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# Does Financial Inclusion Enhance Tax Revenue: Indian Experience

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# **Does Financial Inclusion Enhance Tax Revenue: Indian Experience**

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**Abstract:** The Government of India has taken several initiatives to enhance financial inclusion in the country. It is hypothesized that financial inclusion augments tax revenue through increased business development and private consumption. This paper uses panel data structural break methods to comprehend the effectiveness of the schemes launched in the last decade. It also estimates a causal relationship between tax revenue and financial inclusion using the dynamic Generalised Method of Moments (GMM). The study finds structural breaks in the relationship between tax revenue and deposit or credit account rates in 2014, which concurs with the launch of PMJDY. The PM MUDRA scheme was launched in 2015, and the 95% confidence level in the estimated structural breaks was in the period of [2013 2015]. These structural breaks reveal the effectiveness of the recent financial inclusion steps taken by the Indian government. Another significant finding is that all the pre-break and post-break coefficients of financial inclusion indicators are statistically significant that reflect the effectiveness of the policies in meeting the targeted objectives. The government should strengthen the ongoing measures of financial inclusion for eliminating financial untouchability and augmenting states' fiscal capacity.

Key Words: Financial inclusion, Tax-revenue-SGDP ratio, Structural breaks; PMJDY, PM MUDRA

**JEL Classification**: C13; O16; G21; G28, G15

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#### 1. Introduction

Financial inclusion and rising income could enhance government tax revenues. Economic growth determines the size of an economy and its tax base. Financial inclusion increases taxable economic activities. Enhanced economic activities generate wealth and increase consumption and investment activities in the economy and raise taxable income and tax revenues. Moreover, financial inclusion formalizes economic activities and deters the working of the shadow economy. Financial inclusion, digitalization, and formalization facilitate tax monitoring and tax collection and increase tax revenue. There is a lack of empirical studies estimating a relationship between financial inclusion with tax revenue receipts (e.g., Oz-Yalaman, 2019; Compaoré, 2022; Rauf, 2022). This paper intends to study the relationship between financial inclusion and tax.

In 2014, India was home to the world's largest unbanked population. Only 53% of adults have bank accounts against the global average of 62%.<sup>1</sup> PM Jan Dhan Yojana (PMJDY), launched in 2014, intends to 'bank the unbanked' population. It is considered one of the world's largest financial inclusion programs.<sup>2</sup> As of 09 November 2022, 47.39 crore<sup>3</sup> accounts have been opened under the scheme.<sup>4</sup> A total of 211.65 crore deposit bank accounts were in the country by 2021-22, i.e., 1648 deposit bank accounts for one thousand persons.<sup>5</sup> Similarly, to 'fund the unfunded', a new scheme known as PM MUDRA (Micro Units Development and Refinance Agency) Yojana was initiated on 8<sup>th</sup> April 2015. The scheme anticipates providing easy access to funds for setting up enterprises.<sup>6</sup> In the first six years of the scheme, 29.55 crore small and medium enterprises (SME) borrowers were given INR 15.52 lakh crore. These big-push initiatives might have affected the structural relationship between the indicators of financial inclusion and tax revenue. This paper intends to estimate the structural breaks in the relationships. It also estimates a causal relationship between financial inclusion and tax revenue. A robust empirical evaluation of the effectiveness of these initiatives is entailed to learn policy lessons to further strengthen the ongoing schemes and to initiate new measures.

The economy theory postulates a positive association between access to institutional finance and economic growth (Aghion et al., 2009; Aghion and Bolton, 1997; Banerjee and Newman, 1993; Bayoumi and Melander, 2008; Cecchetti and Kharroubi, 2012). There are many studies examining the relationship between financial inclusion and economic growth. Increased financial inclusion facilitates inclusive economic growth (Back et al., 2007). Financial access improves local economic activities. Burgess and Pande (2005), in a quasi-experimental setting, reveal that opening bank branches in rural areas significantly reduces rural poverty. Bauchet et al. (2011), using randomized control trials (RCTs), show that the growing use of financial instruments is positively associated with increasing self-employment, business activities, and household consumption. Access to institutional finance enhances business activities and coping ability with risks (Banerjee and Duflo 2011, Dupas and Robinson 2013). Easier access to financial institutions are advantaged in terms of diversified portfolios, lower risk, and more lending.

<sup>&</sup>lt;sup>1</sup> Demirgüç-Kunt, Asli, et al.2015. "The global findex database 2014: Measuring financial inclusion around the world." http://documents.worldbank.org/curated/en/187761468179367706/pdf/WPS7255.pdf

<sup>&</sup>lt;sup>2</sup> For details about the plan, please see <u>https://pmjdy.gov.in</u>

<sup>&</sup>lt;sup>3</sup> 10 million makes 1 crore, 10 lakhs make a million, and a hundred thousand makes a lakh.

<sup>&</sup>lt;sup>4</sup> <u>https://pmjdy.gov.in/account</u> as accessed on 17 November 2022.

<sup>&</sup>lt;sup>5</sup> <u>https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications#!9</u> as accessed in September 2022.

<sup>&</sup>lt;sup>6</sup> For details on the plan, please see <u>https://www.mudra.org.in/</u>

Though there are many studies using cross-country data, there are few empirical studies that are based on Indian data, especially using recent data. Singh and Ghosh (2021) examine the PMJDY scheme in the context of the 2016 demonetization using monthly data. They observe a structural break in the relationship between economic growth and financial inclusion in November 2016. It is not mere access to bank accounts; the use of financial services improves economic activities which is dependent on the incentives and policy environment. Another recent study, Salgotra et al. (2021), examines the PM MUDRA scheme and finds that larger access to finance reduces multidimensional poverty, though the impacts are moderate, in the state of Jammu and Kashmir. These studies measure the impact of financial inclusion on economic growth and activities, the present study estimates the effects on tax revenue receipts.

There is a huge literature scrutinizing the determinants of tax revenue in an economy. Per capita income, inflation, capital flows, trade openness, and sectoral growth are generally considered determinants of tax revenue. Some studies have tried to link tax revenue to financial inclusion. For example, Akram (2016) finds that an increase in bank branches and market capitalization has a favourable and considerable impact on tax collection in the long run. Ahamed (2016) observes that financial inclusion or development increases tax revenue by reducing tax evasion and the shadow economy. Similar findings are observed in other studies such as Okon (2018), Nnyanzi et al. (2018), among others. In recent studies, Oz-Yalaman (2019) and Compaoré (2022) observe that financial inclusion is a significant determinant of tax revenue receipts. Oz-Yalaman applied the ownership of individual bank accounts as an indicator of financial inclusion, and Compaoré uses the number of ATMs per square kilometer as a proxy for financial inclusion. Note that most of these studies were carried out using cross-country panel data and there is a scarcity of country-level studies. This paper intends to fill the gap.

The paper aims to comprehend the effectiveness of financial inclusion initiatives on tax revenue receipts. Most of the earlier studies analyzing the determinants of tax revenue receipts could be dividing the sample based on policy announcements. These studies tend to define the structural break based on a priori policy or regime changes and render the research approach vulnerable to the inappropriate making of sub-samples. We follow a data-determined approach based on appropriate econometric tests for determining the structural breaks in the sample. To our knowledge, this is the first study in the literature on the relationship between financial inclusion and tax revenue using Indian data.

This paper uses panel data structural break methods and articulates testable hypotheses regarding the impact of financial inclusion on the tax revenue of Indian state governments. The advantages of using the structural break approach involve that the timing and the number of breaks are determined from the data, the method is robust in the presence of interactive effects, it avoids the need of defining the suitable treatment and control groups, and the assumptions such as parallel trends between the control and treatment groups are not required to infer causal relationships (Ditzen et al., 2022). Moreover, we estimate a causal relationship between tax revenue and financial inclusion exploiting panel regression models through the interaction between economic growth and financial inclusion. The paper uses a reduced-form framework to study the relationship between financial inclusion and tax revenue growth. It uses the dynamic Generalised Method of Moments (GMM) to estimate the relationship. GMM addresses the concerns of endogeneity and reversal causality.

The study employs state-level panel data on tax revenue, economic growth, and financial inclusion data for the period of 2004 to 2019. Deposit accounts per 1000 persons, credit

accounts per 1000 persons, deposit to SGDP (State Gross Domestic Product) ratio, and credit to SGDP ratio are used as indicators of financial inclusion. These indicators cover both the demand and supply sides of financial services.

We find structural breaks in the relationship between tax revenue and deposit or credit account rates in 2014, which is statistically significant. This finding concurs with the launch of PMJDY; PMJDY was launched on 28 August 2014. Opening of deposit accounts is supposed to be positively associated with increasing bank deposits which makes available more funds to the banks for lending and more credit accounts are opened. Note that the PM MUDRA scheme was launched in 2015, and the 95% confidence level (CI) in the estimated structural breaks was in the period of [2013 2015]. The estimated structural break in the relationship between tax revenue and deposit to SGDP ratio takes place in 2009 and 2015 and the years of the structural break in the relationship between the tax revenue and credit to SGDP ratio are 2010 and 2016. These structural breaks reveal the effectiveness of the recent financial inclusion steps commenced by the Indian government.

Another significant finding is that the chosen indicators of financial inclusion are significant determinants of tax revenue. Specifically, all the pre-break and post-break coefficients are statistically significant and it is worth noting that the post-break coefficients are of the same magnitude or the magnitude gets strengthened, reflecting on the effectiveness of the policies in meeting the targeted objectives.

The rest of the paper is organized as follows: Section 2 provides a description of the status of financial inclusion in the country and its relationship with economic growth and tax revenue enhancement. This description is based on a time-series analysis of national data over the study period. Section 3 describes the state-level data used in the study. Section 4 discusses the methodology followed in the study. The estimation results and their analysis has been provided in Section 5. The paper closes in Section 6 with some concluding remarks.

## 2. Background

Major Private Sector banks were nationalized in 1969 to enhance financial development and financial inclusion. Subsequently, regional rural banks were set up and the State Bank of India was tasked with opening bank branches across the country, especially in rural areas (Rishi and Saxena, 2004). In 1982, NABARD was set up to make savings and credit available to rural citizens (Agarwal, 2008). There was significant growth in the financial sector during the 1990s due to technological development in the sector and economic reforms in the country. Financial inclusion as a development strategy was introduced in 2005.<sup>7</sup> In 2011, the Indian government started Swabhiman Yojana to strengthen banking services in rural areas. The scheme had limited success since the people at the bottom of the economic pyramid could not be included (Erturk et al., 2022). To have 'Banking for All' in 2014 Swabhiman Yojana was substituted with PMJDY. PMJDY included basic bank accounts for savings and remittances, a RuPay debit card, an overdraft facility, and pension and insurance schemes. The scheme involves a financial literacy program also.

<sup>&</sup>lt;sup>7</sup> Y. V. Reddy described financial inclusion as "the process of ensuring access to appropriate financial products and services needed by vulnerable groups such as weaker sections and low-income groups at an affordable cost in a fair and transparent manner by mainstream institutional players" (Reddy, 2006)

We plot the deposit and credit accounts per 1000 persons in Figure 1 over the period of 2004 to 2021 to identify the impact of PMJDY. The deposit accounts have increased about four times; in 2004 the deposit accounts were 426 per 1000 persons and it increased to 1562 in 2021. Though there is an increasing trend in the growth rate of deposit accounts, the growth rate picks up after the introduction of PMJDY reflecting the effectiveness of the scheme.

The PM MUDRA scheme has specifically been targeted to provide credit to micro, small, and medium enterprises up to Indian Rupees (Rs.) 10 lakhs. Under the scheme, about Rs 15.52 lakh crores are disbursed to 29.55 crores beneficiaries. A cursory look at the time-trend line of credit accounts per 1000 reveals the effectiveness of the scheme in the post-2014 period for financial inclusion. In the preceding years, the growth rate of credit accounts was stagnant or declining, and it picked up in the post-2014 years, especially after 2015. Credit accounts were only 62 per 1000 persons in 2004 and it increased to 104 by 2014, it has further increased to 220 by 2021.

Figures 2 and 3 show the relationship between financial development and the per capita GDP. Note that the exponential relationship between the credit-to-GDP ratio and deposit-to-GDP ratio to per capita GDP implies that the growth rate of the economy picks up as the ratios cross certain threshold levels. A cursory look at the figures reveals that the threshold level for the credit-to-GDP ratio is at about 45% and for the deposit-to-GDP ratio, the threshold level is at 65%. It also implies that it is not just the ownership of the accounts that translate into economic growth or increased economic activities, but the usage of these accounts. In recent years, there has been an increase in the ownership of deposit and credit accounts which is accompanied by the increased deposit-to-GDP and credit-to-GDP ratios which lead to higher and more inclusive economic growth in the economy.

Figure 4 shows a positive relationship between tax revenue measured as a percentage of GDP and absolute deposits in the economy implying financial development enhances tax revenue in the economy. Moreover, it should be noted that the number of taxpayers and tax receipts have been increasing over the period. A cursory look at the figure reveals that though both corporate and personal income tax receipts are increasing, there is a kink in the relationship sometime in 2007-08 in both tax receipts and there are kinks in 2015-16 in personal income tax receipt and in corporate tax receipts in 2016-17. The later kinks might be due to the financial inclusion initiatives such as PMJDY, PM MUDRA, and demonetization schemes. Similar kinks could be observed in the direct and indirect tax receipts. Therefore, we intend to estimate structural breaks in the tax revenue – financial inclusion relationship using state-level information for the period 2004-2019. To establish a causal relationship between tax revenue and the indicators of financial inclusion, we use the dynamic GMM method. GMM overcomes the problems of endogeneity and reversal causality.

Figure 5 presents the relationship between financial inclusion indicators and per capita SGDP using the pooled information of 29 states over the period of 2004-2019. There are positive associations with the indicators of financial inclusion measured in terms of ownership of deposit or credit accounts or the indicators of financial development represented by the deposit-to-SGDP ratio or credit-to-SGDP ratio. It is revealed from the figure that most of the observations are clustered and the positive relationship might be influenced by some extreme values. Similarly, we observe positive associations between the indicators of financial inclusion or financial development and states' own tax-revenue-to-SGDP ratio (Figure 6). A possible interacting factor for the positive relationship between tax revenue and financial inclusion indicator might be per capita SGDP since rising income is supposed to lead to high tax revenues. These figures or the conventional regression analysis might be able to explain

the relationship between tax revenue and financial inclusion, to distinguish the effectiveness of recent financial inclusion initiatives we resort to panel data structural break analysis.

## 3. Data

To estimate the structural breaks in the relationship between financial inclusion and tax revenue receipts we need information on the indicators of financial inclusion, tax revenue, per capita SGDP (state gross domestic product), and sectoral share of SGDP at the state level. The required information is obtained for the period under consideration from the RBI publication Data Base of Indian Economy.<sup>8</sup> We consider two types of indicators: first is related to the ownership of accounts which is considered a measure of financial inclusion, i.e., deposit accounts per 1000 persons and credit accounts per 1000 persons. The second indicator that we consider is related to financial development, i.e., deposit-to-SGDP ratio and credit-to-SGDP ratio. Per capita SGDP is taken as a measure of economic growth in a state and works as an interacting variable in the relationship between financial inclusion and tax revenue receipts. In the relationship, the share of the agricultural sector in SGDP is taken as a control variable and it is expected that with the development of an economy, the share of agriculture in SGDP declines and tax revenue increases. Tax revenue consists of states' own tax revenue only. We consider all 29 states including Delhi and excluding all union territories for 2004-2019. Appendix Table A1 presents the correlation coefficient of various measures of financial inclusion and development.

Table 1 presents the descriptive statistics of the variables used in the study. There is considerable variability among the states for all the variables considered implying that the level and growth in the financial indicators, economic growth, and tax revenue receipts as a ratio of GDP are not uniform across the states. There is higher growth in the indicators of financial inclusion in the laggard states relative to the leading states, showing the presence of convergence in financial inclusion across states. The results obtained using the CD test of Pesaran (2015) are also reported in the table testing the null hypothesis of no weak crosssectional dependence. The null hypothesis is rejected at all conventional levels of significance implying that fixed effects are not enough to account for cross-sectional dependences. Therefore, in the estimation of structural breaks and causal relationships, we include additional controls such as sectoral share of GDP along with state- and year fixed effects. Moreover, the presence of cross-sectional dependence is suggestive of common factors and rules out the application of the difference-in-difference (DiD) type of estimators for estimating the effectiveness of big-push financial inclusion initiatives in enhancing tax revenues. The DiD estimation is based on the assumption of parallel trends. The results of the unit root test confirm that all the variables are stationary.

# 4. Methodology

The objective of the paper is to understand the effectiveness of big-push financial inclusion initiatives taken in the last decade in terms of their effect on tax revenue receipts. We estimate and test for breaks in panel data following recently developed methods by Karavias et al., (2022), Kaddoura and Westerlund (2022), and Ditzen et al. (2022). Bai and Perron (1998) provide a complete toolbox for detecting and testing for multiple structural breaks in linear

<sup>&</sup>lt;sup>8</sup> <u>https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications#!9</u> as accessed in September 2022.

time-series regressions and Ditzen et al. (2022) extend the model for panel data. The intention here is that effective financial inclusion measures would cause structural breaks in tax receipts. The structural breaks methods estimate both the timing of the breaks and their number from the data contrary to DiD approaches, which are popular in the impact evaluation or causal inference literature. These approaches assume that the timing of the breaks is given (Ditzen et al., 2022). These assumptions may not be satisfied in the context of financial inclusion initiatives since they differ in policy mix, duration, and magnitude. Moreover, the use of the structural breaks approach avoids the usual problems of defining suitable control and treatment groups for identifying the effectiveness of the policy measures and makes its application more relevant as the whole country is affected by the financial inclusion measures to some extent. Lastly, the structural break methods are robust to the presence of interactive effects as policy actions are linked to current and anticipated macroeconomic conditions which may be mistaken for policy breaks if not properly accounted for (Ditzen et al., 2022).

Consider the following panel data model:

$$y_{it} = x'_{it}\beta + w'_{it}\delta_i + f'_t\gamma_i + \varepsilon_{it}$$
<sup>(1)</sup>

Where  $y_{it}$  is the own tax-revenue-to-SGDP ratio of the state *i* in year *t*,  $x_{it}$  are the variables such as per capita SGDP which are not affected by the breaks and  $w_{it}$  are the variables such as the indicators of financial inclusion that are affected by the breaks.  $f_t$  is a vector of unobserved common factors with  $\gamma_i$  being the associated vector of factor loadings, and  $\varepsilon_{it}$  is an idiosyncratic error. It is assumed that the break years are common across states.

We test the null hypothesis of no structural breaks against the alternative hypothesis of *s* structural breaks. Then the structural break methods estimate the exact number of breaks and corresponding years of breaks using the sequential testing approach. We apply the sup-Wald test for the existence of a structural break.

After identifying the structural breaks in the sample, we estimate the tax revenue elasticity of financial inclusion indicators using dynamic panel data models, as specified:

$$y_{it} = \beta_0 + \beta_1 \sum_{k=p}^{K} y_{it-p} + x'_{it}\beta + w'_{it}\delta_i w'_{it}\delta_1 + \sum_{s=0}^{S} 1(t > T_s)w'_{it}\Delta_s + \tau_t + \gamma_i + \varepsilon_{it}$$
(2)

where k=1,2,...,K are the time lags, s=1,2,...,S are the structural breaks,  $\Delta_s = \delta_{s+1} - \delta_s$ , and 1(A) is an indicator function for the event A taking the value one if A is true and zero otherwise. This kind of parameterization is useful since as the special drive carry out for financial inclusion ends, the level and usage of financial services do not return to their pre-intervention levels. Therefore, it is not meaningful to compare the impact of big-push efforts of financial inclusion in terms of opening of Basic Saving Bank Deposit Accounts (BSBDA) from their inception to after the launch of PMJDY, but the opening of BSBDA should be compared post-PMJDY to pre-PMJDY. The parameterization in equation (2) captures this.

Estimation of this equation using pooled OLS or static panel method would cause inefficient estimation due to possible bi-directional causality between the dependent and independent variables and endogeneity problems. Therefore, to estimate the coefficients of the model we apply the system GMM approach to mitigate the possible endogeneity concerns. Moreover, we control for cross-sectional and time-fixed effects to address the unobserved heterogeneity issue that may bias the estimated relationships.

## 5. Estimation Results

We first want to test the occurrence of any structural breaks present in the estimated relationship between tax revenue and financial inclusion indicators. For financial inclusion, the government of India has been working continuously; three committees were constituted during 2005-2010 and Swabhiman Yojana was launched in 2011 before the beginning of big-push efforts in 2014. Therefore, it is not expected that every policy initiative has led to structural breaks. This allows us to treat the number and year of breaks unknown.

Table 2 reports the estimated breakpoints (years), associated 95% confidence intervals, and SupW test values and their statistical significance. The breaks are precisely estimating having very narrow confidence intervals covering only a year before and after, which is partly expected given the sample size.

The estimated structural break dates are of direct interest. The structural break dates coincide with the major events happening in the country in relation to financial inclusion measures. PMDJY and PM MUDRA schemes were launched in 2014 and 2015 respectively and the estimated structural break years in the relationship between deposit accounts or credit accounts ownership and states' own tax revenue coincide with the launch of these events (Figures 7 and 8). During the first year of the scheme, 17.9 crore PMJDY accounts were opened which should be considered a watershed event as far as the ownership of deposit accounts and as a result financial inclusion in the country.<sup>9</sup> Though under the PM MUDRA scheme in the first year 2015-16 about 1.1 crore accounts were opened,<sup>10</sup> the opening of credit accounts realized a jump in 2014 simultaneously with the deposit accounts as the deposits and credits behaviour are interlinked. Access to deposit accounts creates a transaction history that enables the banks to fund the earlier unfunded. This reflects that though the policy for ownership of credit accounts as a big push was started in 2015, the structural change might have started earlier in 2014 with the launch of PMJDY.

The estimated structural breaks in the relationship between the tax revenue-to-SGDP ratio and financial development indicators are presented in Figures 9 and 10. In the relationship of tax revenue-to-SGDP ratio and credit-to-SGDP ratio, the structural breaks are in the years 2010 and 2016. These breaks are consistent with the events around those years. In 2008, the world witnessed the global financial crisis and India was not an exception, though relatively less affected. The liberalized lending policy was followed and as a result, the credit-to-GDP ratio in the country increased to more than 52% and then stabilized or the growth rate slows down. In 2014, it was about 54.92% and then started to decline till 2016 and then starts to pick up and touch 55.95% in 2021. In absolute terms also there is a substantial pick up in credit amount. Similarly, it has been observed that the credit disbursed under PM MUDRA increases from Rs 1.33 lakh crore in 2015-16 to Rs. 1.75 lakh crore in 2016-17, and by 2021-22, the disbursed credit under the scheme was Rs. 3.31 lakh crore.<sup>11</sup>

The estimated structural breaks in the relationship between the tax revenue-to-SGDP ratio and deposit-to-SGDP ratio appear in the years 2009 and 2015 (Figure 10). This finding corroborates

<sup>&</sup>lt;sup>9</sup>https://www.pib.gov.in/PressReleasePage.aspx?PRID=1854909#:~:text=The%20success%20of%20the%20PM JDY,women%20Jan%20Dhan%20account%20holders as accessed on 28 November 2022.

<sup>&</sup>lt;sup>10</sup> <u>https://www.mudra.org.in/default/downloadfile/annual\_report\_of\_mudra\_2015-16.pdf</u> as accessed on 28 November 2022

<sup>&</sup>lt;sup>11</sup> <u>https://www.mudra.org.in/Home/ShowPDF</u> as accessed on 01 December 2022.

the deposit levels in the economy. In absolute terms, bank deposits have increased by Rs. 65 lakh crores during the first 10 years but in the next 7 years, the deposits increased by more than Rs. 75 lakh crore. Since 2009 was the year just after the global financial crisis, it might be possible that people shifted their savings from the stock market to safe sources such as bank deposits. From 2008 to 2009, absolute deposits increased by Rs. 7 lakh crores, and the increase in deposits in 2015 over 2014 was about 10 lakh crore. The deposits in PMJDY accounts which are specifically targetted at the poor and weaker section of society, contrary to popular perceptions, were more than Rs. 10 thousand crores as on 31 January 2015<sup>12</sup> and have increased to Rs. 1.77 lakh crore as on 23 November 2022<sup>13</sup>.

Another point to note is that it is not necessary for the estimated year of the structural break to coincide with the launch year of a scheme. For example, the structural break in the relationship between the tax revenue-to-SGDP ratio and credit accounts ownership is in 2014 though PM MUDRA was launched in 2015 (Figure 8). This shows the effectiveness of the structural break approach over DiD in which the year of policy launch is considered a year of break. This may happen in DiD approaches due to omitted structural breaks. Though under the PM MUDRA scheme in the first year 2015-16 about 1.1 crore accounts were opened<sup>14</sup>, the opening of credit accounts realized a jump in 2014 simultaneously with the deposit accounts as the deposits and credits behaviour are interlinked. Access to deposit accounts creates a transaction history that enables the banks to fund the earlier unfunded. This reflects that though the policy for ownership of credit accounts as a big push was started in 2015, the structural change might have started earlier in 2014 with the launch of PMJDY.

As explained in Section 2, it is expected that financial inclusion or financial development should cause increased tax revenue of the states and we expected  $\Delta_s$  should be positive following an intervention related to financial inclusion. Appendix Tables A2.1 and A2.2 present the regression results of dynamic panel models using two-way fixed effect models, these results might be prone to endogeneity and reversal causality. Therefore we estimate the relationships using the dynamic system GMM approach and the results are given in Tables 3.1 and 3.2.

Table 3.1 presents estimates of the relationship between the tax-revenue-SGDP ratio and indicators of financial inclusion which we measure in terms of deposit and credit accounts per 1000 persons. We begin by considering the deposit accounts rate first. We find that the deposit accounts rate positively affects the tax-revenue-SGDP ratio. The estimated effect of the deposit accounts rate is positive in both the regimes (coefficients  $\alpha$  and  $\beta$  are positive) suggesting that increased deposit accounts rate caused higher tax-revenue receipts of the state governments. The coefficient of the post-break period is not only positive and statistically significant but also higher in magnitude implying the effectiveness of PMJDY. The deposit account rate, an indicator of financial inclusion, is supposed to affect the tax-revenue receipts through the per capita income, therefore, we have included the state GDP and its interaction with the deposit account rate. State GDP, as expected, positively affects the tax-revenue-SGDP ratio. The aggregate effect of deposit accounts rate at the mean level of SGDP (sum of  $\alpha$ ,  $\beta$ , and  $\lambda$ ) is positive and statistically significant. The magnitude of the combined coefficients (sum of  $\alpha$ ,  $\beta$ , and  $\lambda$ ) of deposit accounts rate depicts that a one-percentage-point increase in deposit accounts

<sup>&</sup>lt;sup>12</sup> <u>https://www.pmjdy.gov.in/files/progress/phase1.pdf as</u> accessed on 01 December 2022

<sup>&</sup>lt;sup>13</sup> <u>https://www.pmjdy.gov.in/account</u> as accessed on 01 December 2022.

<sup>&</sup>lt;sup>14</sup> <u>https://www.mudra.org.in/default/downloadfile/annual report of mudra 2015-16.pdf</u> as accessed on 28 November 2022

rate increases the tax-revenue-SGDP revenue by about 0.23 percentage points. Note that a decrease in the share of agriculture in a state's GDP leads to a higher tax-revenue-SGDP ratio.

Another indicator of financial inclusion that we considered is the credit accounts rate. This indicator also affects the tax-revenue-SGDP ratio similar to the deposit accounts rate. An increase in credit accounts rate increases the tax-revenue receipts of a state in both pre-break and post-break periods, the coefficient of the post-break period is higher relative to the coefficient of the pre-break period revealing the effectiveness of the PM MUDRA scheme in terms of enhancing tax-revenue-SGDP ratio. Note that the magnitude of the effect of the credit accounts rate relative to the deposit accounts rate is smaller, i.e., a one percentage point increase in credit accounts rate increases the tax-revenue-SGDP ratio by 0.08 percentage points.

We also estimate the effect of financial development, measured as the deposits or credits as a ratio of SGDP, on states' tax-revenue receipts. The estimated relationships are presented in Table 3.2. The direction of the effects of financial development indicators on the tax-revenue-SGDP ratio is similar to the effects of financial inclusion indicators. The higher magnitude of the coefficients of financial development on tax-revenue receipts reveals that the tax-revenue receipts are affected more by the level of financial development in a state. It is also observed that the deposit-to-SGDP ratio affects the tax-revenue receipts more relative to the credit-to-SGDP ratio. We find an inverse relationship between the share of agriculture in SGDP and the tax-revenue-SGDP ratio.

The results obtained using the structural breaks methods and the tax revenue elasticity of financial inclusion indicators show that the big-push initiatives taken in the post-2014 era have succeeded in achieving their targetted objectives to a large extent. The schemes such as PMJDY and PM MUDRA followed by the 2016 demonetization have included the excluded people in the economic system and have addressed the problem of financial untouchability significantly and enhanced the government's fiscal capacity.

## 6. Conclusion

The paper aims to analyze the effectiveness of financial inclusion measures taken by the Government of India since 2014 in terms of the own tax revenue receipts of the state governments. The measures taken since 2014 are massive in scale and speed, and it is expected that the effects of these measures are substantial in terms of expansion of economic activities and state fiscal capacity. We use panel structural methods to quantify the effect of the financial inclusion measures. We estimate the structural breaks using state-level information for 2004 to 2019 to identify whether these measures lead to structural breaks in the relationship between the indicators of financial inclusion and tax revenue. We also use dynamic GMM to estimate a causal relationship between the financial inclusion or development indicators with the tax-revenue receipts of Indian states.

Economic theory postulates that financial inclusion enhances economic activities and leads to inclusive growth in the economy. Financial inclusion increases the size of the economy and tax base, reduces the operations of the shadow economy, and facilitates tax monitoring and collections. These channels increase government fiscal capacity. We observe positive relationships between the indicators of financial inclusion or development and economic growth and between measures of financial inclusion/development and tax revenue receipts of the central and state governments.

We find the estimated structural breaks in the relationships between tax revenue and deposit and credit accounts ownership in 2014. This finding is consistent with the launch of PMJDY in 2014. It is worth noting that though the PM MUDRA scheme was launched in 2015, the estimated break in the relationship occurs in 2014, and the opening of deposit accounts encourages formal financial institutions to fund earlier unfunded. The 95% confidence level (CI) in the estimated structural breaks was in the period of [2013 2015]. The estimated structural break in the relationship between tax revenue and deposit to SGDP ratio takes place in 2009 and 2015 and the years of the structural break in the relationship between the tax revenue and credit to SGDP ratio are 2010 and 2016.

Identifying these structural breaks is important to show that these big-push initiatives for financial inclusion are able to bring structural changes (breaks) in the economy: the trajectory of inclusive growth has been strengthened and the fiscal capacity of the government has increased. The regression results reveal that in the post-break period, the relationship between the financial inclusion or development indicators with the tax-revenue SGDP ratio has strengthened relative to the pre-break period. There are yet about 230 million unbanked persons in the country; the government should strengthen the ongoing measures and provide incentives to eliminate financial exclusion in the country and for enhancing the states' fiscal capacity.

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Variable	Obs	Mean	Std. Dev.	Min	Max	UR	CD
Deposits							
SGDP							
Ratio (%)	464	52.39	27.36	12.72	191.92	-0.093***	80.494***
Credits							
SGDP							
Ratio (%)	464	29.74	27.68	3.18	170.65	-0.205***	80.352***
Deposit							
Accounts							
per 1000							
persons	464	910.89	644.30	99.13	3778.41	-0.211***	80.548***
Credit							
Accounts							
per 1000							
persons	464	102.30	74.93	15.13	418.36	-0.266***	80.512***
Per capita							
SGDP	464	92176	60482	13075	373741	-0.022***	80.594***
Tax							
Revenue							
SGDP							
Ratio (%)	464	5.53	2.02	1.29	14.55	-0.111****	79.112***
Agriculture							
share in							
Value							
Added (%)	464	10.86	5.59	0	29.11	-0.315	73.523***

Table 1: Summary Statistics of variables used in the study

NOTE: "Mean," "Std. Dev," "Min," and "Max" refer to the sample average, the standard deviation, the minimum value and the maximum value of each variable. The column labeled "UR" reports unit root test results (Karavias and Tzavalis, 2014). "CD" refers to Pesaran's (2015) test for cross-sectional dependence.

#### **Table 2: Estimated Structural Breaks**

Relationship	Structural	CI (95%)	SupW
	Break Year		
Tax Revenue - Deposit-GDP Ratio	2009, 2015	[2008 2010], [2014 2016]	16.38***
Tax Revenue - Credit-GDP Ratio	2010, 2016	[2009 2011], [2015 2017]	30.27***
Tax Revenue – Deposit Accounts	2014	[2013 2015]	27.00***
Tax Revenue – Credit Accounts	2014	[2012 2016]	9.64**

*NOTE: "sup-W"* refers to the sup-Wald test for the existence of a structural break, and "CI (95%)" refers to the associated 95% confidence interval. Finally, \*, \*\* and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively.

<b>Table 3.1:</b>	<b>GMM system</b>	estimates of	f the relationship	between ta	ax revenue an	d financial
inclusion						

	Deposit Accounts	Credit Accounts
L1.IntaxrevenueSGDPratio	$0.908^{***}$	$0.950^{***}$
	(0.032)	(0.022)
ldepositaccountpopratio (α)	0.161**	
	(0.077)	
ldepositaccountpopratio (β)	0.197**	

	(0.098)	
lcreditaccountpopratio (a)		0.083**
		(0.038)
lcreditaccountpopratio (β)		$0.106^{*}$
		(0.058)
L.LSGDP	0.021	0.019
	(0.043)	(0.018)
L.ISGDPXIdepositaccountpopratio ( $\lambda$ )	-0.011*	
	(0.006)	
L.ISGDPXlcreditaccountpopratio ( $\lambda$ )		-0.009**
		(0.004)
Agrishareinvalueadded	-0.001**	-0.002***
	(0.001)	(0.001)
Intercept	-0.604	-0.149
	(0.618)	(0.292)
ldepositaccountpopratio ( $\alpha+\beta+\lambda$ )#	$0.234^{**}$	
	(0.104)	
lcreditaccountpopratio ( $\alpha+\beta+\lambda$ )#		$0.088^{**}$
		(0.034)
State, Year fixed effects	Yes	Yes
Ν	435	435
Wald chi2(20)	68503.74	72652.98
Arellano-Bond test for AR(1)	-3.29***	-3.36***
Arellano-Bond test for AR(2)	-0.31	-0.27
Sargan test	279.59***	275.00***
Hansen test	12.75	13.39

*NOTE:* Unreported controls: state and year fixed effects. The dependent variable is the logarithmic of tax revenue to SGDP ratio. The numbers within parentheses are the standard errors. Finally, \*, \*\* and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively. #At the mean level of SGDP

<b>Table 3.2:</b>	GMM system e	estimates of the	e relationship	between t	ax revenue a	and financial
developme	ent					

	Deposits	Credits
L1.IntaxrevenueSGDPratio	0.934***	0.921***
	(0.018)	(0.019)
ldepositSGDPratio (α)	0.343***	
	(0.102)	
ldepositSGDPratio (β)	0.365***	
	(0.121)	
ldepositSGDPratio (γ)	0.341***	
	(0.112)	
lcreditSGDPratio (α)		$0.262^{***}$
		(0.060)
lcreditSGDPratio (β)		0.247***
		(0.065)
lcreditSGDPratio (γ)		0.252***

		(0.070)
L.LSGDP	0.093**	$0.037^{*}$
	(0.040)	(0.020)
L.ISGDPXIdepositSGDPratio (λ)	-0.029***	
	(0.009)	
L.ISGDPXlcreditSGDPratio (λ)		-0.021***
		(0.005)
Agrishareinvalueadded	-0.001*	-0.002***
	(0.001)	(0.001)
Intercept	-0.965*	-0.331
	(0.503)	(0.265)
ldepositSGDPratio ( $\alpha+\beta+\gamma+\lambda$ )#	0.722***	
	(0.233)	
lcreditSGDPratio ( $\alpha+\beta+\gamma+\lambda$ )#		$0.524^{***}$
		(0.183)
State, Year fixed effects	Yes	Yes
Ν	435	435
Wald $chi^2(20)$	32432.58	50608.62
Arellano-Bond test for AR(1)	-3.2***	-3.29***
Arellano-Bond test for AR(2)	-0.45	-0.17
Sargan test	244.71***	255.99***
Hansen test	17.33	9.01

*NOTE:* Unreported controls: state and year fixed effects. The dependent variable is the logarithmic of tax revenue to SGDP ratio. The numbers within parentheses are the standard errors. Finally, \*, \*\* and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively. #At the mean level of SGDP



Figure 1: Deposit and Credit Accounts perr 1000 person in India



Figure 2: Relationship between deposit-to-GDP ratio and per capita GDP

Figure 3: Relationship between Tax Revenue GDP Ratio and Deposits





Figure 4: Levels of direct and indirect tax revenues in India





Figure 6: Relationship between deposit accounts per 1000 persons and per capita SGDP





Figure 7: Structural Breaks in the relationship between tax revenue-to-SGDP ratio and credit accounts per 1000 persons

Figure 8: Structural Breaks in the relationship between tax revenue-to-SGDP ratio and deposit accounts per 1000 persons



Figure 9: Structural Breaks in the relationship between tax revenue-to-SGDP ratio and credit-to-SGDP ratio



Figure 10: Structural Breaks in the relationship between tax revenue-to-SGDP ratio and deposit-to-SGDP ratio



# Appendix

	Deposits	Credits	Deposit	Credit		Tax	Agriculture
	SGDP	SGDP	Accounts	Accounts	Per	Revenue	share in
	Ratio	Ratio	per $1000$	per 1000	capita	SGDP	Value Added
	(%)	(%)	persons	persons	SGDP	Ratio (%)	(%)
Deposits	(/0)	(/0)	persons	persons	DODI	Itutio (70)	(70)
SGDP Ratio							
(%)	1						
Credits							
SGDP Ratio							
(%)	0.85	1					
Deposit							
Accounts per							
1000 persons	0.58	0.43	1				
Credit							
Accounts per							
1000 persons	0.45	0.58	0.71	1			
Per capita							
SGDP	0.53	0.43	0.84	0.58	1		
Tax Revenue							
SGDP Ratio							
(%)	0.31	0.39	0.40	0.50	0.14	1	
Agriculture							
share in							
Value Added							
(%)	-0.41	-0.35	-0.36	-0.36	-0.54	-0.05	1

#### **Table A1: Correlation Matrix**

# Table A2.1: Dynamic Panel data estimates of the relationship between tax revenue and financial inclusion

	Deposit Accounts	Credit Accounts
L.IntaxrevenueSGDPratio	0.741***	$0.782^{***}$
	(0.054)	(0.080)
ldepositaccountpopratio (α)	$0.280^{**}$	
	(0.107)	
ldepositaccountpopratio (β)	0.313**	
	(0.135)	
lcreditaccountpopratio (α)		0.114**
		(0.053)
lcreditaccountpopratio (β)		0.112
		(0.090)
L.LSGDP	-0.066	-0.065
	(0.107)	(0.083)
L.ISGDPXIdepositaccountpopratio		
$(\lambda)$	-0.015*	
	(0.008)	

L.ISGDPXlcreditaccountpopratio		
(λ)		-0.010**
		(0.004)
Agrishareinvalueadded	-0.002	-0.002
	(0.002)	(0.002)
Intercept	0.237	1.154
	(1.477)	(1.218)
ldepositaccountpopratio ( $\alpha+\beta+\lambda$ )#	0.421**	
	(0.177)	
lcreditaccountpopratio $(\alpha+\beta+\lambda)\#$		0.113
		(0.109)
State, Year fixed effects	Yes	Yes
Ν	435	435
F(20,28)	423.1	694.77

*NOTE:* Unreported controls: state and year fixed effects. The dependent variable is the logarithmic of tax revenue to SGDP ratio. The numbers within parentheses are the standard errors. Finally, \*, \*\* and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively. #At the mean level of SGDP

Table A2.2: Dynamic Panel	lata estimates of the relationship	between tax revenue and
financial development	_	

	Deposits	Credits
L.IntaxrevenueSGDPratio	0.692***	0.694***
	(0.033)	(0.042)
ldepositSGDPratio (α)	0.484***	
	(0.080)	
ldepositSGDPratio (β)	0.489***	
	(0.088)	
ldepositSGDPratio (γ)	0.451***	
	(0.083)	
lcreditSGDPratio (α)		0.343***
		(0.055)
lcreditSGDPratio (β)		0.303***
		(0.053)
lcreditSGDPratio (γ)		0.267***
		(0.067)
L.LSGDP	-0.040	-0.135
	(0.078)	(0.085)
L.ISGDPXIdepositSGDPratio ( $\lambda$ )	-0.030***	
	(0.009)	
L.ISGDPXlcreditSGDPratio ( $\lambda$ )		-0.022***
		(0.005)
Agrishareinvalueadded	0.001	-0.002
	(0.002)	(0.002)
Intercept	0.564	2.059*
	(1.015)	(1.100)
IdepositSGDPratio $(\alpha+\beta+\gamma+\lambda)$ #	1.088***	

	(0.162)	
lcreditSGDPratio ( $\alpha+\beta+\gamma+\lambda$ )#		$0.666^{***}$
		(0.128)
State, Year fixed effects	Yes	Yes
Ν	435	435
F(20,28)	1488.97	693.33

*NOTE:* Unreported controls: state and year fixed effects. The dependent variable is the logarithmic of tax revenue to SGDP ratio. The numbers within parentheses are the standard errors. Finally, \*, \*\* and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively. # at the sample mean of per capita SGDP.