but its magnitude is not as strong. With this measure of outcome, PSM results in an ATT ranging from 0.14 and 0.17 on a six-point outcome scale. The interpretation of this difference in magnitude is not straightforward. One possible interpretation of this difference could be as a symptom of the "disconnect" between operational team and IEG whereby— despite the harmonization in rating procedures between self and independent evaluations—the two are not capturing project performance along the same criteria. In other words, M&E quality is a crucial element of the objective and more removed assessment by IEG, but plays a weaker role in "the somewhat more subjective and insightful" approach of the self-rating as suggested by Brixi, Lust & Woolcock (2015, p.285). For example, outcome ratings by the team in charge of the operation may rely less on the explicit evidence provided by the M&E system, than on a more tacit and experiential way of understanding project success. This difference may also be the result of the imperfect estimation strategy that cannot fully control for rater effects and other endogeneity issues, as highlighted above.

In addition to documenting the association between M&E quality and project outcome, I am also interested in answering a more practical question: how high does the score of M&E quality has to be to make a difference in project outcome rating? As displayed in Table 6, the model measures the average difference in outcomes between projects across levels of M&E quality. This model confirms that the relationship between M&E quality and project outcome rating is not proportional. Projects that move from a "negligible" to a "modest" M&E quality score 0.24 points higher on the six-point outcome rating scale. The magnitude of the relationship is even higher when moving from a "substantial" to a "high" M&E quality, which is associated with an improvement in the outcome rating by 0.74 points on the six-point scale. This suggests that there might be a tipping point in the quality of M&E activities that makes a difference in the measurement or management of project performance, which is then reflected in the outcome rating.

As with other models, however, when measured through self-evaluation the incremental improvements in project outcome as the quality of M&E increases is not as evident. Only when increasing the quality of M&E by the equivalent of two points on the M&E quality scale, this improvement translates into a statistically significant increase in project outcome rating. For example, when improving M&E quality from negligible to substantial, projects score 0.27 points higher on the six-point outcome scale.

Finally, I use conditional logit regression with project manager fixed effect to measure how much of a difference the quality of M&E makes within groups of projects that have shared the same project managers at one point during their cycles. The results of this analysis are displayed in Table 7. Within groups of projects that have shared a similar project manager, the odds of obtaining a better outcome rating are 85% higher for projects that have benefited from a good M&E quality than for projects that are similar on several characteristics but that have poor M&E quality. A surprising finding is that, for the first time in the analysis, the positive relationship between M&E quality and outcome rating is stronger in magnitude when considering the self-evaluation outcome rating than when considering the IEG outcome rating. Here, the odds of obtaining a better outcome rating are 178% higher for projects with good M&E quality than for projects with poor M&E quality. What the results seem to suggest is that a given project manager in charge of two similar projects but with one project benefitting from better M&E seems to obtain better outcome rating on this particular project according to both self-evaluation and independent validation.

6. Conclusions and Implications

As shown by Denizer et al. (2013), there is a wide range of as-yet-unmeasured factors, at both the country and project levels, that account for the variation in project performance. The development community for the past 20 years has hypothesized that one of these important explaining factors is the quality of M&E. This study is among the first to investigate quantitatively patterns of regularity in the association between M&E quality and project performance across a large sample of development projects. The study presents evidence that within the institutional context of the organization, M&E quality is an important factor in explaining the variation in World Bank project outcome ratings. To summarize, I find that the quality of M&E is systematically positively associated with project outcome ratings as institutionally measured within the World Bank and its Independent Evaluation Group. The PSM results show that on average, projects with high M&E quality score between 0.13 and 0.40 points better than projects with poor M&E quality on a six-point outcome scale, depending on whether the outcome is measured by IEG or the team in charge of operations. This positive relationship holds when controlling for a range of project characteristics and is robust to various modeling strategies and specification choices. More specifically, the study shows that:

(1) When measured through OLS, and when controlling for a wide range of factors, including the quality of supervision and the project quality at entry, the magnitude of the relationship between M&E quality is on par with the association between quality of supervision and project outcome rating (respectively 0.17 and 0.18 points better on a 6 point scales).

(2) When matching projects, the average treatment effect on the treated of good M&E quality on project outcome ratings ranges from 0.33 to 0.40 points when measured by IEG, and between 0.14 and 0.17 points when measured by the self-evaluation.

(2) Even when controlling for project manager identity (which was found in the past to be the strongest predictor of project performance), the ATT of M&E quality remains positive and statistically significant. The odds of scoring better on project outcome are 85% higher for projects with high M&E quality than for otherwise similar projects that were managed by the same project manager at one point in their project cycle but have low M&E quality.

All in all, the systematic positive association between M&E quality and outcome rating found in this study gives credence to the notion that within the institutional performance rating system of the World Bank and IEG, M&E quality is a potentially strong determinant of satisfactory project ratings. However, there are important caveats to this study that have been highlighted above. Future research can help bolster this evidence, by finding empirical strategies that would overcome these limitations, in particular endogeneity issues and rater effects. Notwithstanding these caveats, the findings of this study have some institutional implications for the World Bank and the larger development community. A number of these implications are highlighted here.

First, these findings suggest that there is some institutional value in investing in M&E, given that the overall quality of M&E remains weak at the Bank. While strengthening the evaluation culture within the organization is a long and complex process, the systematic text analysis conducted as a preliminary step in this paper suggests that a number of rather simple actions can lead to improving M&E quality at the margin. For instance:

- Ensuring that M&E design is not overly complex, and is aligned with the existing management information system that the client countries already have would go a long way in improving M&E quality.
- Ensuring that the data collected are quality controlled or audited is also an important determinant of M&E credibility and ultimately its usability for performance management.
- Ensuring that M&E is not an operational afterthought but supported by a clear division of labor between the World Bank team, clients, and implementing teams is key.

A second finding is that the relationship between M&E quality and project performance is higher when measured by IEG, in the framework of an independent validation, than when it is measured by the implementing team, in the framework of a self-evaluation. Although this study cannot explain empirically why such a gap exists, it confirms that there is a substantial 'disconnect' between how an independent evaluation unit and operational staff measure success. It is possible that while the former puts a lot of emphasis on formal and explicit evidence of impact, the latter relies more on tacit and implicit evidence of success. This discrepancy is not unique to the Bank but a recurrent theme of the results based management literature in international organizations. The Bank has actively worked towards bridging the 'disconnect' in ratings for years, and monitors this gap closely. This study echoes others in suggesting that working on the M&E culture would go a long way in bridging this gap.[24] It is thus critical to further investigate the institutional dynamic around project performance measurement, and results-based management within the World Bank, which is partly addressed in a forthcoming evaluation of the World Bank's self-evaluation system.

Third this study highlights the need to better understand the underlying mechanisms through which M&E makes a difference in project success. Recently, Legovini et al. (2015) tested and confirmed

[24] The series of annual report on the Results and Performance of the World Bank Group (RAP) have consistently showed that M&E quality is weak and should be improved to help project perform better. The recent study on Learning and Results in World Bank operations also corroborated these findings: http://ieg.worldbankgroup.org/evaluations/learning-results-wb-operations2

the hypothesis that certain types of evaluation, in this case impact evaluation, can help keep the implementation process on track and facilitate disbursement of funds. Others suggest that as development interventions become increasingly complex, adaptive management— i.e. iterative processes of trials, errors, learning and course corrections— is necessary to ensuring project success. M&E is thought to play a critical role in this process (e.g., Pritchett et al., 2013; Andrews, 2015). Certain approaches to M&E may be more impactful than others in certain contexts, and this should be studied closely.

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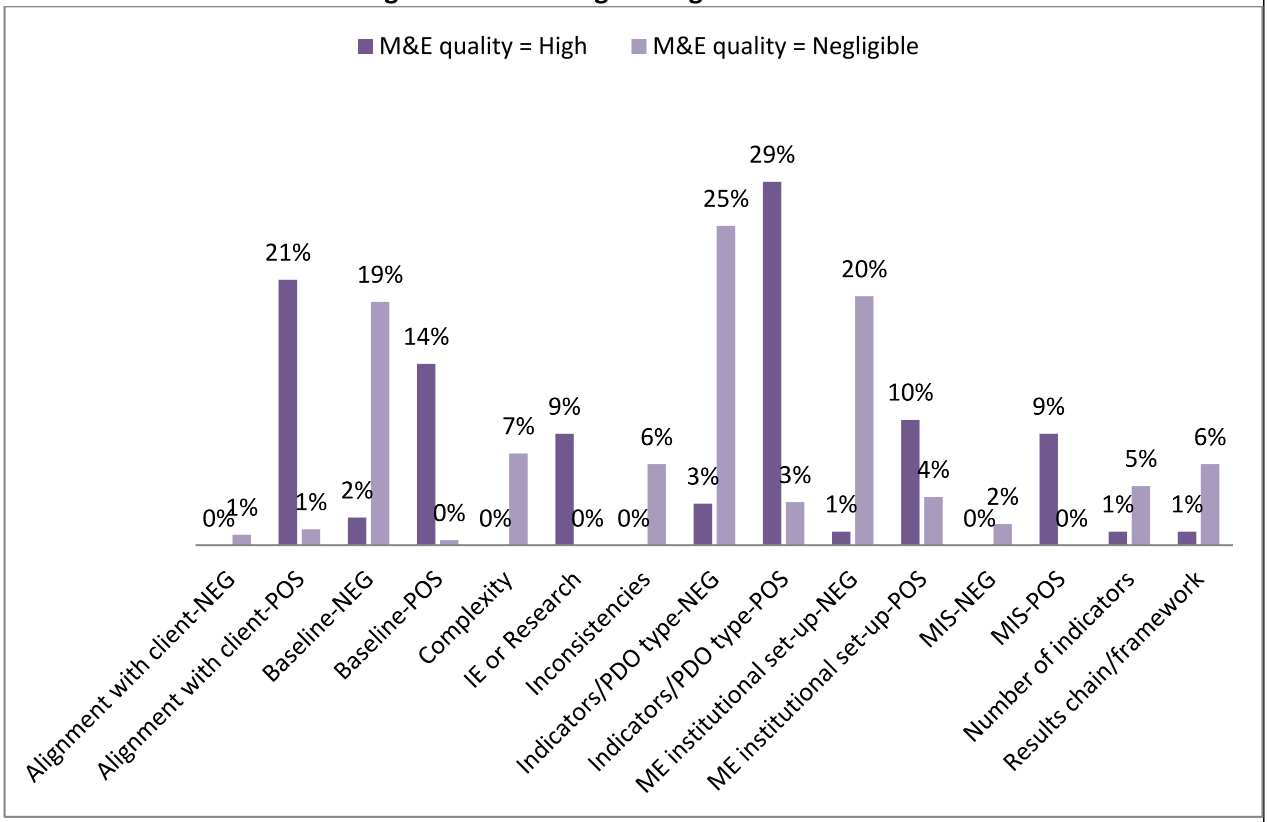
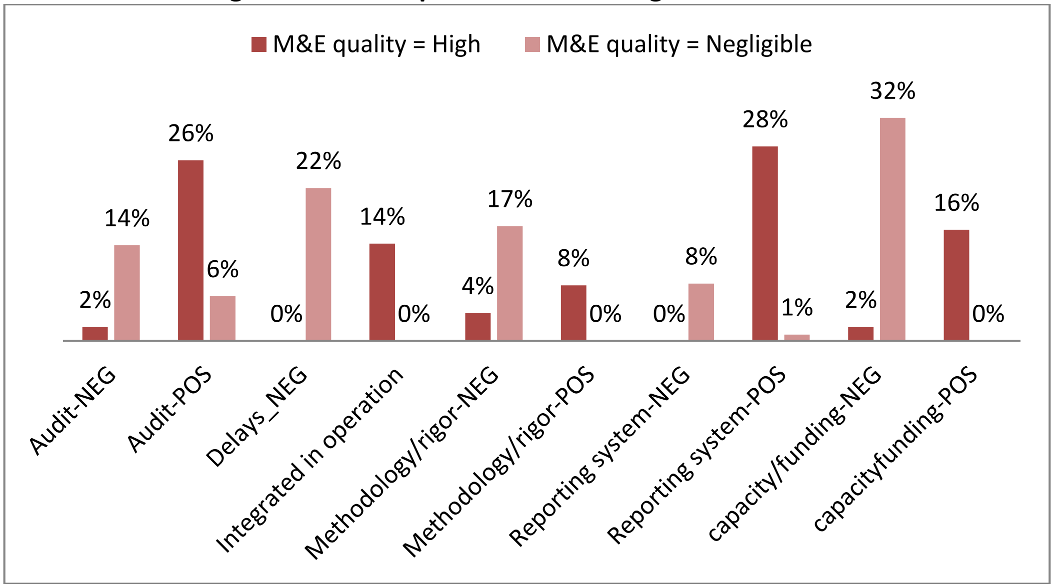
Figures and Tables

Figure 1. M&E Design rating characteristics



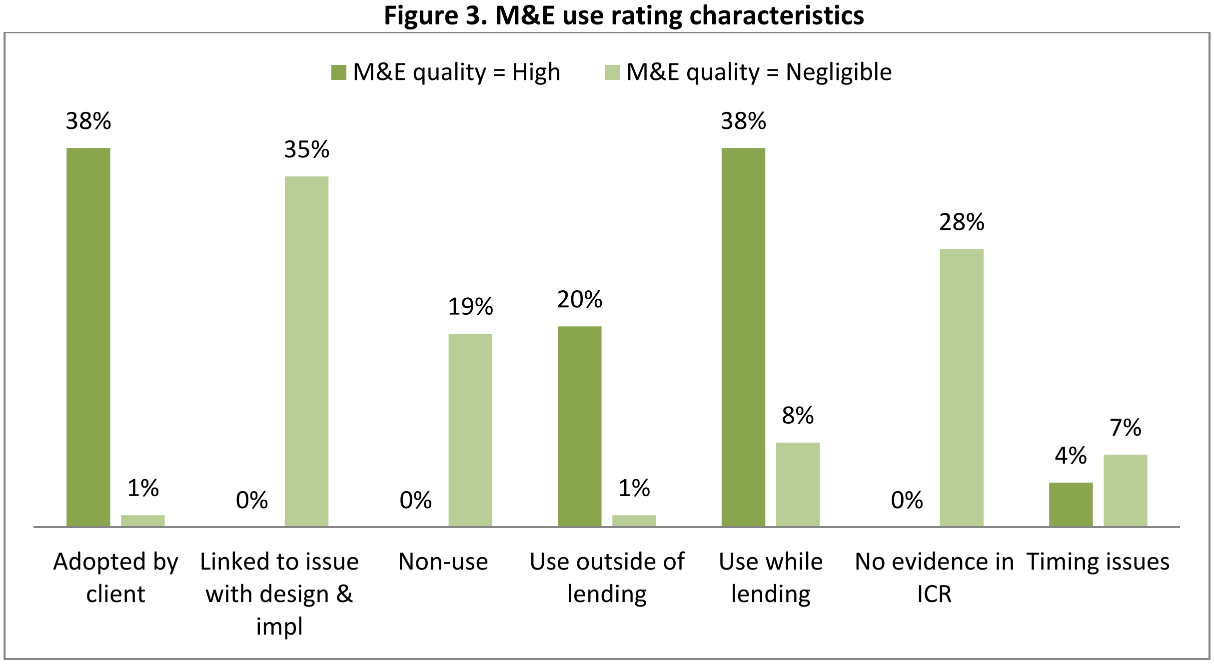
Notes:
1.The unit of analysis is a coded segment.
2.There are 91 coded segments in the category M&E = high and 235 in the category M&E = low.
3. The data is normalized for comparison purposes.

Figure 2. M&E Implementation rating characteristics



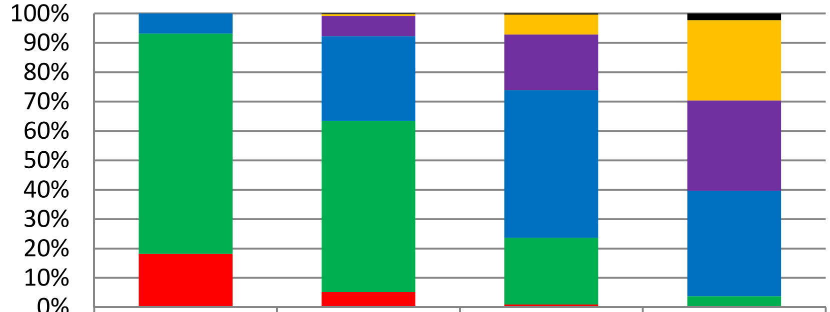
Notes:
1.The unit of analysis is a coded segment.
2. There are 50 coded segments in the category M&E = high and 109 in the category M&E = low.
3.The data is normalized for comparison purposes.

Figure 3. M&E use rating characteristics



Note:
1. The unit of analysis is a coded segment.
2. There are 45 coded segments in the category M&E = high and 83 in the category M&E = low.
3. The data is normalized for comparison purposes

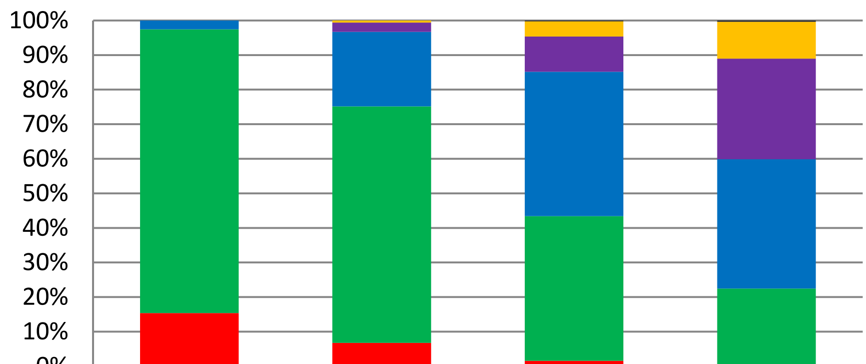
Figure 4a. Association between M&E quality and IEG outcome rating



IEG Outcome rating	High	Substantial	Modest	Negligible
Highly unsatisfactory	0.0%	0.2%	0.4%	2.2%
Unsatisfactory	0.0%	0.6%	6.8%	27.3%
Modestly unsatisfactory	0.0%	6.8%	18.9%	30.7%
Modestly satisfactory	6.8%	28.8%	50.2%	36.0%
Satisfactory	75.0%	58.3%	22.7%	3.7%
Highly satisfactory	18.2%	5.2%	1.0%	0.0%

M&E Quality rating

Figure 4b. Association between M&E quality and ICR outcome rating (N=1385)



ICR outcome rating	High	Substantial	Modest	Negligible
Highly unsatisfactory	0.0%	0.0%	0.2%	0.4%
Unsatisfactory	0.0%	0.6%	4.4%	10.6%
Modestly unsatisfactory	0.0%	2.7%	10.2%	29.1%
Modestly satisfactory	2.6%	21.6%	41.7%	37.4%
Satisfactory	82.1%	68.4%	41.9%	22.4%
Highly satisfactory	15.4%	6.8%	1.6%	0.0%

M&E Quality rating

Table 1. Summary Statistics for the main variables

Evaluation year (2008-2014) 1384 observations		
Variable	Mean	Std Dev.
Outcome Variables		
IEG Satisfactory (1)/ Unsatisfactory (0)	.71	.45
IEG 6-point scale	3.93	.97
ICR Satisfactory (1)/ Unsatisfactory (0)	.83	.37
ICR 6-point scale	4.29	.89
Treatment Variable		
M&E quality	2.14	.69
Project Characteristics		
Number of TTL during project cycle	3.08	1.3
Quality at Entry (IEG rating) (1=bad-6=good)	3.79	1.03
Quality of Supervision (IEG rating) (1=bad-6=good)	4.18	.96
Borrower Implementation (IEG rating) (1=bad-6=good)	4.05	1.003
Borrower Compliance (IEG rating) (1=bad-6=good)	3.94	1.045
Expected project duration	6,5	2.26
Natural log of project size	17.60	1.42
CPIA average score (1=bad-6=good)	3.62	.483

Table 2. Determining the Propensity score

Variables	Propensity Score M&E quality dummy
Number of project managers (TTL) during project cycle	-.076*** (.036)
Expected project duration	-.038 (.035)
Log of project size	.224*** (.057)
Country Policy and Institutional Assessment (CPIA)	.209 (.183)
Borrower Implementation (IEG rating)	.841*** (.104)
Borrower Compliance (IEG rating)	.509*** (.096)
Sector Board Control dummy	X
Agreement Type dummy	X
N	1385
Pseudo R^2	.214

Notes:
1. Logit model that serves to predict the likelihood of a project to receive good vs. bad M&E quality.
2. M&E quality is dichotomized at the mid-point cut off.

Table 3. M&E quality and outcome ratings: OLS regressions

Variables	Model 1		Model 2		Model 3	
	IEG rating	ICR rating	IEG rating	ICR rating	IEG rating	ICR rating
M&E quality	.307*** (.029)	.117*** (.028)	.212*** (.029)	.057*** (.029)	.168*** (.029)	.029* (.029)
Number of project managers during project cycle	.007 (.008)	-.0015 (0.008)	.010 (.008)	-0.001 (.008)	.0139* (.008)	.003 (.008)
Expected project duration (in years)	.014 (.008)	-.009 (.0084)	.022*** (.008)	0.013** (.008)	.020*** (.008)	.01** (.008)
Log of project size (log $)	.0002 (.014)	-.006 (.013)	-.012 (.013)	-.013 (.013)	-.011 (.013)	-.013 (.013)
Country Performance and Institutional Assessment (CPIA)	-.039 (.044)	-.007 (.042)	-.019 (.041)	.006 (.041)	-.006 (.041)	-.014 (.041)
Quality at Entry (IEG rating)			.268*** (.023)	.170*** (.022)	.233*** (.022)	.148*** (.022)
Quality of Supervision (IEG rating)					.183*** (.025)	.114*** (.025)
Borrower Implementation (IEG rating)	0.36*** (.024)	.343*** (.023)	.283*** (.024)	.293*** (.0235)	.224*** (.025)	.26*** (.024)
Borrower Compliance (IEG rating)	0.32*** (.023)	.332*** (.022)	.246*** (.022)	.284*** (.022)	.220*** (.022)	.267*** (.022)
Sector (dummy)	X	X	X	X	X	X
Type of agreement (dummy)	X	X	X	X	X	X
Evaluation Year (dummy)	X	X	X	X	X	X
N	1298	1298	1298	1298	1298	1298
Adjusted R^2	0.596	0.565	0.637	0.572	0.651	0.578

Notes:
***statistically significant at p<0.01; ** statistically significant at p<0.05; * statistically significant at p<0.1

Table 4. M&E quality and outcome ratings: Ordered-logit model

Variables	Model 1		Model 2		Model 3	
	IEG rating	ICR rating	IEG rating	ICR rating	IEG rating	ICR rating
M&E quality	1.08*** (.103)	.4897*** (.104)	.847*** (.106)	.290*** (.109)	.708***[1] (.108)	.212* (.111)
Number of project managers during project cycle	.0118 (.0278)	-.015 (0.028)	.026 (.0285)	-0.009 (0.289)	.039 (.028)	-003 (.029)
Expected project duration (in years)	.029 (.029)	-.005 (.030)	.058 (.030)	0.011 (.031)	.057*** (.030)	.009 (.031)
Log of project size (log $)	.0158 (.0475)	.0036 (.051)	-.268 (.048)	-.017 (.051)	-.029 (.044)	-.016 (.051)
Country Performance and Institutional Assessment (CPIA)	-.226* (.144)	-.125 (.151)	-.172 (.147)	-.082 (.153)	-.12 (.148)	-.059 (.153)
Quality at Entry (IEG rating)			.977*** (.0856)	.651*** (.0.84)	.880*** (.087)	.596*** (.086)
Quality of Supervision (IEG rating)					.623*** (.092)	.321*** (.093)
Borrower Implementation (IEG rating)	1.189*** (.087)	1.220*** (.089)	.992*** (.089)	1.078*** (.0922)	.823*** (.093)	.976*** (.096)
Borrower Compliance (IEG rating)	1.072*** (.0814)	1.17*** (.084)	.864*** (.084)	1.014*** (.087)	.793*** (.085)	.971*** (.087)
Sector (dummy)	X	X	X	X	X	X
Type of agreement (dummy)	X	X	X	X	X	X
Evaluation Year (dummy)	X	X	X	X	X	X
N	1298	1298	1298	1298	1298	1298
Pseudo R^2	0.3415	0.3365	0.381	0.356	0.394	0.359

Notes:
***statistically significant at p<0.01; ** statistically significant at p<0.05; * statistically significant at p<0.1

[1]Interpretation: This is the **ordered log-odds estimate** for a one unit increase in **M&E quality** score on the expected **outcome** level given the other variables are held constant in the model. If a project were to increase its M&E quality score by one point (on a 4-point scale), its ordered log-odds of being in a higher **outcome rating** category would increase by 0.708 while the other variables in the model are held constant. Transforming this to odds ratio facilitates the interpretation: The odds of being in a higher outcome rating category are two times higher for a project with a one point increase in M&E quality rating, all else constant. In other words, the odds of being in a higher outcome category are 100% higher for project with a one point increase in M&E quality rating.

Table 5. Results of various propensity score estimators

Outcome measure	IEG outcome rating					ICR outcome rating				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Estimator	5 nearest neighbor	Nearest neighbor within specific caliper[1]	Radius (caliber 0.1)	5 Nearest neighbor	Kernel (epan)[2]	5 nearest neighbor	Nearest neighbor within specific caliper[1]	Radius (caliber 0.1)	5 Nearest neighbor	Kernel (epan)[2]
ATT difference	.372*** (.0644)	.379*** (.079)	.404*** (.064)	.336*** .074	.364*** (.044)	.145*** (.059)	.168*** (.074)	.172*** (.060)	. 138*** (.069)	.145*** (.033)
Interaction terms & higher order	No	No	No	Yes	No	No	No	No	Yes	No
Untreated (N=)	923	923	923	923	923	924	924	924	924	924
Treated (N=)	375	374	374	375	374	374	375	374	375	374

Notes:
Standard errors are indicated in bracket.
*when t> 1.96
[1] The caliper is 0.25 times the standard deviation of the propensity score
[2] The kernel type used here is the default epan standard error obtained with bootstrapping

Table 6. Average treatment effect on the treated for various levels of M&E quality.

M&E quality level	IEG rating	ICR rating
ATT (modest vs. negligible)	.238*** (.071)	.111* (.066)
ATT (substantial vs. modest)	.319* (.242)	.177 (.277)
ATT (substantial vs. negligible)	.543*** (.099)	.275*** (.097)
ATT (high vs. substantial)	.739*** (.340)	.461 (.365)
ATT (high vs. modest)	1.053*** (.250)	.639*** (.250)
ATT (high vs. negligible)	1.059*** (.249)	.523*** (.248)
(N=)	1298	1299

Notes:

1. The models control for CPIA, anticipated duration, number of managers, project size, measure of quality at entry and quality of supervision, as well as borrower implementation and compliance.
2. Estimator: IPW regression adjustment, Outcome model = Poisson, treatment model: multinomial logit.
3. Robust standard errors in bracket.
4. *** statistically significant at the 1%, ** at the 5% and * at the 10% level.

Table 7. Association between M&E quality and project outcome ratings by project manager (TTL) groupings

	IEG outcome rating[1]		ICR outcome rating[2]	
	Coeff	Odds ratio	Coeff	Odds ratio
M&E quality	.617*** (0.172)	1.85*** (0.319)	1.023*** (.204)	2.78*** (.56)
Expected project duration (year)	.066 (0.053)	1.06 (0.056)	-.031 (.06)	.968 (.059)
Log of project size (log $)	-.1007 (0.123)	.904 (0.111)	.202 (.143)	1.224 (.175)
CPIA	.224*** (0.092)	1.25*** (0.116)	-.093 (.098)	.911 (.091)
Borrower Performance (IEG rating)	2.89*** (0.186)	18.11*** (3.38)	2.23*** (.173)	9.27*** (1.61)
Evaluation FY	x	x	x	x
Manager unique identifier	Grouping	Grouping	Grouping	Grouping
(N=) Pseudo R^2	1965 0.6345		1458 0.62	

Notes:

1. Models are C-logit (conditional logistic regression) with fixed effects for TTL.
2. The projects were sorted by UPI. I then identified projects with the same UPI and paired them up. Projects with a quality of M&E rating that was "negligible" or "modest" were assigned a 0 and projects with a quality of M&E rating that was "substantial" or "high" were assigned a 1.I then ran C-logit regressions for the matched case and control groups within a given UPI grouping.