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No. 2 | February 2011

Asian Development Bank

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Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org

February 2011
Publication Stock No. WPS113033

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Evaluating the PRMPA[1] Using a Synthetic Control Group[2]

ABSTRACT

The Asian Development Bank (ADB) provided a program loan to the Government of Assam in the early part of this decade to help stabilize its fragile finances. We evaluate the immediate short-term implications of this program with a focus on own tax revenue generation and interest payments using a synthetic control method that not only allows us to take into account baseline levels of performance for Assam but also to model what would have happened in Assam in the absence of the ADB intervention. We find that the ADB program led to an average 0.40% increase in the own tax to gross state domestic product (GSDP) ratio in the 3 post-intervention years than what would have happened in the absence of the program. However, these gains do not extend to the interest payments to GSDP ratio.

JEL Classification: E52, E61, E62, H30, H63

Keywords: Fiscal Consolidation, Synthetic Control Method, Assam, Own Tax to GSDP Ratio, Interest Payments to GSDP Ratio.

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[1] PRMPA stands for Public Resource Management Program in Assam

[2] The authors would like to thank participants at three ADB seminars—(i) South Asia Department, (ii) Independent Evaluation Department, and the (iii) South Asia Regional Division Economists' retreat—for their suggestions and comments. They are particularly grateful to Bruno Carrasco and V. Tulasidhar for their comments and also thank an anonymous referee for useful comments.

I. INTRODUCTION

1. A key challenge in evaluating the impact of fiscal interventions, and indeed any state-level intervention, has always been the difficulty in formulating a credible counterfactual, viz. what would have happened to the state in the absence of the fiscal intervention. Much of the progress in the last two decades in quantitative evaluation has been in terms of using micro-data to look at study designs where the missing counterfactual is constructed from a vast donor pool of untreated units (Shadish, Cook, and Campbell 2001). While this missing counterfactual problem is common to any evaluation, what makes this particularly challenging in the context of fiscal policy (or any state-level policy) is the limited set of unexposed states from which to construct the missing counterfactual.

2. Fiscal policy evaluations have relied on before and after study designs to understand how a state's fiscal space has evolved with state-level policy adjustments (RBI 2010, Purohit and Purohit 2010, Brondolo et al. 2008, Mundle 1997). Some case studies have even tried to benchmark such performance with respect to other ostensibly similar states where similarity is subjective and based on either geographic, historic, or cultural proximity. Two studies that have formalized the study of macro-interventions, albeit not pertinent for fiscal policy evaluation, are the study of the impact of the cigarette reform bill in California (Abadie, Diamond, and Hainmueller 2010) and the effect of terrorism in Basque county in Spain (Abadie and Gardeazabal 2003). We use these methods in the context of an ADB program loan that was designed to reform fiscal imbalances in the state of Assam in India.

3. Briefly, we find that the ADB loan program in the immediate short-run had a strong impact on Assam's ability to raise its own tax revenues, while its effects on interest payments are more ambiguous. In addition, these sorts of interventions are also difficult to study due to a number of reasons: (i) often similar programs are in place in many of the control states that would tend to imply that the estimated program effects are underreported; and (ii) post-intervention fiscal changes that take place in the intervention unit that are independent of the program itself (e.g., High Court abolition of certain state taxes) and would need to be factored into the counterfactual as these are changes that would have been seen even in the absence of the program and yet they are not something that can be anticipated based on past historical trends.

4. The rest of the paper is arranged as follows: Section II discusses the methods we use with a literature review of basic evaluation design to place the macro-evaluation or synthetic control method in the larger evaluation literature; Section III outlines the Assam loan program made by ADB with a careful discussion of its components; Section IV examines the data with details of the outcome variables that we use; Section V reviews the results; and Section VI closes with a discussion of the results.

II. EVALUATION AND SYNTHETIC CONTROL METHODS

5. Evaluation is a key tool that contributes to transparency and accountability for a range of stakeholders—from clients, stakeholders, and program beneficiaries to the funder. By providing nonpartisan evidence on intended and unintended program outcomes, an evaluation helps improve development impacts of government and international aid agencies in the development sector.

(i) **The basic evaluation problem.** The key econometric challenge in any evaluation is the lack of evaluation design to observe the program beneficiaries when they receive the program as well as when they do not receive the program. For example, if we are evaluating the effect of a headache pill on a person's headache—it is not possible to observe the same person with and without taking the headache pill. This problem is known in the evaluation literature as the problem of the missing counterfactual. Rubin's causal framework for potential outcomes is often used to formally denote this. In a binary intervention assignment framework, if y_i measures an outcome of interest for unit i, then its potential outcomes may be denoted as (y_i^I, y_i^{NI}) where y_i^I denotes the outcome with the intervention and y_i^{NI} denotes the outcome without the intervention (Holland 1986).

(ii) **Types of identification.** Econometric approaches to solving this problem of the missing counterfactual are based on making various assumptions about the data that we in fact can see—i.e., headache levels of people with and without the headache pill. Using such observational data ordinary least squares (OLS) regression methods, propensity score models, panel data methods, and instrumental variables approach all have various different identifying assumptions that range from the most implausible to those that are plausible but need data that are relatively difficult to capture (Meyer 1995; Shadish, Cook, and Campbell 2001).[1] These are known as identifying assumptions because they each make an assumption that identifies a control group in providing estimates of what would have happened in the absence of the intervention. The concern for all these methods always stems from the credibility of the identified control group to tell us what would have happened in the absence of the intervention.

For example, two basic evaluation designs that have often been used in cross-country or cross-unit studies are the "with and without intervention" design and the "before and after" design (Shadish, Cook, and Campbell 2001). Let us continue with the headache pill example—we are interested in testing if a certain pill is useful in reducing headaches for those who consume the pill. The first design requires purely cross-sectional information on a group of individuals, some of whom have consumed the pill while others have not, and to look at the intensity of headache across these groups after adjusting for observable differences such as gender, age, height, occupation, prior health conditions, etc. Here the underlying assumption is that the headache levels of the group without the headache pill would be a good proxy for what would have happened to the individuals who have taken the pill had they not done so. Usually, this is an unrealistic assumption as individuals choose to consume a pill or not and usually people with higher levels of headache will consume pills so that the observed difference could either be because of the pill—or something unobservable—the original level of the headache.

The before and after evaluation design requires observations on the same units before and after the intervention. If we survey people with a headache before they take the pill and then resurvey them after they take the pill, one usually has a more credible control group—the individual at an earlier point in time without

[1] The key challenge in any evaluation is the difficulty with having truly exogenous variation between a treated group and a control group in terms of who received the intervention.

the pill is the control for the person later on after having consumed the pill. However, even this before and after comparison is seen to be problematic as we do not know if the observed change in headache is due to either the changes that would have happened in the absence of a pill—such as a disappearance in the headache episode—or is due to the pill alone; such threats to evaluation design are often called regression to the mean or maturation concerns. Observational studies have increasingly relied on evaluation strategies that are called difference in differences (DID) that combine a "with and without intervention" design with a "before and after" design by collecting pre-intervention data on a sample where everyone is untreated and then resurveying the sample after a subset receives the treatment (Meyer 1995; Shadish, Cook, and Campbell 2001). Here the identification comes from the group which never received the intervention but whose before and after observations help us address maturation and selection concerns—they tell us what would have happened to the intervention group across time in the absence of the intervention.

An alternative approach has been the use of experiments or more generally, random assignment to program and control states to evaluate program efficacy. This is often thought of as the "gold standard" in the evaluation literature as the process of random assignment—i.e., to randomly assign who receives the intervention and who maintains status quo ensures that there are no differences between the treatment and control groups (Shadish, Cook, and Campbell 2001). Thus, random assignment creates a credible counterfactual state that tells us what would have happened had the intervention not taken place. This ensures that any observed differences after the intervention takes places can be attributed to the intervention alone and not due to differences that may have emerged over time if we study a purely before and after study design or differences that exist in a cross-sectional study design between treatment and control groups.

(iii) **Macro-intervention and synthetic control methods.** In general, all these methods are used with microdata from large datasets (i.e., sample sizes are in the thousands) and where program beneficiaries tend to be individuals. However, interventions take place at both the individual level and at the level of macro-units such as neighborhoods, blocks, districts, or states. State-specific macro-economic program interventions are difficult to evaluate since the unit of intervention itself allows for few, if any, counterfactuals that may be relied on to understand what would have happened in the absence of the program (Abadie and Gardeazabal 2003; Abadie et al. 2010). While this is also a natural problem even in the context of interventions targeted at individuals, or at much more disaggregated geographical units, econometric evaluations attempt to build a counterfactual by relying on a huge pool of potential *non-treated* or *donor* cases that are statistically indistinguishable from the *treated* cases. At the macro-level there simply are not enough cases to allow for such methods. Consequently, traditional approaches to understanding the impact of interventions at the state level have had to rely on context-specific evaluations that are essentially case-study based with close and careful understanding of the program and how it was implemented and that tend to be a before and after design if baseline data exist.

While evaluating macro-policies or events which affect macro-units remains difficult, a promising new method has been the use of "synthetic control"

macro-units that are statistically equivalent to the target state or country before the policy was adopted. Such methods have been used recently to evaluate the effect of terrorism on economic development in the Basque county (Abadie and Gardeazabal 2003) or in the context of state-level tobacco control laws in the state of California (Abadie et al. 2010). While these are essentially difference in differences evaluation designs, they are very different from the microdata-based approach: In the Basque county case, there is one intervention county, the Basque county, and only 16 donor counties from which the synthetic control group is constructed, a weighted combination of 2 of these 16 counties acted as the synthetic Basque county (Catalonia and Madrid). Similarly, in evaluating the effect of tobacco control laws in California, there is only one intervention state (California), and 38 donor states for the analysis: A combination of 5 states (Colorado, Connecticut, Montana, Nevada, and Utah) was used to create a synthetic California for the analysis. Evaluating the Public Resource Management Program in Assam (PRMPA) has similar sort of data concerns: We are interested in the counterfactual state of what would have happened in Assam without the intervention and we have 27 donor states from which we can construct a synthetic Assam.

(iv) **Estimation strategy.** A key goal for a credible evaluation is to identify an appropriate counterfactual for the state that received the intervention. Let there be S candidate donor states (S could be 27—India has 28 states), so that the sample consists of S+1 states—where we have one intervention state (i.e., Assam) and S unexposed states where the intervention is receiving PRMPA. We observe each of these S+1 states for T periods, where T_0 indicates the year in which the intervention was initiated ($1 \leq T_0 \leq T$). Thus, the pre-intervention period would be years {1, 2,…, (T_0 –1)}, while the post-intervention period would be the years {T_0, … , T}.[2] Let Y_{it}^I denote the outcome that state i would observe in year t provided it experienced the program; similarly, let Y_{it}^N denote the outcome that state i would observe in year t provided it did not experience the program. Thus, for all t in {1, … , T_0} and for i in {1, … , N}, we have $Y_{it}^I = Y_{it}^N$.

The assumption underlying this equality is that the program intervention (PRMPA) has no effect before it was launched (in our illustration T_0 = 2004). In addition, the usual assumption of no effect of other units on any unit's outcomes, and in particular that there were no effects of PRMPA on the outcomes of the non-participating states, is implicit in our analysis. One way in which this could be violated is if some other states were to initiate fiscal reforms that are similar to the program under consideration during the post-intervention period.

We are interested in calculating effect that the program loan had on Assam in each of the years following its implementation. Thus, we need to compute

$$\tau_{S+1} = Y_{S+1,t}^I - Y_{S+1,t}^N, \forall t \geq T_0. \quad (1)$$

[2] The PRMPA was initiated in 2004–2005, the full disbursement occurred over the period 2004–2005 to 2006–2007, making 2007–2008 the first post-intervention period. However, since we are interested in trends we keep 2004–2005 to investigate how our outcomes change from 2004–2005 onward. The true post-intervention will be 2007–2008, but we can also see how Assam and its synthetic control group got there.

Note that for values of $t < T_0$, we want $\tau_{S+1,t}$ to be as close to zero as possible to ensure that the counterfactual is indeed similar to Assam before the intervention started. Next, note that the fundamental problem of causal inference immediately makes equation (1) impossible to estimate from any dataset; we cannot observe the intervention state (Assam) with both the intervention and without the intervention. Thus, after T_0 = 2004, we only see $Y^I_{s+1,t}$ and $Y^N_{s+1,t}$ needs to be estimated from the unexposed S control states.

To estimate $Y^N_{s+1,t}$ from the unexposed S control states, we need to identify a set of weights $W = (w_1, w_2, ..., w_s); (\sum_{i=1}^{s} w_i = 1; w_i > 0 \forall i)$ that would reflect how "close" each of the control states is to the intervention state (Assam). We measure "closeness" on the basis of a set of key pre-intervention variables (i.e., between $X^N_{it} \forall i \in \{1,..,S\}, \forall t > T_0$ for the non-intervention states and $X^I_{s+1,t}, \forall t < T_0$ for the intervention state) that are relevant in terms of identifying key outcome variable(s) on which the counterfactual needs to be similar to Assam.

The choice of these pre-intervention variables is context specific—thus, for the tobacco control evaluation the authors choose to match on beer consumption profiles to ensure that the counterfactual or the synthetic California was matched with states where socially acceptable drug intake (beer, nicotine, etc.) is high. However, in studying growth concerns in Spain the authors use measures for the structure of the economy of the Basque county with its synthetic version. In the current case, we too focus principally on the structure of the economy; we discuss our measures of the structure of the economy in more detail in the results section.

For a set of identified $(X^I_{s+1,t}, X^N_{s+1,t})$ we calibrate the set of weights *W* by minimizing $(X^I_{s+1,t} - X^N_{i,t}W)' V (X^I_{s+1,t} - X^N_{i,t}W)$ with the restriction that $w_i \geq 0 \forall i \{1,..,S\}$ and $\sum_{i=1}^{S} W_i = 1$. *V* is another set of variable-specific weights (as opposed to W which is state specific) that captures the importance of each variable in the minimization exercise.[3] Following existing practice, we identify *V* in such a manner to have the best-predictive performance for Y_{it} in the control states relative to the intervention state (Assam) prior to the intervention. Note that in general the *W*s are a function of the *V*s; thus, the optimal V^* is such that it is $\text{argmin}(Y^N_{S+1} - [Y^N_1 ... Y^N_S]W^*(V))'V(Y^N_{S+1} - [Y^N_1 ... Y^N_S]W^*(V))$ over the pre-intervention period.[4] Thus, *V* is a diagonal matrix with non-negative elements such that the diagonal elements of *V* reflect the importance of different covariates (indicators) in predicting pre-intervention Y_{it}. Thus, with this loss function we are

[3] Let us explain this formula with a simple example. Suppose there are three states—Assam (program state), Maharashtra (M), and Tamil Nadu (T)—and there are two predictors of the outcome variable Y: X_1 and X_2. The minimization exercise is Min. $V_1 (X_1^A - X_1^M W_M - X_1^T W_T)^2 + V_2 (X_2^A - X_2^M W_M - X_2^T W_T)^2$; subject to W_M, W_T>0, and $W_M + W_T = 1$.

[4] This exercise is carried out for the pre-intervention period. Therefore, all the superscripts are N.

looking for weights that minimize the multivariate pre-intervention differences between the treated and the control states, and in this sense the intervention state and its synthetic version are "close." Thus, to find the counterfactual for Assam, we solve a two-level optimization problem—one pertaining to which states we should consider as a counterfactual (*W*s), and the other related to the relative importance of the predictors of Y_{it} (*V*s).

III. ASSAM PUBLIC RESOURCE MANAGEMENT PROGRAM

6. The Assam state government (ASG) faced fiscal and governance-related problems in early 2000. Its infrastructure endowment lagged most Indian states indicating poor investment in infrastructure in the past. The state's fiscal position was weak due to stagnating tax and non-tax revenues and growing revenue expenditures. ASG also had a high debt servicing burden, rising government wage and salary expenditures, and pension liabilities. Moreover, several loss-making public sector enterprises (PSEs) imposed a considerable budgetary burden.

7. ADB provided a program loan of $100 million in 2004 to support reform measures under three components: (i) reform of state finances, (ii) reform of fiscal governance, and (iii) reorientation of the role of the state.[5] The following outcomes were expected: (i) enhanced fiscal responsibility, (ii) broadened tax base and enhanced tax collection, (iii) enhanced non-tax revenues, (iv) restructured state debt, (v) containment of state pension liabilities, (vi) improved state budgeting, (vii) enhanced poverty-focused and growth-oriented expenditure, (viii) public sector enterprise reforms, (ix) strengthened public–private partnership, and (x) public administration review. The program loan was supported by a technical assistance loan of $25 million for capacity development. A brief description of the revenue augmenting measures and debt restructuring measures proposed under the program is described below. See Appendix 3 for the details of various reforms proposed under the program.

8. **Tax policy reforms.** The revenue measures focused on (i) widening the tax base rather than increasing tax rates to bring economic activities that are currently exempt within the scope of the tax system; (ii) increasing tax buoyancy linked to higher gross state domestic product (GSDP); and (iii) reducing incentives for tax evasion rather than through imposing taxes ad hoc, which may adversely affect the growth of GSDP. Consequently, the program proposed reform measures for major taxes, such as sales, excise, stamp, and agricultural taxes, in accordance with such policy parameters.

9. **Tax and revenue administration.** It was felt that to address fiscal constraints on tax collection inefficiencies that can undermine sustainable revenue increases, substantial tax and revenue administration actions would be required. The introduction of tax policy reform measures, such as a system equivalent to value-added tax (VAT), ad valorem excise duty, and objective property valuation for stamps and registration fees, needed to be accompanied by tax and revenue administration measures. Consequently, specific revenue administration measures were prepared and supported.

[5] The program included the program cluster modality and comprised two subprograms. The second subprogram was approved in 2008 (ADB 2004). ADB's program was essentially designed to complement Assam's own reform initiatives that started in 2003 under the central government's fiscal reform plan for the states. ASG signed a Memorandum of Understanding with the Government of India detailing the fiscal reform plan. This plan was amended later to make it consistent with the proposals of the Twelfth Finance Commission. The amendment of the fiscal reform plan was one of the tranche release conditions in the loan.

10. **Non-tax revenue reforms.** To address the poor performance of state-determined user charges in Assam, service quality and feasibility of increases in user charges for a cross-section of significant sectors such as health, transport, water supply, and education were reviewed. Certain measures to initiate the enhancement of user charges were also proposed under the program.

11. **Debt restructuring.** To contain the substantial high interest debt burden on the state for creating critical fiscal resources, it was agreed that ASG would undertake (i) a swap of high-cost, small savings loans availed of from the central government with lower cost loans; and (ii) settlement of high-interest institutional loans. Based on crystallized and documented negotiation with banks and financial institutions, ADB's financial support was provided to reduce the stock of high-cost institutional loans.

IV. VARIABLES AND DATA

12. The data used for this analysis is from the latest Reserve Bank of India (RBI) Handbook of Statistics on State Government Finances (RBI 2010). This provides time series information on all states in India on key public finance aggregates that allows for a complete analysis of a state's fiscal performance. For our analysis, we use data on 27 states (including the state of Assam) for the period 1999–2000 to 2008–2009.[6] We pair this public finance data with data from the Annual Survey of Industries as well as population estimates from the Ministry of Health and Family Welfare. See Table 1 in Appendix 1 for specific details on the variables used in the analysis.

(i) **Outcomes of interest.** Fiscal consolidation is a complex process that primarily aims at creating fiscal space by (i) altering the discretionary part of unproductive government expenditure in the short term and gradual changes in fund allocation that are non-discretionary in the short term but can be altered on a longer time horizon; and (ii) mobilizing additional resources in a non-distortionary manner. Given that we are evaluating the program within 3 years of completing loan disbursal of subprogram I, we decided to look at the ratio of own tax revenues to GSDP (net of central government fiscal transfers that are institutionally determined by the successive finance commissions as well as non-tax revenues[7]) and the ratio of interest payments to GSDP.

Both of these outcomes are the ones that are likely to be influenced by the large number of reform measures that were identified under the program (see the Policy Matrix in Appendix 3). For example, under the outcome to *Enhance Fiscal Responsibility*, it was expected that ASG would set up midterm fiscal plans, establish a fiscal management unit to achieve these fiscal plans (specifically targeting revenue reform, debt management, budget reform, expenditure reforms, and pension reforms). Similarly, the *Broaden Tax Base* and *Enhance Tax Collection* outcomes would require ASG to introduce tax policy reforms in tune with VAT, implement improved processes for various components of own tax revenues such as for sales tax, excise tax, etc. Finally, under the outcome to

[6] More current data pertaining to the financial year 2009–2010 were also available. However, these were budget estimates and were not fully audited as yet and hence have been left out.

[7] Non-tax revenues are those collected on the basis of user charges or royalties generated by services provided by the state government—for example, fines and penalties, or sale of telecom bandwidth, or mineral royalties, dividends, and profits from public sector enterprises (see Purohit and Purohit (2010) for further details).

Restructure State Debt, ASG was expected to swap its high-cost institutional loans and improve debt management. Outcomes pertaining to other collateral reforms, such as those related to pension reforms, are omitted for this analysis since we have only two-year post intervention data. We also omit non-tax revenues for now to focus on own tax revenues as well as restructuring state debt for which there were detailed reform road maps.

Aside from program design aspects specific to the ADB loan program, empirical estimates also suggest that own tax revenues are responsive to fiscal reforms; for example, in the case of Indonesia's tax administration reforms there is a strong positive impact on the tax yield. The non-oil and gas revenue to GDP ratio increased from 9.9% in 2002 to 11.6% in 2005 without many changes in tax policies. The result was particularly striking in the case of VAT. Some of the important reforms include setting up of large taxpayers unit, improved tax audit, better human resource management, etc. (Brondolo et al. 2008).

Pre-intervention covariates. The role of pre-intervention covariates is to identify variables that are key predictors for our outcomes of interest, and so should ideally be variables on which the synthetic counterfactual and Assam are fully matched—i.e., are statistically identical. We look at two outcome variables for this analysis—the own revenues to GSDP ratio and the interest payments to GSDP ratio. Thus, the selection of pre-intervention covariates plays an extremely crucial role in designing the *synthetic Assam*.

(a) **Own revenues to GSDP ratio.** Own-revenues of a state are mostly dependent on sales taxes/VAT that are largely dependent on the structure of the economy. Thus, in creating the synthetic counterfactual for the own tax revenue to GSDP ratio, we ensured that the following measures were identical to the state of Assam—the pace of economic growth (as measured by the log of GSDP), the composition of economic activity, i.e., specifically the size of the nonagriculture sector in the economy, and the per capita number of factories that are functioning. Rising GSDP indicates larger spending in the economy and thereby larger tax collections (e.g., through greater sales taxes). In India, the size of the nonagriculture sector is a key determinant of taxes since the agriculture sector by and large does not pay any taxes. Finally, we also use the per capita number of factories in the state as an alternative measure of economic activity (especially industrial activities) in the state.

(b) **Interest payments to GSDP ratio.** The current level of interest payments is almost completely determined by two variables: the past year's outstanding liabilities (debt) and the effective average rate of interest applicable on them. For these reasons, for the interest payments analysis, we use a different set of predictors: the total outstanding debt as a fraction of GSDP at the end of the past financial year, the average effective rate of interest (AERI) that is charged on outstanding liabilities, and the rate of growth of GSDP.

13. **Other data issues and concerns.** The goal of the first part of the analysis is to develop a set of weights that will identify a synthetic counterfactual for Assam. To do this, we match Assam with all the available donor states on the set of pre-intervention covariates, as well as

pre-intervention trends in our outcome variables. Two sets of concerns arise related to bias in identifying the synthetic Assam: quality of match achieved on the pre-intervention variables and concerns associated with omitted variables that might bias our outcome variables. We can address the former using a conventional one-sample t-test for each of the pre-intervention variables where the target population value is that of the variable specific Assam mean where the control group is weighted with the estimated weights. The concern about omitted variable bias is also addressed at first pass since we look at differences in outcomes over time and across intervention statuses, thus controlling for time-invariant (observable and unobservable) differences that may otherwise exist between Assam and its synthetic control group.

14. Finally, quite apart from the PRMPA intervention other changes have also been known to affect the finances for the state of Assam. Entry of items into Assam listed in the Principle Act had been a significant revenue source (entry tax) that was nullified by the order of the Honorable High Court. In addition, the progressive phasing out of the central sales taxes from 4% to 3%, which accrued to state government has led to a decline of revenues as well. The budget speech for the year 2007–2008 estimates that there has been a decline in revenue collection by approximately 0.83% of GSDP. These are changes that took place quite independent of the PRMPA and would have impacted Assam even in its absence and we incorporate these changes to be reflected in both the synthetic and treatment groups. One way to incorporate such changes in the treatment unit into the synthetic control unit, provided they are unrelated to why Assam received the program, would be to have a variance-preserving decline in the mean own tax levels collected for 2007–2008 and 2008–2009. Currently, however, our estimates do not account for this as it would show that our treatment effect estimates would be even larger than they are, and we report our estimates and document the possibility that they are underestimated.

V. RESULTS

15. Table 2 in Appendix 1 provides raw descriptive statistics of the entire analysis sample. Our data spans the financial years 1999–2000 to 2008–2009. The states of India are vastly different in size and economic performance and this is readily seen by looking at the wide ranges for GSDP, population, and the size of the nonagriculture sector. On average, own tax revenues as a share of GSDP were 5.75%, while interest payments as a share of GSDP were 3.82%. For Assam during the period 1999–2008, the average own tax revenues to GSDP ratio was about 4.62%, while average interest payments as a ratio of GSDP were 3.8%, showing that Assam has had a lower revenue from its own source and higher interest payments than the national average. However, the wide variation in economic performance across states lends us good support in creating a synthetic control unit for Assam.

16. **Quality of synthetic control unit.** Tables 4 and 6 in Appendix 1 provide details on the quality of balance achieved on the pre-intervention variables. For each of the pre-intervention variables we see that point estimates are quite close to the Assam pre-intervention values and the 95% confidence interval always contain these. This suggests that on the dimensions that we care about, the synthetic control unit is statistically identical to Assam. In addition, if we look at each of the time plots in Figures 1–4 in Appendix 2, we observe that the synthetic control groups are able to reproduce the pre-intervention period outcomes for Assam with a high degree of accuracy and usually very small errors, strongly suggesting that we have not only balanced across key pre-intervention covariates, but that we would also expect that if the intervention had not happened, then the synthetic control unit would continue to track the

outcomes of Assam. Thus, these estimates provide a good estimate of the counterfactual state for Assam.

17. Finally, we look at the construction of the synthetic Assam for the two separate analyses to identify which states are most similar to Assam in terms of the own revenues to GSDP and the interest payments to GSDP ratios. The state-specific weights are presented in Table 7 in Appendix 1 and one can see the set of states and their respective weights that best create a synthetic Assam for each analysis.

18. For the own tax revenues to GSDP ratio, we find that about 25.4% of the weight comes from Meghalaya and 19.4% from West Bengal—both of which neighbor Assam. Another 50.8% of the weight comes from Bihar, Orissa, and Uttar Pradesh, all of which are economies that are also performing below the national average, just as Assam, and the remaining 4.4% comes from Punjab which is an economically prosperous state.

19. For the interest payments to GSDP ratio, we find a somewhat different profile of states possibly indicating that patterns of own revenue collection that perhaps reflect current resources generating abilities and interest payments that reveal past expenditure profiles are matched by a different set of states. Haryana, Meghalaya, and Tamil Nadu account for about 88% of the total weight, with Bihar and Punjab making up the remainder.

20. Figure 1 displays time trends for own tax revenues as a share of GSDP for Assam, the rest of India, and the synthetic Assam during the period 1999–2000 to 2008–2009. Notice that the synthetic Assam time trend closely tracks Assam's time trend in the pre-intervention period—much more so than that of the rest of India. This is also true for the interest payments to GSDP ratio, reemphasizing that the synthetic Assam is a good synthetic control group for Assam (see Figure 2 in Appendix 2).

21. Our estimate of the effect of PRMPA on the own tax revenues to GSDP ratio in Assam is the difference between the own tax revenues to GSDP ratios in Assam and in its synthetic version after the implementation of PRMPA. Immediately as the lending program is implemented, the two lines begin to diverge noticeably. While own tax revenues in the synthetic Assam continued on a moderate upward trend, Assam experienced a sharper rise. The discrepancy between the two lines suggests a positive effect of the PRMPA on own tax revenues.[8]

22. Our estimate of the effect of PRMPA on the interest payments to GSDP ratio in Assam is the difference between the interest payments to GSDP ratios in Assam and in its synthetic version after the implementation of PRMPA. Figure 2 in Appendix 2 suggests that there is little discrepancy between the two lines, indicating little effect, if any, of the PRMPA on interest rate payments as a ratio of GSDP.[9]

[8] Since we are comparing the own tax revenues to GSDP ratios of Assam and the synthetic Assam, any bias in the Finance Commission's transfers in favor of Assam during the period of analysis relative to the synthetic Assam will not distort this result. However, this may bias the comparison based on the fiscal deficit to GSDP ratio.

[9] See para. 26 for an explanation.

23. In order to assess the robustness of our results, we included additional predictors among the variables used to construct the synthetic control. Our results stayed virtually unaffected regardless of which and how many predictor variables we included. The list of predictors used for robustness checks included state-level measures of employment, income inequality indicators from the National Sample Survey Organization (NSSO), investment measures, population density, numerous variables to capture the demographic and social structure of states, and even more disaggregated measures of the structure of the state economy.

VI. DISCUSSION

24. The end goal of any fiscal restructuring is to ensure reduction in gross fiscal deficit and primary deficit (i.e., gross fiscal deficit net of interest payments). We also look at both of these measures using the same methods as above and find that Assam's fiscal deficit and primary deficit are lower than what would have been expected in the absence of the PRMPA (see Figures 3 and 4 in Appendix 2). Both of these diagrams show that fiscal deficit and primary fiscal deficit are lower than what they would have been in the absence of the PRMPA.

25. The earlier part of this work shows that there has been an increase in own revenues for Assam over and above what would have occurred in the absence of the fiscal consolidations strategies that have accompanied the PRMPA. Thus, the reduction in deficit, fiscal, and particularly primary, has been through revenue generation and not through reduction in interest payments. The fiscal changes following the intervention are in the expected direction with improved own revenues and non-increasing interest payments. Further changes initiated that would start affecting the non-discretionary portion of the fiscal scenario for Assam would take place on a longer time horizon. Thus, there are some short-term gains that have been realized with an increase in the own tax to GSDP ratio in the order of 0.10% to 0.58% in the post-intervention period, averaging about 0.40% over the 3 post-intervention years. This is over and above any regression to the mean or natural trends that one may have expected to have caused an increase in this measure given that it had been below the national average.

26. A number of caveats should be noted in light of this finding. First of all, the ADB loan program to Assam, while geared to the needs of Assam, is broadly similar to other programs that are ongoing in other states that would tend to make these estimates of the program appear to be an underestimate of the true program effect (e.g., in the state of Karnataka), particularly if it is a part of the synthetic control group. Second, the lack of program effects on interest rate payments as a share of GSDP may in part be explained by the fact that other states also availed of the debt swap scheme of the Government of India. Under the Government of India Debt Swap Scheme that was in place during 2002–2003 to 2004–2005 and whose effects were realized in the post-intervention period, the synthetic control to have a lower interest payment profile than it would have had otherwise. More disaggregated loan data need to be studied to understand the patterns in the interest payments to GSDP ratio for the high-cost financial institutional loans because ADB's support was provided to prepay only high-cost financial institutional loans. While the synthetic control method provides an excellent way to benchmark performance of macro-interventions, it also needs careful work particularly for fiscal interventions where the pattern of flows is not only effected by the state economy, the functioning of the tax administration machinery, but also by the High Court and lower court judgments on tax matters that affect collection.[10] These tend to affect not only the state which

[10] This explains the drop in the own revenues to GSDP ratio in 2007–2008 in Assam (Figure 1 in Appendix 2, see also para. 14 for an explanation).

saw the intervention but also other potential control states and thus needs careful information collation to understand unexpected dips and rises in revenue collection and expenditures. Finally, our analysis in this paper is not equipped to comment on the sustainability of fiscal reforms in Assam—which is indeed an important requirement for a successful public resource management program of this nature.

REFERENCES

Abadie, A., A. Diamond, and J. Hainmueller. 2010. Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program. *Journal of the American Statistical Association* Vol. 105. No. 490. pp. 493–505.

Abadie, A. and J. Gardeazabal. 2003. The Economic Costs of Conflict: A Case Study of the Basque Country. *American Economic Review* Vol. 93 pp. 112–132.

Asian Development Bank. 2004. *Proposed Program Loan Cluster and Project Loan to India for the Assam Governance and Public Resource Management Sector Development Program*. Manila.

Brondolo, J., C. Silvani, E. Le Borgne, and F. Bosch. 2008. Tax Administration Reform and Fiscal Adjustment: The Case of Indonesia. *IMF Working Paper* No. WP/08/129. Washington, DC: IMF.

Holland, P. W. 1986. Statistics and Causal Inference. *Journal of the American Statistical Association* Vol. 81(396). pp. 945–960.

Meyer, B. 1995. Natural and Quasi-Natural Experiments in Economics. *Journal of Business & Economic Statistics* Vol. 13. pp. 151–161.

Mundle, S. 1997. *Public Finance: Policy Issues for India*. New Delhi: Oxford University Press.

Purohit, M. C., and V. K. Purohit. 2010. *Non-Tax Sources in India: Issues in Pricing and Delivery of Services*. New Delhi: Gayatri Publications.

Rao, M. G., and P. Chakraborti. 2006. Multilateral adjustment lending to states in India: Hastening fiscal correction or softening the budget constraint? *Journal of International Trade and Economic Development* Vol. 15 (3). pp. 335–357.

RBI. 2010. *Handbook of Statistics on State Government Finances*. Division of State and Local Finances (DSLF) of the Department of Economic Analysis and Policy (DEAP), RBI Mumbai. Weblink: http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/HBST060710FL.pdf

Shadish, W. R., T. D. Cook, and D. T. Campbell. 2001. *Experimental and Quasi-Experimental Designs for Generalized Causal Inference*. California: Wadsworth Publishing.

APPENDIX 1

Table 1: Variables Used and Their Sources

No.	Variable	Data Source
1	Own tax revenues	Table 6, RBI HSSGF
2	Own non-tax revenues	Table 9, RBI HSSGF
3	Own revenues = own tax + own non-tax revenues	From Nos. 1 and 2
4	Interest payments	Table 9, RBI HSSGF
5	Outstanding liabilities (debt)	Table 28, RBI HSSGF
6	Average effect rate of interest (t) = interest payments (t)/Outstanding liabilities (t–1)	From Nos. 4 and 5
7	Fiscal deficit	Table 1, RBI HSSGF
8	Primary deficit	Table 3, RBI HSSGF
9	Gross state domestic product (GSDP)	RBI DIE
10	Debt by GSDP	From Nos. 5 and 9
11	Share of agriculture in GSDP	RBI DIE
12	Share of nonagriculture in GSDP = 1 – share of agriculture	From No. 11
13	Population	NCP, MHFW
14	Number of factories	ASI
15	Per capita no. of factories	From Nos. 13 and 14

Sources: Data from Reserve Bank of India (RBI) Database on the Indian Economy (RBI DIE); Annual Survey of Industries (ASI), Ministry of Statistics and Programme Implementation; and the RBI Handbook of Statistics on State Government Finances (RBI-HSSGF), National Commission on Population, Ministry of Health and Family Welfare (NCP, MHFW).

Table 2: Data Summary

Variable	Obs	Mean	Std. Dev.	Min	Max
Year	240			1999	2008
GSDP (Rs crores)	240	104,126	115,042.1	896	692,749
Log(GSDP)	240	10.56	1.65	6.79	13.45
Population (in ’000)	240	38,687	40,689	529	190,254
Number of factories	240	5,223	6,155	21	23,691
Fiscal deficit (Rs crores)	240	3,862	4,277	-2,821	20,557
Fiscal deficit by GSDP	240	5.06%	3.85%	-3.26%	22.38%
Primary deficit (Rs crores)	240	779	2,303	-15,025	9,641
Primary deficit by GSDP	240	1.24%	3.27%	-8.61%	17.35%
Nonagriculture by GSDP	240	74.88%	7.30%	60.09%	93.58%
Current outstanding liabilities (Rs crores)	240	35,355	39,328	593	197,501
Last year’s outstanding liabilities (Rs crores)	240	36,175	37,953	593	179,741
Last year’s outstanding liabilities by GSDP	240	41.83%	16.79%	16.38%	107.39%
Interest payments (Rs crores)	240	2,903.71	3,006.28	68.00	12,367.00
Interest payments by GSDP	240	3.82%	1.46%	1.29%	7.79%
Own tax revenues (Rs crores)	240	7,523.95	9,127.652	11	50,088
Own tax revenue by GSDP	240	10.85%	14.61%	2.37%	119.87%
Average effective interest rate (AEIR)	216	9.00%	2.00%	2.00%	24.00%

1 crore = 10 million, GSDP = gross state domestic product.
Note: Summary statistics are based on a dataset for 24 states across 10 years.
Source: See Table 1.

Table 3: Time Trends for Own Tax to GSDP Ratio, %

Year	Assam	India minus Assam	Synthetic Assam	Differences/Error	
				India	Synthetic Assam
	(1)	*(2)*	*(3)*	*(1)–(2)*	*(1)–(3)*
1999	3.52	15.95	3.49	-12.44	0.03
2000	3.84	5.33	3.95	-1.49	-0.11
2001	4.09	5.48	4.08	-1.39	0.01
2002	4.46	5.71	4.39	-1.25	0.07
2003	4.38	5.68	4.38	-1.31	-0.01
2004	5.16	5.88	4.53	-0.72	0.63
2005	5.59	6.23	4.87	-0.64	0.72
2006	5.41	6.39	4.82	-0.99	0.58
2007	4.69	6.27	4.59	-1.58	0.10
2008	5.09	6.41	4.57	-1.32	0.53

GSDP = gross state domestic product.
Source: Authors' estimates.

Table 4: Pre-Intervention Covariate Balance for Own Revenue to GSDP Ratio

Variable	Assam	Synthetic Assam			P-Value
		Mean	Lower 95% CI	Upper 95% CI	
log(GSDP)	10.594	10.749	9.73	11.77	0.76
Nonagriculture/GSDP	0.661	0.651	0.641	0.660	0.42
Per capita no. of factories	0.057	0.056	0.051	0.059	0.39

GSDP = gross state domestic product; CI = confidence interval.
Source: Authors' estimates

Table 5: Time Trends in Interest Payments to GSDP for Assam, %

Year	Assam	India minus Assam	Synthetic Assam	Differences/Error	
				India	Synthetic Assam
	(1)	*(2)*	*(3)*	*(1)–(2)*	*(1)–(3)*
1999	2.745	3.640	2.602	-0.895	0.143
2000	2.350	3.850	2.553	-1.500	-0.203
2001	2.772	4.031	2.730	-1.260	0.042
2002	2.868	4.161	2.972	-1.293	-0.104
2003	3.057	4.142	2.980	-1.086	0.077
2004	2.673	4.012	2.753	-1.339	-0.080
2005	2.612	3.591	2.402	-0.980	0.210
2006	2.353	3.474	2.285	-1.121	0.068
2007	2.111	3.180	2.086	-1.069	0.025
2008	2.411	3.189	1.943	-0.778	0.467

GSDP = gross state domestic product.
Source: Authors' estimates.

Table 6: Pre-Intervention Covariate Balance for Interest Payments by GSDP

Variable	Assam	Synthetic Assam	95% Confidence Interval		P-Value
			Lower	Upper	
log(GSDP)	10.59365	10.84548	9.82	11.39	0.9697
Debt/GSDP	26.38%	27.84%	27.74%	34.69%	0.4282
AEIR	10.45%	10.23%	9.94%	10.58%	0.4621

AEIR = average effective interest rate, GSDP = gross state domestic product.
Notes:
Debt/GSDP refers to the total outstanding liabilities of a state as the end of the last financial year. AEIR is the average effective interest rate paid out on all outstanding loans.
Source: Authors' estimates.

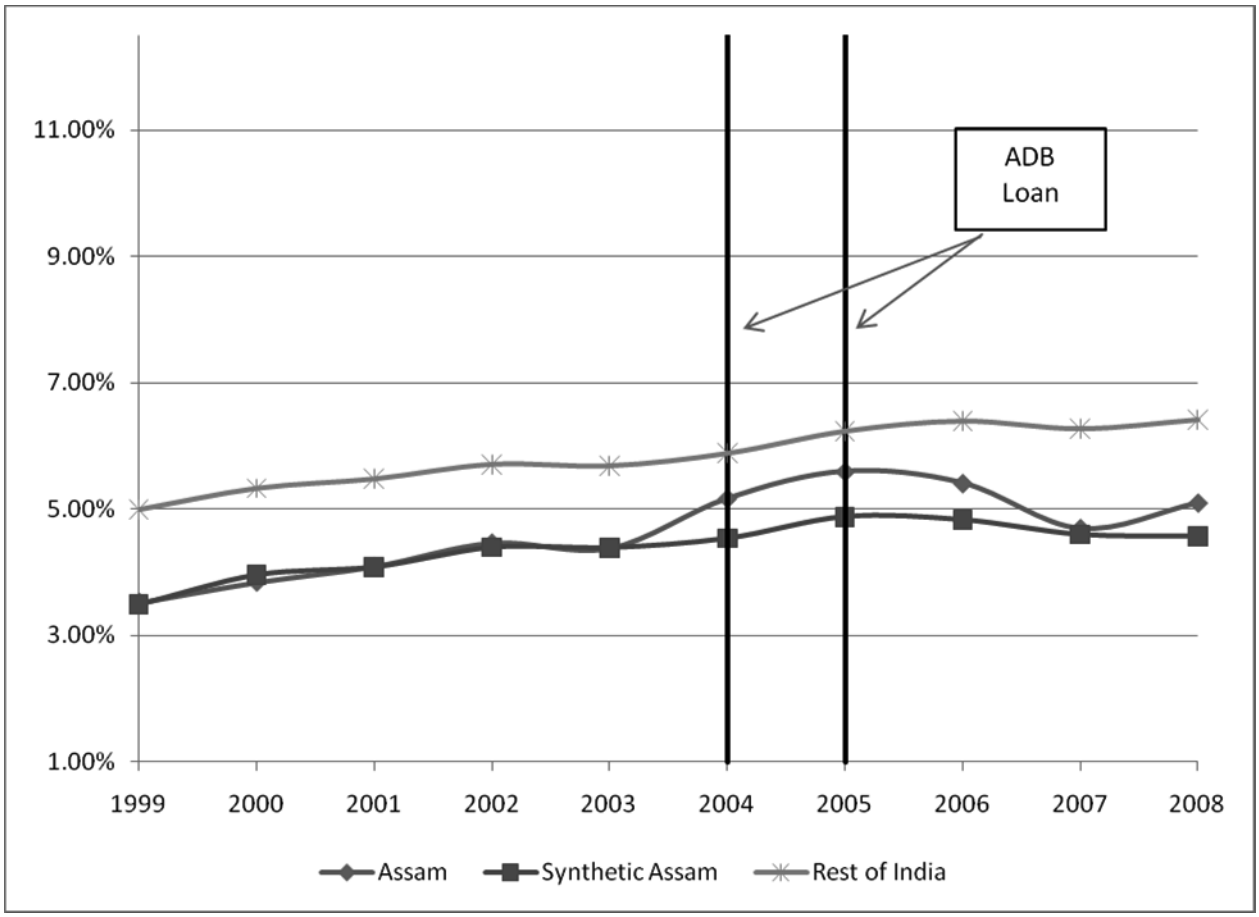
Table 7: Weights for Control Group States

States	Interest Payments/GSDP	Own Tax/GSDP
Bihar	0.034	0.079
Haryana	0.220	0.00
Meghalaya	0.228	0.254
Mizoram	0.033	0
Orissa	0	0.428
Punjab	0.086	0.044
Tamil Nadu	0.43	0
Uttar Pradesh	0	0. 001
West Bengal	0	0.194

GSDP = gross state domestic product.
Source: Authors' estimates.

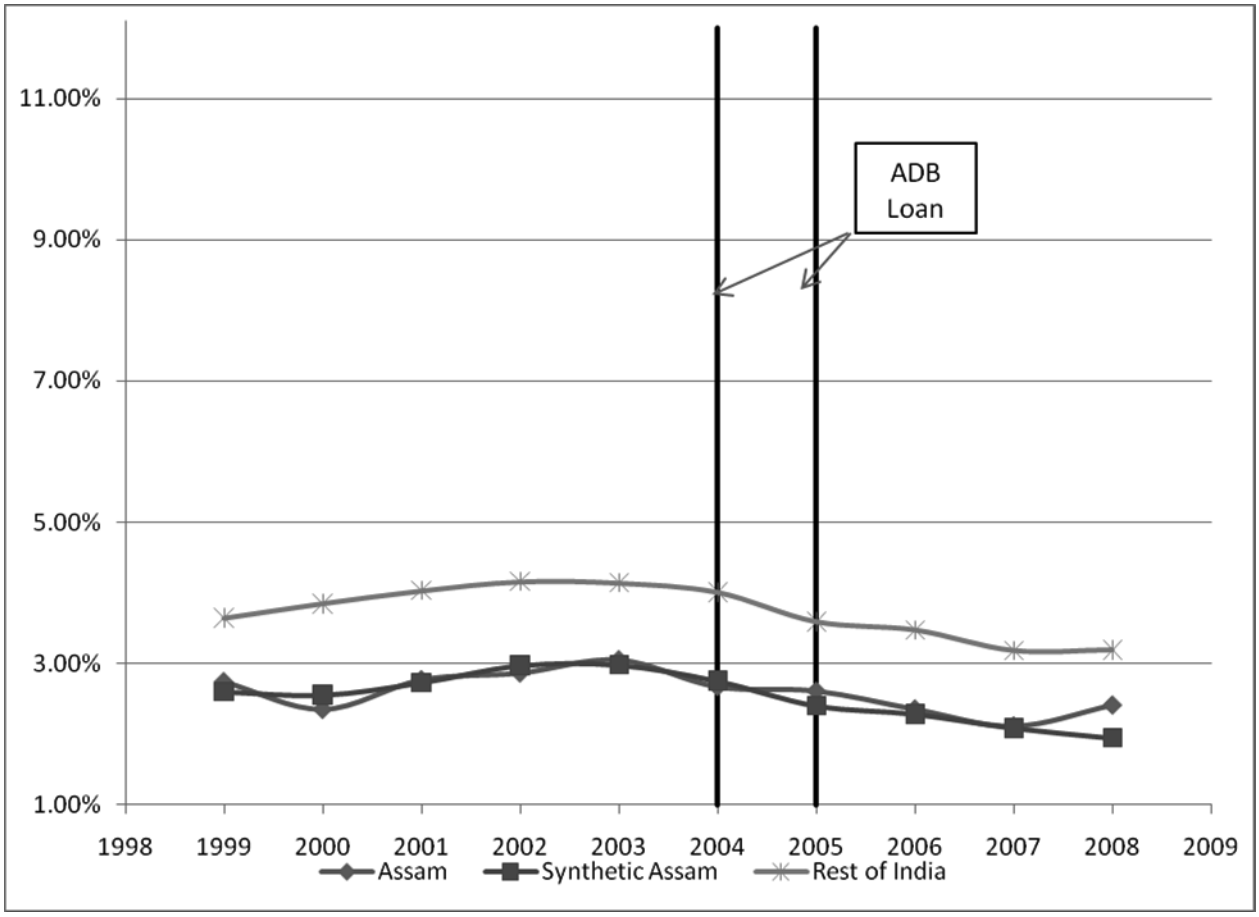
APPENDIX 2

Figure 1: Time Trends for Own Tax Revenues as a Share of GSDP



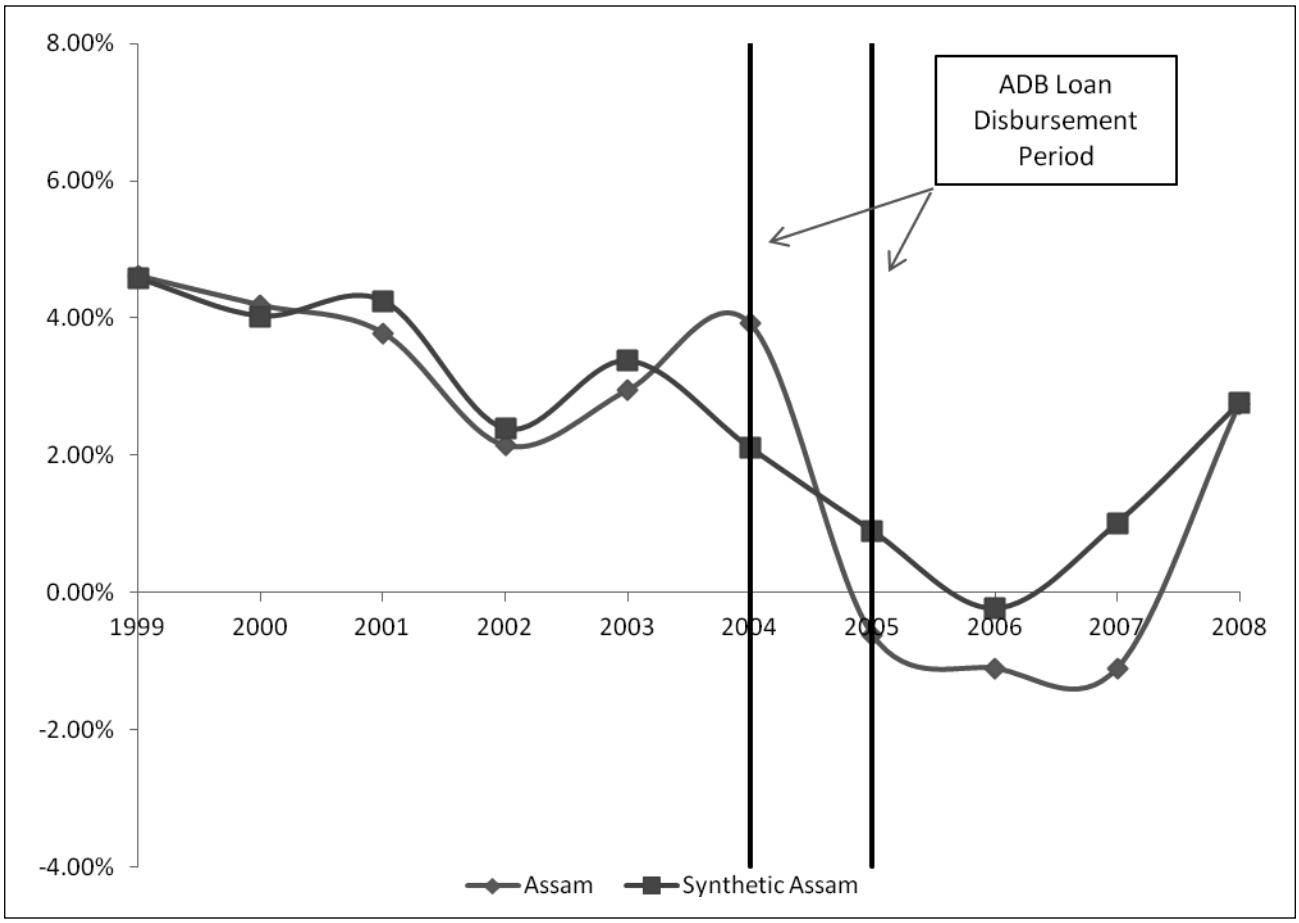
ADB = Asian Development Bank, GSDP = gross state domestic product.
Note: Estimates for the rest of India exclude the states of Jharkhand, Chhattisgarh, and Uttarakhand.
Source: Authors' estimates.

Figure 2: Time Trends in Interest Payments as a Share of GSDP



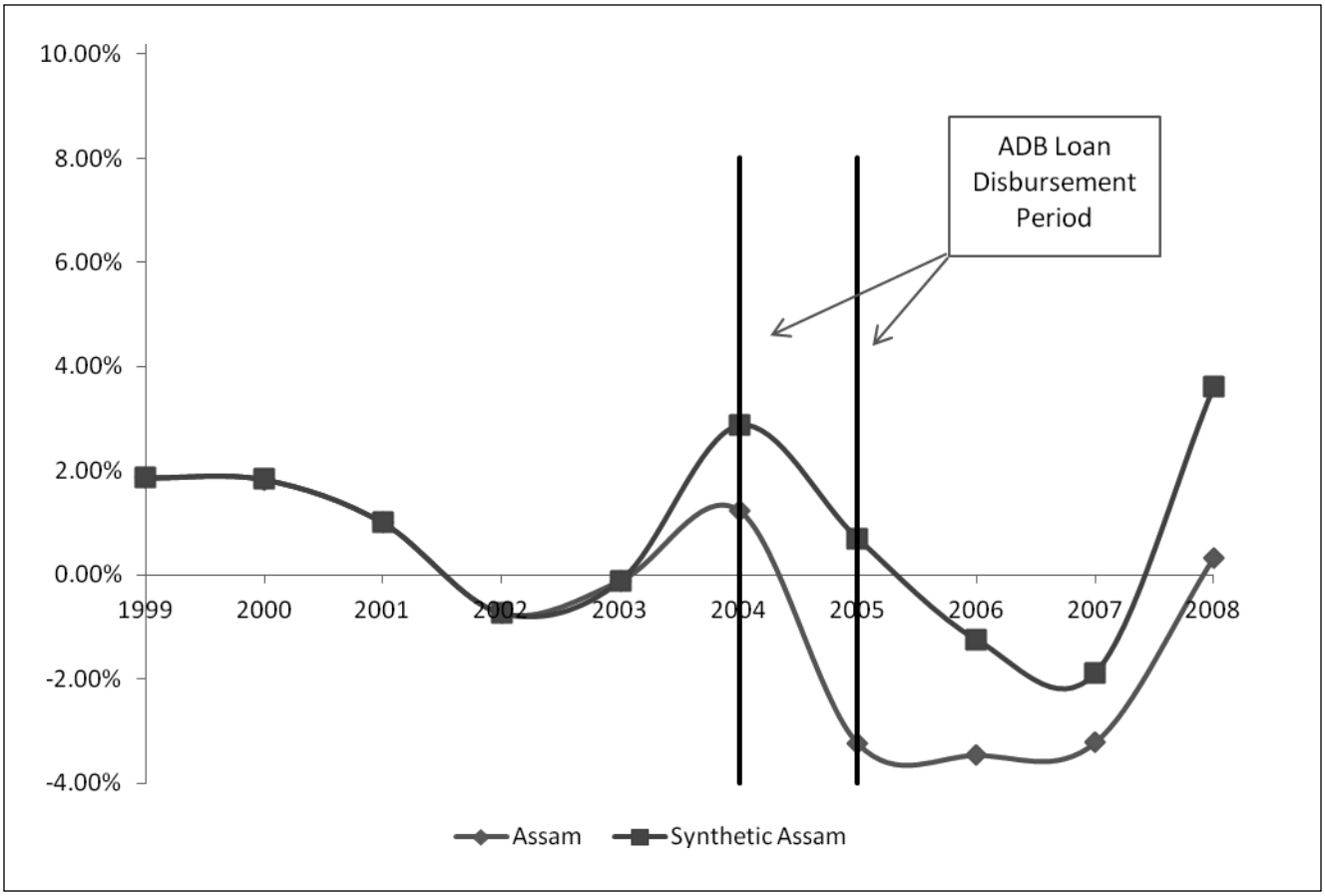
ADB = Asian Development Bank, GSDP = gross state domestic product.
Note: Estimates for the rest of India exclude the states of Jharkhand, Chhattisgarh, and Uttarakhand.
Source: Authors' estimates.

Figure 3: Time Trends for Fiscal Deficit as a Share of GSDP



ADB = Asian Development Bank, GSDP = gross state domestic product.
Source: Authors' estimates.

Figure 4: Time Trends for Primary Deficit to GSDP Ratio



ADB = Asian Development Bank, GSDP = gross state domestic product.
Source: Authors' estimates.

Appendix 3: Details of the Assam Program Policy Matrix

Tranche 1 (December 2004)	Incentive Tranche	Tranche 2 (December 2006)
Component 1: Reform of State Finances		
Outcome 1: Enhance Fiscal Responsibility		
Achievements: The Assam state government (ASG) will (i) approve a medium-term fiscal plan (MTFP), (ii) establish a fiscal management unit (FMU), and (iii) approve a time-bound action plan for the FMU.	**Achievements:** ASG will (i) update the MTFP, (ii) introduce a fiscal responsibility bill (FRB) in the state's legislative assembly, (iii) adopt cash management discipline as part of fiscal responsibility, and (iv) implement the time-bound action plan for the FMU.	
Actions: **Medium-Term Fiscal Plan:** ASG will approve an MTFP for fiscal year (FY) 2006 onward.	**Actions:** **MTFP and Fiscal Responsibility Bill:** ASG will (i) prepare an updated MTFP[1] pursuant to reviews of MTFP quarterly review and remedial action reports on targets; and (ii) introduce an FRB in the state's legislative assembly, consistent with the updated MTFP, including targets for deficit reduction, fiscal transparency, ASG guarantees, a prohibition on recurrence of fiscal year-end negative cash balances, and authority of the FMU related to the FRB.	
	Cash Management: ASG will adopt a policy, as of 30 April 2005, of not resorting to overdrafts with the Reserve Bank of India so as to ensure that there are no year-end negative cash balances.	
Fiscal Management Unit: ASG will (i) approve establishment of an FMU in the Finance Department consisting of five cells (revenue reform cell, debt management cell, budget reform cell, expenditure reform cell, and pensions reform cell); and (ii) approve a time-bound action plan on staffing, reporting, skills, and computerization requirements for the FMU.	**FMU:** ASG will have implemented the time-bound action plan for the FMU.	
Outcome 2: Broaden the Tax Base and Enhance Tax Collection		
Achievements: ASG will provide policy direction on (i) development of common facilities for revenue administration; (ii) functional efficiencies in sales tax administration; (iii) excise, stamp duties and registration fees, and agricultural income tax policy reform on tax	**Achievements:** ASG will (i) introduce tax policy reforms on value-added tax (VAT) or its equivalent law, excise duty, and stamp duty valuation methods; and (ii) approve a composite check post.	**Achievements**: ASG will (i) enhance transparency in tax collection for excise, stamp duties, and transport taxes; (ii) implement verification of tax administration information; (iii) extend common facilities for revenue

[1] The updated MTFP will take due account of the proposals of the Twelfth Finance Commission.

Tranche 1 (December 2004)	Incentive Tranche	Tranche 2 (December 2006)
assessment collection and rates; and (iv) fiscal empowerment of local bodies.		administration through composite check posts; and (iv) adopt property tax resourcing for local bodies.
Actions: **Revenue Administration:** ASG will (i) approve revenue policy guidelines; and (ii) direct the FMU revenue reform cell to develop an action plan on information technology and services for sales tax, excise, and transport tax administration in support of composite check posts.	**Actions:** **Revenue Administration:** ASG will approve and notify a composite check post at Srirampur.	**Actions:** **Revenue Administration:** ASG will (i) complete implementation of the FMU revenue reform cell action plan on verification and validation of individual tax administration information through the composite check posts; and (ii) approve and notify composite check posts at Boxirhat and Digarkhal.
Sales Tax Administration: ASG will include in the approved revenue policy guidelines commitment to develop sales tax administration reforms in preparation for a VAT/multipoint sales tax system.	**Sales Tax Policy:** ASG will introduce a bill in the state's legislative assembly for amendment of the VAT bill or introduction of its equivalent in the form of a destination-based multipoint sales tax.	
State Excise Policy: ASG will include in the approved revenue policy guidelines commitment to develop excise policy reforms for alternative methods of levy and collection of excise duties.	**State Excise Policy:** ASG will introduce a bill amending the Excise Act in the state's legislative assembly to convert specific excise duties on Indian Made Foreign Liquor into an ad valorem levy.	**State Excise Policy:** ASG will introduce a bill amending the Excise Act in the state's legislative assembly to replace the fixed fee based licenses with an alternative method of collection of excise for country spirits.
Stamp Duties and Registration Fees Policy: ASG will include in the approved revenue policy guidelines commitment to (i) develop an objective methodology for valuation of properties and guidelines on minimum valuation, and (ii) develop automated processing of stamp duties and registration fees.	**Stamp Duties and Registration Fees Policy:** ASG will approve and notify objective valuation methods for properties.	**Stamp Duties and Registration Fees Administration:** ASG will establish valuation committees, chaired by deputy commissioners, and commence the use of objective valuation methods.
Agricultural Income Tax Policy: ASG will reduce the peak rate of agricultural income tax to equal the rates in the Central Income Tax Act.		
		Transport Taxes Administration: ASG will (i) computerize state register data for motor vehicles and prepare an action plan for regular updating of data; and (ii) apply penalties at composite check posts (Srirampur, Boxirhat, and Digarkhal) through introduction of weighbridge facilities.
Local Bodies Fiscal Empowerment: ASG will include in the approved revenue policy guidelines commitment to develop fiscal empowerment of local bodies through property taxation.		**Local Bodies Property Tax:** ASG will issue and notify a government order to amend property tax rules on the property tax structure and collection mechanism to implement a unit area method of property taxation.

Tranche 1 (December 2004)	Incentive Tranche	Tranche 2 (December 2006)
Outcome 3: Enhance Non-Tax Revenues		
Achievements: ASG will initiate a strategic review of user fees.		**Achievements**: ASG will approve a user fee policy committing to (i) increase total non-tax revenues from user fees; and (ii) enhance quality of operation and maintenance and service delivery.
Actions: **User Fees Strategic Review:** ASG will mandate a strategic review of user fees in the health, transport, water supply, and education sectors in Assam, including affordability, service quality, and feasibility issues.		**Actions:** **User Fees Policy:** ASG will approve a user fee policy committing to increased total non-tax revenues from user fees in health, transport, water supply, and education.
Outcome 4: Restructure State Debt		
Achievements: ASG will (i) approve debt swaps and debt settlement of high interest institutional loans; and (ii) introduce enhanced debt management and data collection systems.	**Achievements:** ASG will agree on debt swaps/debt settlement of high interest institutional loans (and guarantees given to public sector enterprises [PSEs]).	**Achievements**: ASG will have a complete automated inventory of debts.
Actions: **Loan and Guarantees Data Collection and Management**: ASG will mandate the FMU's debt management cell to undertake a time-bound action plan for inventorying of debt with all terms of borrowing, maturity, loan amount, source, debt servicing dates, outstanding balances in terms of principal, interest and arrears, and guarantees made and discharged.		**Actions:** **Loan and Guarantees Data Collection and Management**: ASG will have a complete automated inventory of debt managed by the FMU.
Debt Restructuring: ASG will (i) approve debt swaps of high interest Government of India debt, and (ii) agree on debt settlement of high interest institutional loans.	**Actions:** **Debt Swaps:** ASG will agree on debt swaps/negotiated settlements of high interest institutional loans (and guarantees given to PSEs).	
Outcome 5: Contain State Pension Liabilities		
Achievements: ASG will (i) initiate estimation of pension liabilities, and (ii) provide policy direction to reform the current pensions policy and administration.		**Achievements**: ASG will (i) complete estimation of pension liabilities, (ii) complete a pension database, and (iii) adopt a new contributory pension scheme for new ASG employees.
Actions: **Estimation of Liabilities:** ASG will mandate the FMU pensions reform cell to undertake a time-bound action plan for the estimation of all ASG pension liabilities.		**Actions:** **Estimation of Liabilities:** ASG will complete and validate the estimation of all ASG pension liabilities.
Pensions Policy: ASG will approve pension policy guidelines on (i) commitment to develop systemic reforms on introduction of a pension arrangement for new ASG employees in line with the Government of India's pension		**Pensions Policy:** ASG will approve a pension policy for a new ASG employee contributory pension scheme.

Tranche 1 (December 2004)	Incentive Tranche	Tranche 2 (December 2006)
scheme, and (ii) consideration of a menu of options on parametric reforms.		
Pensions Administration: ASG will mandate the FMU pensions reform cell to act as the nodal agency of the pensions reform process for (i) process reengineering and skill upgrading, and (ii) development of a reliable and comprehensive pensions database.		**Actions:** **Pensions Database:** ASG will complete a pensions database within the Finance Department.
		Pensions Administration: ASG will notify a nodal department for pension administration.
		Budget Mechanism for New ASG Employees Contributory Pension Scheme: ASG will notify an appropriate pension fund in line with Government of India (GOI) rules and procedures for the duly approved pension scheme for new ASG employees.
Component 2: Fiscal Governance Reforms		
Outcome 6: Improve State Budgeting		
Achievements: ASG will (i) initiate scope and transparency reforms in state budget reporting, and (ii) initiate an inventory of central transfer schemes.	**Achievements**: ASG will (i) approve operating guidelines on state budget planning, and (ii) commence preparing a state budget for FY2007 incorporating revised MTFP projections.	**Achievements**: ASG will (i) adopt state budgeting in accordance with FRB requirements, and (ii) complete the inventory of central transfer schemes.
	Actions: **Budget Planning, Preparation, and Presentation:** ASG will (i) approve the operating guidelines on state budgeting covering budget presentation and content, charts of accounts, off-budget borrowings, contingent liabilities, arrears, PSE losses, and subsidies; and (ii) commence preparing a state budget for FY2007 incorporating revised MTFP projections.	
Actions: **Budget Reporting**: ASG will mandate the budget reform cell of the FMU to (i) develop budget processes and procedures for comprehensive and transparent public reporting of fiscal performance monitoring and evaluation consistent with the MTFP; and (ii) prepare a time-bound action plan for an inventory of all major central transfer schemes.		**Budget Reporting:** ASG will (i) publish a semiannual report on achievement of FRB targets or remedial action on key fiscal information including contingent liabilities, off-budget borrowings, arrears, PSE losses, and subsidy payments; and (ii) complete the inventory of all major central transfer schemes and record all related funding and reporting requirements.

Tranche 1 (December 2004)	Incentive Tranche	Tranche 2 (December 2006)
Outcome 7: Enhance Poverty-Focused and Growth-Oriented Expenditure		
Achievements: ASG will (i) initiate strengthening of the poverty focus and growth orientation of ASG development expenditure to priority infrastructure and the maintenance and preservation of existing priority physical and social infrastructure; and (ii) initiate design of financial and management reporting, treasury, and procurement elements of a financial management system required to serve such expenditure orientation.		**Achievements**: ASG will (i) establish prioritized capital investment and levels of operation and maintenance expenditure consistent with the updated MTFP, (ii) establish key elements of a modern financial management system, and (iii) adopt a public procurement manual.
Actions: **Capital and Operation and Maintenance (O&M) Expenditure:** ASG will mandate the expenditure reform cell of the FMU (i) to develop a prioritization process for ASG's investment program, which will evaluate investment in accordance with objective prioritization criteria related to economic rates of return; and (ii) to determine the adequacy of the structure and levels of operation and maintenance expenditure to appropriately maintain assets.		**Actions:** **Capital and O&M Expenditure**: ASG will (i) approve a core investment program in accordance with prioritization procedures for FY2008 onward, and (ii) approve operation and maintenance expenditure targets consistent with the updated MTFP for FY2008 onward.
Financial Management Reporting: ASG will mandate the expenditure reform cell to design government financial management reports for performance evaluation and decision-making purposes.		**Financial Management System:** ASG will implement elements of an integrated financial management system required to support monitoring of FRB targets.
Treasury and Payments: ASG will mandate the expenditure reform cell to design the payments approval process and disbursement systems in terms of speed, efficiency, transparency, accountability, and resultant cash management and budgetary controls.		**Treasury and Payments:** ASG will complete implementation of a Treasury information technology action plan, including agreed service standards of management information system reporting, required to support cash management and budgetary controls.
Procurement: ASG will mandate the expenditure reform cell to develop standards for all public procurement.		**Procurement:** ASG will adopt a procurement manual for all public procurement.
Component 3: Reorienting the Role of the State		
Outcome 8: Reform of Public Sector Enterprises		
Achievements: ASG will (i) establish a policy framework for PSE reforms, (ii) prepare a draft design of a social safety net (SSN) design for PSE employees, and (iii) approve a state renewal fund for PSE reforms.	**Achievements:** ASG will (i) approve the SSN design, (ii) make necessary budget provision for Assam State Electricity Board (ASEB) terminal benefit liabilities, and (iii) approve one-time settlement of PSE loans to inoperative PSEs identified for closure.	**Achievements**: ASG will (i) approve rules and memoranda of understanding to promote corporate and financial governance and performance accountability of PSEs to be restructured, (ii) publish Department of Public Enterprises (DPE) reports on the performance of PSEs, (iii) implement SSN for PSE employees in PSEs identified for closure, and (iv) commence the process of closure for all identified inoperative PSEs.

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Actions: **PSE Reforms Policy:** ASG will approve policy guidelines on a comprehensive policy on PSE reforms.		
		DPE: ASG will (i) publish memoranda of understanding on the DPE website, and (ii) publish DPE's annual reports of PSEs to enable performance measurement of PSEs against plan and budget parameters.
Budget Mechanisms for PSE Reforms: ASG will approve an earmarked state renewal fund for implementation of PSE reforms.		
		Promotion of Corporate and Financial Governance and Performance Accountability of PSEs to Be Restructured: ASG will (i) approve, issue, and notify rules and regulations governing relationships between ASG, line departments, DPE, and PSE boards of directors; and (ii) approve and issue memoranda of understanding between ASG and 8 PSEs on financial and operating performance and corporate conduct.
Design of SSN: ASG will prepare a draft SSN program design acceptable to ADB.	**SSN Program:** ASG will approve, issue, and notify the SSN program designs.	
	Closure of PSEs: ASG will approve one-time settlements of PSE debts of identified inoperative PSEs to be closed.	**Closure of PSEs**: ASG will begin the process of closure of identified inoperative PSEs, for containing ASG's further fiscal exposure, and will initiate voluntary retirement scheme (VRS) and SSN activities.
	ASEB Terminal Benefits: ASG will make necessary budget provision for ASEB terminal benefit liabilities.	
Outcome 9: Strengthen Public–Private Partnerships		
	Achievements: ASG will approve the establishment of institutional mechanisms to facilitate PSE employment training and PSE outsourcing services.	**Achievements**: ASG will establish the foundations for a private sector facilitation policy framework through (i) a legal, regulatory, and administrative constraints assessment; and (ii) a review of PSE employment training and PSE outsourcing of services assessment through the business incubation unit and skills development unit in the DPE.
		Actions: **Public–Private Task Force:** The public–private task force will submit to ASG (i) a review of laws

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		related to labor, environmental, and business establishment, inspection procedures, licensing, and regulations for purposes of rationalization; and (ii) a review of single window agency clearance facilities in Assam for purposes of promoting private investment into Assam.
	Business Incubation Unit and Skills Development and Placement Unit: ASG will establish a business incubation unit and a skills development and placement unit, both in the DPE, to facilitate PSE employment training and PSE outsourcing services.	**Business Incubation Unit and Skills Development and Placement Unit:** The relevant units of DPE will submit to ASG a report on PSE employment training and outsourcing services for PSEs.
Outcome 10: Public Administration Review		
Achievements: ASG will (i) adopt a policy on rationalization of public administration expenditure, and (ii) mandate reviews on the quality of public administration.	.	**Achievements**: ASG will complete (i) reviews for assessment of public administration quality, and (ii) an automated employee database.
Actions: **Public Administration Rationalization Policy**: ASG will approve a public administration rationalization policy that (i) restricts the replacement rate of ASG employees retiring in accordance with the MTFP, and (ii) enables departmental replacement/recruitment in accordance with functional reviews.		**Actions:** **Public Administration Quality Reviews:** ASG mandated agencies will submit to the State Level Empowered Committee (i) public expenditure tracking surveys of selected departments, (ii) functional reviews of selected departments, and (iii) review of anticorruption mechanisms within the state.
Public Administration Quality: ASG will (i) mandate the expenditure reform cell of the FMU to undertake public expenditure tracking surveys of selected ASG departments; and (ii) mandate the Assam Administrative Reforms Commission to build on its functional reviews for selected ASG departments and its review of the functioning of the Vigilance Commissioner, Directorate of Anti Corruption, and other existing vigilance mechanisms to enhance their effectiveness for prevention and investigation of corruption.		
Public Administration Management: ASG will mandate the Finance Department to act as the repository of an employee database and develop the approach and methodology for preparing a complete digitized staff inventory for identified departments, and a system for updating the inventory.		**Employee Database:** ASG will complete an automated employee database.

Evaluating the PRMPA Using a Synthetic Control Group

The report evaluates the immediate short-term implications of a program loan provided by the Asian Development Bank (ADB) to the government of Assam using a synthetic control method that allows not only to take into account baseline levels of performance for Assam but also allows the modeling of what would have happened in the absence of the ADB intervention. The report revealed that the ADB program led to an average of 0.40% increase in own-tax to gross state domestic product (GSDP) ratio in the 3 post-intervention years than what would have happened in the absence of the program.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries substantially reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to two-thirds of the world's poor: 1.8 billion people who live on less than $2 a day, with 903 million struggling on less than $1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org/poverty
Publication Stock No. WPS113033

Printed in the Philippines