# Financial Inclusion, *At What Cost?* Quantification of Economic Viability of A Supply Side Roll Out

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## Abstract

The paper focuses on supply side funding gaps inherent to financial inclusion schemes that threaten their efficacy and sustainability. We model the double bind problem that providers of banking services for the poor face as they struggle to achieve economies of scale to drive down average fixed financial infrastructure costs, while average account balances are low due to insufficient income. This model is applied to the Prime Minister Jan-DhanYojna (PMJDY) financial inclusion scheme in India, which was started in 2014. An innovative approach based on cross sectional bank level data from 2014 till 2017 is used to quantify the incentives and costs involved in targeting unbanked households. This gives a monetary estimate of the economic shortfalls or surpluses for participating banks, measured as bank balances relative to outlay costs and subsidies per PMJDY beneficiary. A lack of economic viability of PMJDY accounts is found in the majority of Indian public sector banks, a matter which is problematic in view of their extant financial fragility. We provide evidence for cross subsidization of rural bank accounts by urban accounts. We use fixed effects panel methods to determine *what cost* public sector banks bear and also quantify the extent to which account ineffectiveness is ameliorated by exogenous factors, primarily the tie up of PMJDY accounts with bio-metric Aadhar cards and electronic direct benefit transfer of G2P payments.

JEL Classification: G20, O16, O38, H41

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## 1. Introduction

The problem of being excluded from the formal financial sector is one that is being tackled both by developed (European Commission, 2019[2], UK HM Treasury 2018, Kempson et. al. 2004) and developing countries, with the latter being much greater in scale and scope.[3]Improving the quality of life for those below the poverty line (BPL) has been a long-standing issue for developing countries over the past several decades. Many different methods have been used such as aid, various government social security schemes for poverty reduction, non-governmental organizations spearheading microfinance (see, Murdoch (1999), Bannerjee et. al (2015)) and more recently government led schemes for financial inclusion, Arun and Kamath (2015). Access to finance is seen to enable people to transform their production and employment activities, thus help them to exit poverty. The World Bank (2017) definition of financial inclusion enumerates the financial products, such as transactions, payments, savings, credit and insurance, that businesses and individuals need to have access to in a responsible and sustainable way. Rangarajan (2008) underscores issues of socio-economic vulnerability in his definition of financial inclusion as "the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low income groups at an affordable cost".

This paper highlights how sustainability issues for financial inclusion are closely linked to the double bind problem faced by banks at the centre of such schemes. On the one hand, banks struggle to achieve scale economies to drive down average fixed financial infrastructure costs for the poor who require last mile coverage, typically, in rural areas, while on the other hand the average account balances and account activity of BPL customers are low due to insufficient income (Beck and de la Torre, 2006). The lack of sustainability from this intrinsic loss making situation of basic bank accounts for BPL customers and other credit schemes has dogged financial inclusion drives to date (Sriram (2011), Das (2017) and Morduch (1999)). Concerns have been raised about ignoring this problem of credit for subprime customers, which could result in financial instability or exacerbate the burden on weak institutions (Collard and Kempson (2005), Rajan (2010) and Khan (2012)). The model and estimation approach developed in this paper for the funding gaps inherent to banking

[2]https://ec.europa.eu/neighbourhood-enlargement/neighbourhood/eu-initiative-financial-inclusion_en

[3]In 2014, the World Bank reports that the number of unbanked to be around 2 billion(see Global Findex). However, around this period only 54 percent of adults in developing countries report having a bank account, in contrast to 94 percent in the Organisation for Economic Co-Operation and Development (OECD) countries (Demirgüç-Kunt, et al. 2015)

services for the poor that arises from the double bind problem identified above has wide applicability. Extensive efforts have focused on demand side barriers of financial inclusion such as that of the World Bank and the recent OECD (2018) Toolkit to create measures of financial literacy and financial inclusion. We argue that identifying and quantifying the intrinsic loss making situation of top down financial services schemes for the poor from a supply side is necessary to address issues relating to their long term viability.

We study this problem in the context of the Indian drive for universal household bank account ownership with the Pradhan Mantri Jan DhanYojna (PMJDY) of the Modi government, arguably one of the most vigorously pursued schemes which started in 2014. PMJDY follows in the wake of financial inclusion objectives pursued by successive governments and private sector organizations in India for many decades. Many sources, primarily the World Bank's Global Findex database (see, Demirgüç-Kunt et. al.2015), Günther (2017), Sriram (2018) and Intermedia's 2018 Financial Inclusion Insights (FII)[4] survey, show that the 2014 PMJDY initiatives have finally and substantially moved the dial on the number of registered bank account holders.

The PMJDY roll out premises a top down bank-wise and state-wise targets in terms of Subservice Areas (SSAs) of 2-3 villages with 1000-1500 households that have to be serviced by measures that include the business correspondent or the so called bank mitra model that has antecedents from a previous scheme in 2006, Kochar (2016). The new initiatives of the PMJDY include accident insurance cover, access to debit card payments in the form of the RuPay card, INR 5000 in overdraft facilities and the technology tie up of these accounts in the JAM trinity (Jan Dhan accounts, the Aadhaar ID system and mobile technology) with the unique biometric identity Aadhar card based Direct Benefit Transfers (DBT ) for government to person (G2P) payments.

From the Government of India PMJDY database[5] that records targets being achieved, a recent statistic on 13th March 2019 shows that PMJDY has created around 344.3 million beneficiaries with deposits totalling INR 946 billion ($13.68 billion). Public sector banks hold most of these accounts (79.9%), followed by regional rural banks (16.9%) and private sector banks (3.16%). The Findex 2017 Report states that in 2018, approximately 80% of adults in India have a bank account, up from 53% in 2014 and 35% in 2011.Of course, there are still challenges to be surmounted. 190 million Indians are still unbanked,

[4] http://finclusion.org/country/asia/india.html#dataAtAGlance
[5] https://pmjdy.gov.in/

second only to China. Reaching this last, but a big and important, financially excluded segment will take more than just top down government strictures: there have to be economic incentives for the supply side providers of financial services and also for demand side barriers to be alleviated.

An important element in evaluating the effectiveness of increasing financial inclusion to alleviate poverty is tied up with the economic viability of the accounts and how they are utilised. The 2017 Findex database states that in end-2016, approximately 25 percent of accounts created under the PMJDY initiative had zero balances and over the period of 2017- 2019, starting at 48% and falling to 38% of bank accounts in India had no activity through deposits or withdrawals. Further, no more than 1% of PMJDY account holders (3.1 million beneficiaries) use overdraft facilities available to them. An important Findex finding for those with no financial accounts in 2017, is that 54% cite insufficient funds, and this reason scores the highest amongst demand side impediments.

In light of the above, the Findex survey of Government Payment Recipients gives evidence that 57% of them claim in 2017 (29% in 2011) that they opened their first bank accounts to receive government benefit payments. This shows that the JAM trinity architecture is increasingly being primed to channel the electronic G2P payments to PMJDY accounts, Mularidharan et. al. (2016). The main outcome of this is that despite low usage and balances in PMJDY accounts at the time of signing up to the eponymous zero or low balance accounts, due to insufficient income of BPL customers, over time the electronic channelling of G2P direct benefit transfers (DBT) can make these accounts viable. In the interim, it should be noted that the Indian public sector banks, which form the main vehicle of the PMJDY drive, have been engulfed in conditions of financial distress far worse than the rest of the banking system. This has come to a head in 2016 with a high incidence of non-performing assets of over 14% of total loans of public sector banks. With only two banks in this sector in the black and eleven of them under conditions of Prompt and Corrective Action that includes a bar on them from opening branches in rural areas see, Reserve Bank of India Financial Stability Report, 2018, Mishra and Tanka, 2018), there is some urgency in developing a model on the funding gap and economic viability of PMJDY.

The above circumstances behind financial inclusion in India and other *finance for all* schemes (Demirgüç-Kunt et. al., 2008) make it important to highlight the inherent conflict between achieving laudable objectives of opening bank accounts for the poor and maintaining these accounts that are potentially loss making for banks. This is a problem that is exacerbated during conditions of financial fragility (Ghosh (2008), Hannig and Jansen

(2010)) and clearly requires more investigation than has been the case.[6]The potential lack of supply side incentives for financial services for the poor also characterizes the truism that service for the poor becomes poor service. If monetary incentives are insufficient for the supply side entities to make the necessary investments to maintain sustainable banking services for poor households, especially in rural locations, the target led suppliers of financial services for the poor may pay lip service[7] without making adequate resource inputs as the size of account balances do not cover the costs. This was found to be the case (see, Das (2017) and Sriram (2011)) in earlier basic savings bank deposit account (BSBDA) schemes for the poor when banks seeking to reduce the burden of non-profitable accounts stopped promoting BSBDA and discouraged their personnel from servicing or opening such accounts in India. Further, it is clear that private sector banks in India, which are not under government strictures, have voted with their feet.

We develop an innovative approach using cross sectional bank level data from 2014 till 2017 to quantify the incentives and costs involved in targeting unbanked households. While there are details specific to India, such as cross sectional data covering the 3 classes of Indian banks (Private sector banks, Public sector banks and Rural and Regional Banks), a general methodology is proposed to quantify the monetary shortfalls that arise from operational difficulties of obtaining sufficient scale economies to reduce average per account costs of the infrastructure needed for financial inclusion involving basic bank accounts (see Beck and de la Torre (2006)) when average account balances are low and could fall as more BPL customers are signed up. This gives a monetary estimate of the economic shortfalls or surpluses for participating banks, measured as account balances relative to outlay costs and subsidies, respectively, averaged over the total number of PMJDY accounts for bank. Against the background of the financial fragility of Indian banks, we argue that it is important to identify and quantify the account balance shortfalls as a useful benchmark index to estimate the speed with which public sector banks are likely to move into surplus for PMJDY accounts, as the direct benefit transfer trend strengthens.

[6]Raghuram Rajan , the Governor of the Reserve Bank of India in 2014, is reported to have highlighted this problem of burdening public sector banks with the costs of the PMJDY program (see, Mishra and Tanka, 2018 ).
[7]Due to top down pressures, in a bid to report a reduction of zero balance accounts, a number of public sector bank officials have said to have seeded these PMJDY accounts with INR1. https://indianexpress.com/article/business/banking-and-finance/how-banks-cut-their-zero-balance-jan-dhan-accounts-one-rupee-trick-3028190/

We investigate the specific incentives and outlays that have a clear rural bias on the part of encouraging public sector banks and rural and regional banks to make the last mile to fill the gap for the unbanked rural poor. This is studied in Kochar (2016) in the context of the effect on household savings of the PMJDY program, highlighting the use of branchless banking via local agents called bank mitras (BMs) or business correspondents, who provide doorstep or last mile financial services using mobile technologies in rural areas of India. As of March 2015, the number of BMs had grown to represent 91% of banking outlets nationwide. This is likely because BMs have a much lower direct cost than opening a brick-and-mortar branch. Branchless doorstep financial services also eliminate the opportunity cost for households in rural areas in travelling to their local bank branch. Other costs include differential costs for opening urban and rural accounts, and the cost of issuing and maintaining RuPay card. These can be offset by the subsidy on rural bank balances.

To estimate the shortfalls or surpluses for the banks, we use the cross sectional bank level data that is publicly available on the PMJDY website supplemented with specially collected data from financial statements of banks and other sources on their financial inclusion activities relating to bank mitras. Then the unit average costs and subsidy variables are specially constructed for the empirical model specifications. Panel regression analyses with fixed effects are done for the 3 different classes of banks and also for the full cross section of banks. The Arellano and Bond (1991) General Method of Moments(GMM) first difference estimator is used to test for endogeneity problems. Using techniques well known in the literature based on comparing the statistical significance of coefficients from the panel regression and GMM estimation (Baum et. al (2003), Schultz et. al. (2010) and Ullah et. al. (2020)), there appears to be no endogeneity problem for the majority of the explanatory variables involving the case of public sector banks.

We find that a majority (17 out of 26) of public sector banks, which interestingly includes the 11 banks under Prompt and Corrective Action, suffer monetary shortfalls in that the PMJDY average account balances do not cover per PMJDY account costs for all the period 2014-2017. This is ameliorated as the roll out progresses. We also investigate the relative profitability of opening rural versus urban accounts and we find that there is evidence that the latter can provide some cross subsidy for the former. Finally, a simple index for each of the public sector banks is constructed in terms of their progress toward achieving target PMJDY beneficiaries. A panel regression of a cross section of indexes made from the estimated shortfalls experienced by public sector banks obtained from our main model is

done on the PMJDY beneficiary target index for these banks. We find that there is positive trend in the data, at the rate of about 25% per annum, for closing the economic shortfall gap of the public sector banks as the PMJDY scheme comes to full fruition and the PMJDY architecture is increasingly geared to G2P payments. This bodes well for the long term economic viability of the PMJDY services. In the interim period there are financial burdens estimated to be around INR 15 billion ($210 million) in 2017 for public sector banks. We consider this to be an underestimation of true shortfalls in terms of the PMJDY accounts relative to their costs of maintaining the extant scale of PMJDY accounts and RuPay cards issuance.

The rest of the paper is organized as follows. In Section 2, we provide a literature review and a perspective on PMJDY against the history of state led financial inclusion schemes in India. In Section 3 we develop the main model and the empirical specification for the estimation of the economic viability of the PMJDY scheme at the bank level. Section 4 reports the data analysis and the panel regression results. Section 4.3 quantifies the "*what cost ?"* to public sector banks from PMJDY roll out and also gives an estimate for the falling trend in the monetary shortfalls suffered by the main purveyors of the PMJDY accounts that arises from the maturation of scheme with the increasing drive to link up G2P transfers and the biometric Aadhar enabled payments. Section 5 provides conclusions.

## 2. Financial Inclusion in India: Literature Review

It is not our objective to give an overview of the extensive literature on the plethora of schemes and institutions aimed at providing credit and payment services that have been developed by governmental and non-governmental micro finance agencies for the amelioration of poverty. Without being exhaustive, this has been competently done by Demirgüç-Kunt et. al. (2017), Murdoch (1999), Dupas and Robinson (2013), Cull et. al. (2014)), with Bannerjee et. al (2015) setting the scene for the use of random control trials to evaluate the effectiveness of scheme design and its behavioural and economic outcomes. Of relevance to our investigation into the economic viability of the PMJDY scheme is the work of Morduch (1999), which looks at the financial performance of several microfinance institutions and finds that the ones that prioritise non-monetary social effects over profitability are less likely to be financially sustainable. While, harnessing the principle of

peer group pressure and collective responsibility for reducing defaults on subprime credit is indeed worthy of the accolades won by Mohamed Yunus and the Grameen Bank, Morduch (1999) finds that the micro-finance institutions have to some extent rely on grants and subsidies in order to avoid substantial losses. This brings into question the effectiveness of MFIs and whether the social benefits they create are worth subsidising instead of providing other forms of aid or investments to ameliorate financial exclusion.

PMJDY follows in a long line of concerted state-led initiatives for the role of banks in India as a vehicle for economic development. This started in 1967 when the Indian government nationalised the 14 largest commercial banks in the country to pursue an objective of opening bank branches in rural areas where there were no existing branches (see, Burgess and Pande (2005)). This involved introducing a new branch licensing policy that required a bank to open 4 branches in unbanked locations, before being able to obtain a license to open a branch in a location already containing a bank. The policy encouraged banks to keep rural lending interest rates lower than urban ones, whilst interest rates for savings were also kept higher in rural areas than urban areas. Though this policy was discontinued in 1990, Burgess and Pande (2005) find that opening a branch in an unbanked rural area per 100,000 people decreases rural poverty by 4.7% and an additional branch in the same area lowers aggregate poverty by 4.1%. While the exact figure for the reduction in poverty from this financial inclusion drive that Burgess and Pande (2005) claim is contested, other such studies for developing countries (see, Demirgüç-Kunt et. al. (2017), Dupas and Robinson, 2013, Cull et. al. (2014)) find a positive impact of micro-finance and savings held in rural banks on poverty.

The other noteworthy bank oriented institutions set up by the Indian Government and the Reserve Bank of India (RBI) over the last several decades to provide credit and financial services to the poor include the Co-operative & Regional Rural Banks (RRBs, 1976), establishment of National Bank for Agriculture and Rural Development (NABARD, 1982), Service Area Approach for lending (1988), Self Help Group SHG-Bank Linkage Programme (1992) and introduction of Microfinance Institutions (MFIs). The PMJDY scheme of 2014 builds on prior government led drives for financial inclusion such as the no frills basic savings bank deposit account (BSBDA) (see, Das, 2017 and Sriram, 2011). The latter did not fare well due to the inherent problem of the double bind that banks are caught in. With banks being unable to make bank charges to cover costs and the BPL customers have little or no disposable income to deposit in these accounts, these accounts are

intrinsically loss making. This lack of demand and supply side viability for bank accounts for the poor, which manifest as very high rates of dormancy and low/zero balances, can also be seen to be characteristic of PMJDY accounts till the G2P direct benefit transfers kicked in. The problem here is that many of these discussions are informal and anecdotal (Das (2017), Sriram (2011), Khan (2012)) and there is no quantification of the intrinsic losses to banks from providing accounts for the poor. While the problems of banks achieving optimal scale economies in terms of the average cost curveis are well understood in banking literature, and there has been discussion of this in the context of financial inclusion by Beck and de la Torre (2006), we claim that this has not received the attention it deserves. Beck and de la Torre (2006) state "the fixed costs can constitute an important limitation to outreach in the provision of payment and savings services and, hence, a key barrier to the broadening of access to these services… Unless a way is found to raise transaction volumes to seize scale economies, low-income clients with the need for small and few payment and savings transactions would not constitute a profitable clientele for financial service providers."

Kochar et. al. (2009) is the closest there has been about the need to measure the 'funding gap' relating to the intrinsic loss making aspects of no frills based accounts for BPL customers that involves rural outreach using correspondent bank agents. The funding gap measurements in Kochar et. al. (2009) are based on highly granular data in specific areas but the method does not extend to estimates for this for all banks involved. Moving away from the funding gap problem, Kochar (2016) uses household data from the state of Karnataka in South India to discover if the correspondent bank mitra program influenced household savings. This study separates households into 'labor' and 'non-labor' households and finds that the presence of a bank mitra increases total household savings, as well as savings in bank accounts. This occurs mainly in the case of 'labor' households because of the effect of bank mitras on wages, particularly, due to the governments National Rural Employment Guarantee Act (NREGA) welfare payments, which are deposited into the bank account of eligible households. This paper also discovers that savings in areas provided with a BM increase with the village population, suggesting that the program is more effective in areas where households are more highly concentrated. Areas that have a lower population density may have less access to financial services due to the geographical implementation of the policy. Kochar (2016) concludes that utilising BMs with government programs such as welfare, pensions and subsidies may help to tackle inequality in areas with high levels of poverty.

Sen and De (2018) take this further and explore whether the savings generated in the bank accounts created by the PMJDY program are used productively by investing in

human capital through education, thus help improve living standards for those in poverty. After reviewing the existing literature, they come to the same conclusion as Kochar (2016) that households who receive payments via bank accounts accumulate more savings on average, however there is a lack of evidence regarding how these savings are utilised. Sen and De (2018) controversially find that those households who receive NREGA payments via bank transfer spend on average INR 1,173 less on education than households who received cash payments. The authors suggest that this might be due to the transaction costs of withdrawing payments from bank accounts, delays in payment, distance from a branch, embezzlement or financial illiteracy of account holders preventing them from making regular withdrawals. The authors argue that these constraints are likely to discourage discretionary expenditure on things such as education. This paper, controversially, concludes that bank accounts are proving an obstruction to helping alleviate poverty in India through the means of investing in human capital via education.

Aggarwal et. al (2017) and Chopra et. al (2017) do large scale studies based on proprietary data on PMJDY accounts opened by public sector banks. Chopra et. al. (2017) data comprises a random sample of 3,418 PMJDY account holders from 4 branches of a large state-owned bank in India. They track account activity for roughly 7 quarters from 2014 until October 24, 2016. In contrast, Aggarwal et. al (2017) exploit a much larger sample including more than 1.5 million PMJDY accounts, but the tracking period ends significantly earlier, in May 2015, or just 10 months after the program began. Both papers, come to the similar conclusion that with time, usage of PMJDY and non-PMJDY accounts (of banked households) seem to converge. Exploiting regional variation in ex-ante financial access, Aggarwal et. al (2017) find that regions more exposed to the program saw an increase in lending and defaults on new loans. In contrast to Sen and De (2018), Aggarwal et. al (2017) also find some evidence of increased borrowing and spending for health related reasons in regions more exposed to the program.

Using field survey data on financial inclusion in India, many studies, such as Ravi (2019), find regional disparities in PMJDY outreach and facilities such as RuPay card issuance. For instance, Ravi (2019), noted that Chandigarh, Chhattisgarh and Delhi show high rates of PMJDY accounts per capita rural population. Assam, Chhattisgarh, Madhya Pradesh, Uttar Pradesh, Odisha and Manipur show high urban beneficiaries to urban population ratios. The study finds roughly eight of every ten beneficiaries opt for the services of a RuPay card. Based on the micro evidence from a case study of Gubbi Taluk in Tumkur (Karnataka), Singh and Naik (2018) find that the new facilities under the PMJDY and the use

of RuPay cards are not sufficiently large enough to promote financial inclusion among the lower end of the population. This study further noted that 90 percent of respondents need help in operating ATMs and internet banking, which poses substantial challenges to the digitization of financial services, and indicates the need to enhance financial literacy. Based on a survey of four low income states, Günther (2017) observed a less substantial effect of PMJDY on the most marginalized segments of the population.

As low income and poverty remain constraints on savings and limits usefulness of bank accounts, it is widely held that PMJDY account link ups to electronic Direct Benefit Transfers of G2P transfers is the major factor that will overcome the disproportionate burden of the scheme on public sector banks. Based on a review of 259 G2P DBT schemes in India, Sriram (2018) notes that the effectiveness of the DBT program depends on the capacity of the Aadhaar linkage of the accounts to weed out duplicate accounts and leakage of funds before it reaches the beneficiaries. With the roll out of unique biometric Aadhar enabled payments for National Rural Employment Guarantee Scheme (NREGS), Social Security pension, Direct LPG subsidy (Liquified Petroleum Gas), Handicapped Old Age Pension etc. of the central or state Government, it is anticipated that the size of PMJDY account balances and their activity will also rise. This is projected to have a positive feedback on two sets of operations that can make the supply side purveyors of financial services for the poor more economically viable. Kochar (2016) and a recent Microsave report have shown how as commissions of bank mitras rely on the size of balances and account activity, the G2P payments will enhance the tenure and numbers of bank mitras in rural areas. Ehmke (2016) and Mularidharan et. al. (2016) give detailed analyses of the actual flows to household finances from the NREGA, while studies like Mittal et. al. (2017), Jain et.al. (2018) cover the implications of what is considered to the largest government fuel subsidy in the world for domestic LPG use in India.

## 3. Model and Methodology: PMJDY Supply Side Incentives and Costs

The gap in the literature is an obvious one in that few if any of the papers surveyed above cover issues to do with the economic viability of bank account opening as a financial inclusion strategy, as in the PMJDY, from the supply side of these financial services. In this section, we will discuss the methodology used to determine cross sectional bank level supply side decisions in the context of PMJDY accounts. These relate to profitability and economic viability of a bank's portfolio of rural and urban PMJDY accounts when there are factors on

the costs/subsidies and the size of account balances. In the first model specification given in Section **3.1**, we develop a framework to test if the desired rural bias in the opening of PMJDY accounts are borne out by the relevant incentives and costs faced by banks. In **Section 3.2**, we develop the so called economic viability model to identify the loss making characteristics inherent to the problems of achieving economies of scale that can reduce the average infrastructure costs of a basic bank account based scheme of financial inclusion relative to the average account balances that follow from the roll out.

### *3.1Incentives/Costs Models: Desired Rural Bias in Financial Inclusion Drive*

In order to model the relative direction of bank activity in favouring rural or urban accounts, we will use the well-known framework from McFadden (1984). The profit function for the ith bank, denoted by $\Pi_{it}$, can be specified with respect to the profitability of the two lines of bank activity involving rural and urban PMJDY accounts. This is typically modelled as the ratio of rural to urban PMJDY beneficiaries, denoted as $(\#Rur_{it}/\ \#Urb_{it})$ :

$$\#Rur_{it}/\ \#Urb_{it} \equiv \exp\left(\Pi_{it}\ (\#Rur_{it})\right)/\exp\left(\Pi_{it}(\ \#Urb_{it})\ \right). \quad (1)$$

We assume that a bank's profit functions, denoted respectively as $\Pi_{it}(\ \#Rur_{it})$ and $\Pi_{it}(\#Urb_{it})$, that drive bank activities of opening and maintaining rural or urban PMJDY accounts follows a log linear function in (2) and (3) .

$$\Pi_{it}(\ \#Rur_{it}) = lnBal^{R}_{it} + lnSub^{R}_{it} - lnC^{R}_{it}. \quad (2)$$

$$\Pi_{it}(\ \#Urb_{it}) = lnBal^{U}_{it} - lnC^{U}_{it}. \quad (3)$$

Noting that the superscripts denote R(rural) and U (urban), the profitability of opening either of these accounts depend on specific characteristics listed here: size of the respective PMJDY balances $Bal_{it}$, which is typically driven by the income/poverty levels of the account holders, the subsidies, $Sub_{it}$, and costs, $C_{it}$, relating to the two classes of PMJDY accounts. Each of these variables in (2) and (3) have to be obtained, and in some cases constructed from a number of sources. In (3), note that there are generally no subsidies for urban PMJDY accounts. For comparability, we derive the profit functions for the urban and rural accounts for each bank in unit costs or subsidies normalized by the total PMJDY beneficiaries for that bank. Substituting (2) and (3) into (1) and taking the logarithm of (1), we get the standard benchmark econometric specification for the determinants for bank activity favouring rural households in the PMJDY financial inclusion drive:

$$\ln \#Rur_{it} = \ln \#Urb_{it} + \ln Bal^{R}_{it} - \ln Bal^{U}_{it} + \ln Sub^{R}_{it} - \ln C^{R}_{it} + \ln C^{U}_{it} + \varepsilon_{it} \quad (4)$$

The above specification in (4) is useful in determining the extent to which the subsidies for opening rural accounts have worked and also whether urban accounts have cross-subsidized the opening and maintenance of rural PMJDY accounts.

### *3.2 Quantification of Economic Viability from the Inherent Loss Making No Frills Basic Bank Accounts for the Poor*

We now turn to the important estimation for the economic viability of the PMJDY accounts in terms of the size of account balances and the costs of opening and maintaining these accounts. Can the per capita PMJDY bank balances cover the average costs of maintaining these accounts less any subsidies received? Based on this, we identify which banks are in shortfall/surplus and also obtain an estimate for the impact of exogenous factors relating to growing size of DBT payments that can ameliorate the low level of account balances.
Here we will draw on a conceptualization from Beck and de la Torre (2006) and Humphrey (1990) which highlights the use of the average cost curve to show economies of scale in terms of bank output defined as the number of accounts. The average cost curve that can characterize economies of scale for bank activity has been found to work well when considering only fixed infrastructure costs of providing financial services and abstracting from interest rate costs or revenue for the bank.[8]With very low take up on overdraft facilities in PMJDY (less than 1% of customers) and also with total PMJDY deposits being less than 1% of total mainstream bank deposits, it is plausible to ignore interest rates as a factor for PMJDY.

Beck and de la Torre (2006) list fixed costs such as the brick-and-mortar branch network, computer systems, legal services, accounting systems, and security arrangements and the bank personnel to man these. In the PMJDY case, instead of considering the full set of fixed costs of a bank, which also has non BPL mainstream deposits, we focus on the specific costs associated with the PMJDY roll out, viz. the bank mitra costs, the cost of the RuPay card and fixed costs of urban and rural no frills accounts. We assume that unit costs for each of these categories of infrastructure to be the same for all banks. An example of the unit cost for bank mitras is their monthly salary. Denoting the unit costs for the jth category

[8] Humphrey (1990) lists the cases when the average cost curve approach gives good evidence for economies of scale in the chosen bank output. He says this has been found to feature more prominently for fixed/operational costs rather than when interest rate returns and costs are also included.

of infrastructure cost as $\lambda_j$ and the level of activity in this as $L_j$, we have the fixed costs for the jth category to be, $FC_{ji}$, and the total fixed cost for ith bank is given as

$$TFC_{it} = \Sigma_j \lambda_j L_{jit} = \Sigma_j FC_{jit} \ . \qquad (5)$$

Note the level of activity $L_{jit}$ at time t varies with the different banks in that some banks have a greater outreach in terms of bank mitras or in the issuance of RuPay debit cards. In having abstracted from interest rate costs or returns to the bank from PMJDY, deposit balances (and subsidies) feature as the major cost reducing inputs. Following the notation in the Glossary in **Appendix 2**, $\#Tot_{it}$ denotes the total number of PMJDY accounts of the ith bank and $TotBal_{it}$ denotes the total INR value of the deposit balances. The average PMJDY account balance, $AvBal_{it}$ , for the ith bank is defined as

$$AvBal_{it} = TotBal_{it} / \#Tot_{it} \ . \qquad (6)$$

The average total fixed costs (net of average subsidy) denoted as $Av\mathit{NTFC}_{it}$ is assumed to have the following functional form,

$$Av\mathit{NTFC}_{it} = \mathit{NTFC}_{it} / \#Tot_{it} \equiv \sum_j \beta_j \frac{FC_{jit}}{\#Tot_{it}} - \alpha \frac{Sub_{it}}{\#Tot_{it}} . \qquad (7)$$

Here, $Sub_{it}$ denotes subsidy received by bank i. Scale economies refer to the fact that relative to a bank's total fixed costs in (5), the average costs fall with the number of PMJDY accounts, $\#Tot_{it}$.

The average profitability of the bank, denoted as $Av\Pi_{it}$ is therefore given by

$$Av\ \Pi_{it} = \frac{\pi_{it}}{\#Tot_{it}} = \frac{1}{\#Tot_{it}} \left[ TotBal_{it} - NTFC_{it} \right] . \qquad (8)$$

If we assume that at the observed level of PMJDY accounts, a bank is operating at its minimum average net fixed cost curve, denoted as $Av\mathit{NTFC}_{it}^{*}$, given the total costs from the levels of activity in each of the j fixed cost categories in (5) net of subsidies, optimality requires that the bank breaks even with the $AvBal_{it} = Av\mathit{NTFC}_{it}^{*}$. [9]In general, the economic viability of a bank at the observed level of its total PMJDY accounts, $\#Tot_{it}$ , is judged with respect to the estimated/expected (E) breakeven average account balances to yield expected average shortfall or surplus, respectively, given by

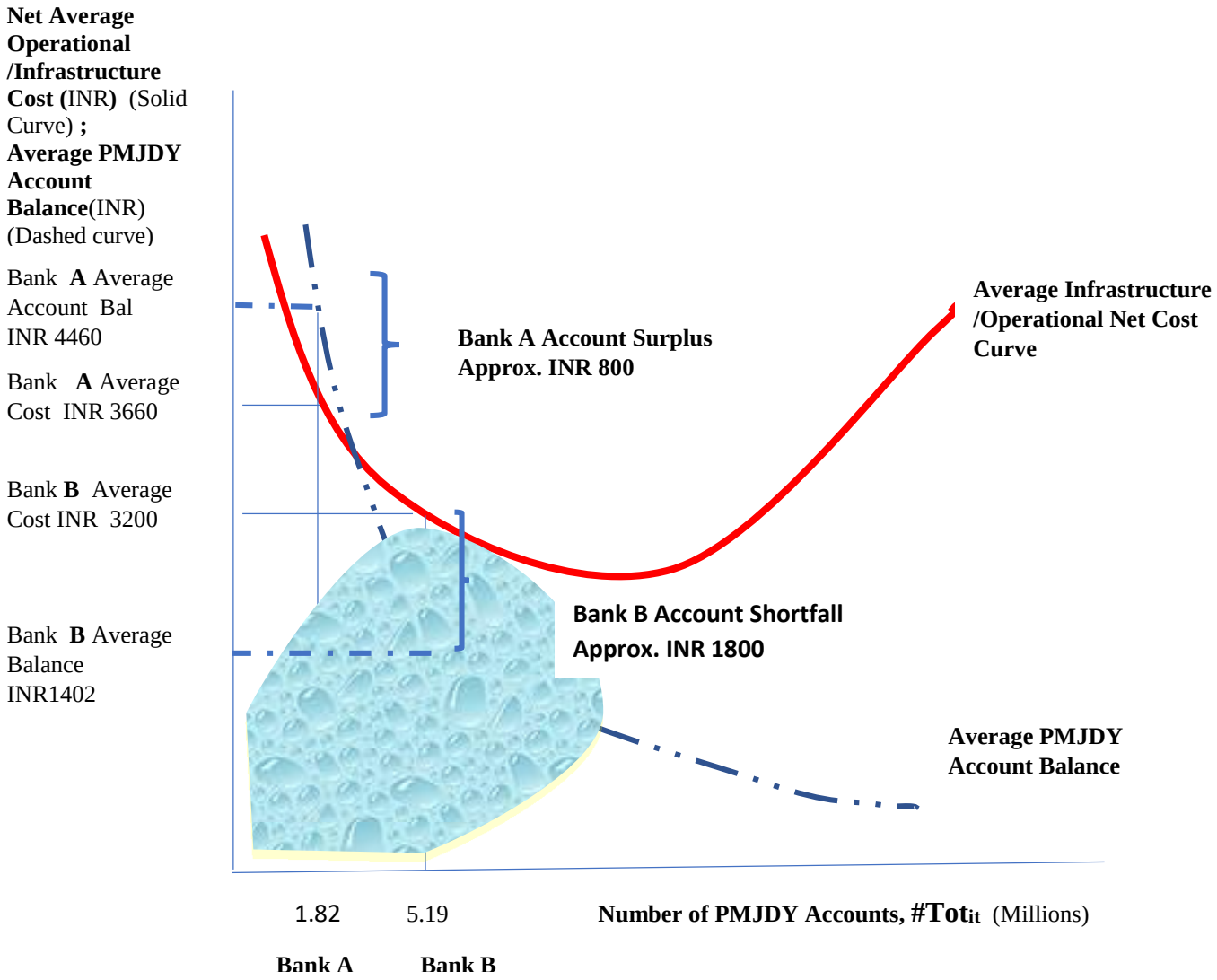
[9] This can be verified by taking first order conditions for $\frac{\pi_{it}}{\#Tot_{it}}$ with respect to $\#Tot_{it}$ in (8) and on setting it equal to zero.

$$[\text{AvBal}_{it} - \text{E}(\text{Av}NTFC_{it})] > 0\ ,\ [\text{AvBal}_{it} - \text{E}(\text{Av}NTFC_{it})\ ] < 0. \quad (9)$$

Before we proceed to explain how the breakeven average account balances is estimated in terms of the average net total fixed costs to yield an estimate of funding gaps or surpluses for a bank, we illustrate this framework in **Figure 1**. We consider two banks **A** and **B** operating, respectively, at two different levels of total number of PMJDY accounts of 1.82 million and 5.19 million given along the horizontal axis.

**Figure 1 Model for Intrinsic Economic Non-Viability of Basic PMJDY Bank Accounts: Expected Shortfalls and Surpluses**

Scale Economies With Different PMDY Account Totals Leading to Average Costs of PMJDY Accounts for Banks **A** and **B** and their Respective Average PMJDY Account Balances




NB: The shaded area represents the bulk of the scatter plot for the average account balances for Indian public sector banks (see **Figure 2**)

The solid curve in **Figure 1** which represents the sector level average net total fixed cost curve for the levels of PMJDY accounts (in millions) shows that Bank **A** and Bank

**B**, respectively, have an average cost of INR 3660 and INR3200. The respective corresponding average account balances for Bank **A** and Bank **B** of about INR 4460 and INR 1400 [10]are given by the dashed curve representing the average account balances for different scales of PMDY accounts for the banks. Reading off from these two curves at the levels of PMJDY accounts that the two banks have, we see that bank **A** has an average account surplus of about INR 800 while bank **B** suffers a shortfall of about INR 1800.

What is interesting is the shape of the average account balances dashed curve in **Figure 1**. This has been drawn on the basis of the empirical scatter plot for Indian public sector banks given in **Section 4**. The shaded area in **Figure 1** shows that the bulk of average account balances for the different banks in 2014 cluster around the mean of INR1208 when sector mean of the number of PMJDY accounts for banks was around 3.24 million. The intrinsic loss making bias of PMJDY accounts arises from low average balances, which tend to fall when more BPL customers are signed on. This is best illustrated by the behemoth bank, the State Bank of India which singlehandedly accounts for over 30% of all PMJDY accounts. In 2014, the State Bank of India had over 20 million PMJDY accounts compared to an average of 3.24 million for public sector banks. This went hand in hand with average PMJDY account balance of INR68 for State Bank of India compared to the sector average of INR 1208. Further, the average infrastructure cost curve in **Figure 1** indicates that even at the lowest point for the sector, scale economies cannot drive the average costs below the average size of account balances. Thus, the funding gap per account in financial inclusion schemes is an intrinsic problem that policy makers should be focussed on. Clearly, from **Figure 1**, at the level of each bank, economic viability of BPL accounts increases if the average net total cost curve is lower and/or the average account balance curve shifts upwards and to the right. The former can be achieved by lowering infrastructure costs or targeting subsidies adequately and the latter requires enhanced account balances as more BPL accounts are opened.

In India, in the absence of G2P direct benefit transfers to PMJDY accounts, the economic viability of financial inclusion is in serious question as more PMJDY beneficiaries are signed up to meet financial inclusion targets of banks. As discussed earlier, even in 2017, 54% of unbanked BPL potential customers indicate that there is no inherent demand for bank accounts due to insufficient income. In the absence of G2P welfare payments, the main

[10] Note these are empirically determined numbers for 2014 with bank **A** data, in **Figure 1**, being that of Oriental Bank of Commerce and bank **B** data corresponds to that for Canara Bank.

drivers for PMJDY accounts are the top down targets on banks and their supply side costs/subsidies. Hence, in the empirical specification for the estimation of the funding gap or surplus for banks, we first estimate the breakeven average PMJDY account balances in terms of the absolute value of the estimated/expected (E) average fixed costs net of subsidies:

$$\text{EAvBal}_{it} = \text{EAv}NTFC_{it} \equiv \left|- \sum_j \beta_j \frac{FC_{jit}}{\#Tot_{it}} + \alpha \frac{Sub_{it}}{\#Tot_{it}}\right| . \qquad (10)$$

The coefficients $\beta_j$ , and $\alpha$ in (11) are obtained by a panel regression of average PMDY account balances for banks on their average fixed cost and subsidy variables specified in (11) below.

$$\mathbf{Bal} = \alpha\,\mathbf{Sub} + \beta_j\,\mathbf{AvFC_j} + \boldsymbol{\varepsilon}, \quad j=1,2,...J. \qquad (11)$$

**Bal** is the column vector of panel data for the dependent variable bank i PMJDY average account balances, defined in (7) for each time t of sample period; **Sub** is the similarly structured panel data vector for the average subsidy for rural balances and $\mathbf{AvFC_{jit}} = \frac{FC_{jit}}{\#Tot_{it}}$ represent the J vectors of panel data for the average fixed costs for jth infrastructure activity, j=1,2,...J; and **ε** denotes the error term vector. Here, $\widehat{\alpha}$ and $\widehat{\beta_j}$ , j= 1,2,…, J are the absolute values for the estimated coefficients from the panel regression with fixed effects in (11). The estimated shortfall or surplus of PMJDY account balance for each bank at time t is given by the actual average PMJDY balances less the estimated/expected breakeven average account balances from (11):

$$\text{AvBal}_{it} - \left|- \sum_j \widehat{\beta_j} \frac{FC_{jit}}{\#Tot_{it}} + \widehat{\alpha} \frac{Sub_{it}}{\#Tot_{it}}\right| \equiv \text{Estimated Average account shortfall/surplus.} \qquad (12)$$

Note, in the panel regression in (11), the estimated coefficient for $\alpha$ should in principle be positive while the infrastructure cost coefficients $\beta_j$ should be positive.

### *3.3 Costs and Subsidies for Urban and Rural PMJDY Bank Accounts*

In this section, we identify the relevant costs and subsidies faced by banks in the PMJDY scheme. In 2015, there have been statements that banks have incurred costs of about INR 20 billion for opening PMJDY accounts.[11]The widespread view is that a disproportionate burden

[11] This is a figure given by T M Bhasin, Chairman of Indian Banks Association (IBA) and Chairman and Managing Director, Indian Bank in 2015. https://www.business-standard.com/article/finance/banks-spent-around-rs-2-000-crore-for-opening-accounts-under-jan-dhan-yojana-iba-chairman-115020300116_1.html#:~:text=The%20Pradhan%20Mantri%20Jan%2DDhan,and%20managing%20director%2C%20Indian%20Bank.

for this falls on public sector banks as they have to incur charges for opening and maintaining PMJDY accounts, which do not have the cash flows to justify that expense. It is held that governmental strictures on this do not apply to private sector banks.[12]

We rely on a number of sources for the costs incurred for opening rural and urban PMJDY accounts. Initially, INR 80 was the projected cost of opening an account, though practitioners now place it at INR 120 for an urban account, while rural accounts have considerable larger outlays.

The major outlay that has to be made in rural outreach for financial inclusion is in the form of bank mitras (BMs). The costs here are obtained from the Wave III studies undertaken by Sharma et. al (2015) of microsave.net. We focus primarily on the fixed monthly average compensation package of about INR 3000. The variable commission part for every new PMJDY account, has been placed in the range of INR 10 to INR 100 to BMs. In respect to investments of equipment, the bank mitra compensation model is a complicated one[13] and will not be covered here as this given to bank mitras in the forms of loans. To compensate banks for the bank mitra outlays for processing direct benefit transfers to rural PMJDY accounts, there are government subsidies of around 1% per value of these transactions, Bakshi et. al. (2015).[14] Finally, the cost of issuing a RuPay card has been put at INR 140.[15] [16] These costs and subsidy considerations are incorporated into bank level data for the model specifications.

We use the PMJDY website for bank level data for total beneficiaries # $Tot_{it}$ and the break down into rural ( #$Rur_{it}$) and urban beneficiaries (#$Urb_{it}$) given there for each of the years from 2014- 2017. The total account balances at the bank level Tot $Bal_{it}$, is unfortunately not broken down into their rural and urban components. As the average rural

[12] "Public-sector banks are having to incur the charges of opening and maintaining an account -- which does not have the cash flows to justify that expense. While they might have to do this as part of their social-sector-priority-sector initiatives, the same compulsions do not govern private banks," said Vishwas Utagi, vice-president, AIBEA. https://timesofindia.indiatimes.com/business/india-business/public-sector-banks-bear-brunt-of-jan-dhan-union/articleshow/63602226.cms

[13] See, http://www.microsave.net/files/pdf/PMJDY_Wave_III_Assessment_MicroSave.pdf

[14] It is interesting to note that Bakshi et. al. (2015) make the case that this subsidy is insufficient to incentivize bank mitras to process DBTs to rural accounts and hence "could potentially derail the entire financial inclusion effort."

[15] "The cost of issuance of RuPay cards alone is about Rs 100; all operational costs put together it comes to Rs 200 per year per account" – as noted by Harvinder Singh, general secretary, All India Bank Officers' Confederation, https://timesofindia.indiatimes.com/business/india-business/public-sector-banks-bear-brunt-of-jan-dhan-union/articleshow/63602226.cms

[16] Based on the Global Findex Survey as no more than 1% of PMJDY account holders or 3.1 million beneficiaries–use overdraft facilities available to them, we do not incorporate this as an explicit cost to banks in their PMJDY roll out till 2017.

bank account balances is larger than that for urban ones, we use a scale factor denoted by, $\gamma$, given by the ratio of $\#Rur_{it}/\#Tot_{it}$ adjusted for by the ratio of the rural monthly income at the poverty line of INR 816 to the INR 1,000 rupees in urban areas.[17]The latter at 0.81 adjusts for the lower average rural income while the former ratio reflects the fact that as new rural PMJDY accounts are unlikely to have another account for the same beneficiary, compared to urban ones, they are known to have higher balances and also non-zero balances (see, Gunther, 2017). The data for bank mitras ($\#BM_{it}$) for each of the years is obtained from the financial account statements of each of the PMJDY banks. We also include the ultra small units in the bank mitra figures. Finally, the PMJDY website gives the number of RuPay cards issued ($\#RuP_{it}$). [18] The full glossary of variables used in the panel regression analyses and the formulae used in their construction can be found in **Appendix 2**. The names of banks involved in the PMJDY roll out and the data for this given at the GOI PMJDY website are listed in **Appendix 1**. These include 27 Public Sector Banks, 19 Rural and Regional banks and 13 Private Sector banks.

### 3.5 Data Analysis and Panel Regression Results

We will start with a summary of the data on the PMJDY website on 21 February 2018 in **Table**1. The dominance of public sector banks in the PMJDY scheme with 251.5 million accounts, which is 80% of all accounts and also 80.1% of the total value of account balances, will be found to underpin the empirical models specified in **Section 4**. The best fit for the panel regression results have been found for this class of banks. In **Table 1**, the average PMJDY account balances stand at about INR 2400. They are highest for regional and rural banks at INR 2526 and the least for private sector banks at about INR 2197. We report the sample statistics for the bank-level variables collected from the PMJDY website and from annual bank financial accounts[19] from 2014- 2016 based on year end data in **Appendix 3**. They reflect the figures found in the snapshot **Table 1** for February 2018. .

**Table 1: PMJDY Accounts – Bank Level (**21 February 2018)

| Bank Class | Total Accounts (m) | Rural/Semi Urban (m) | Urban/Metro (m) | RuPay Cards Issued (m) | Total Balance INR (bn) | Average Balance (INR) |
|---|---|---|---|---|---|---|

[17] This is about $14 per month ($0.46 per day) in rural areas and $17 per month ($0.56 per day) in urban areas, https://en.wikipedia.org/wiki/Poverty_in_India .

[18]At present the cost for RuPay card is INR 0.40 per transaction at an ATM and INR 0. 90 at the POS. This is about one third less than the transaction cost charged by Visa, Mastercard.

[19] The annual bank financial accounts were obtained from https://www.moneycontrol.com/annual-report/allahabadbank/AB15/2014

| | | | | | | |
|---|---|---|---|---|---|---|
| Public Sector | 251.50 | 134.7 | 116.8 | 189.3 | 599.49 | 2,386 |
| Regional and Rural Banks | 50.00 | 42.2 | 7.8 | 36.5 | 126.33 | 2526,6 |
| Private Sector Banks | 9.9 | 6.0 | 3.9 | 9.2 | 21.76 | 2197 |
| Total | 311.4 | 182.5 | 128.5 | 251.1 | 747.58 | 2400 |

Source: Ministry of Finance, Government of India, PMJDY Website

**Figure 2** for 2014 provides an interesting scatter plot that informed the shape of the average PMJDY account balances curve in relation to the numbers of PMJDY accounts that banks have in **Figure 1**. We have already commented on the significance of the State Bank of India being an outlier in terms of the total number of PMJDY accounts, which at 20 million is about 4 times as large as the banks in the next tier, which have about 5 million.

**Figure 2 Public Sector Banks' Average PMJDY Account Balance (INR, Vertical Axis) vs Total Number of PMJDY Accounts (Millions, Horizontal Axis) 2014**

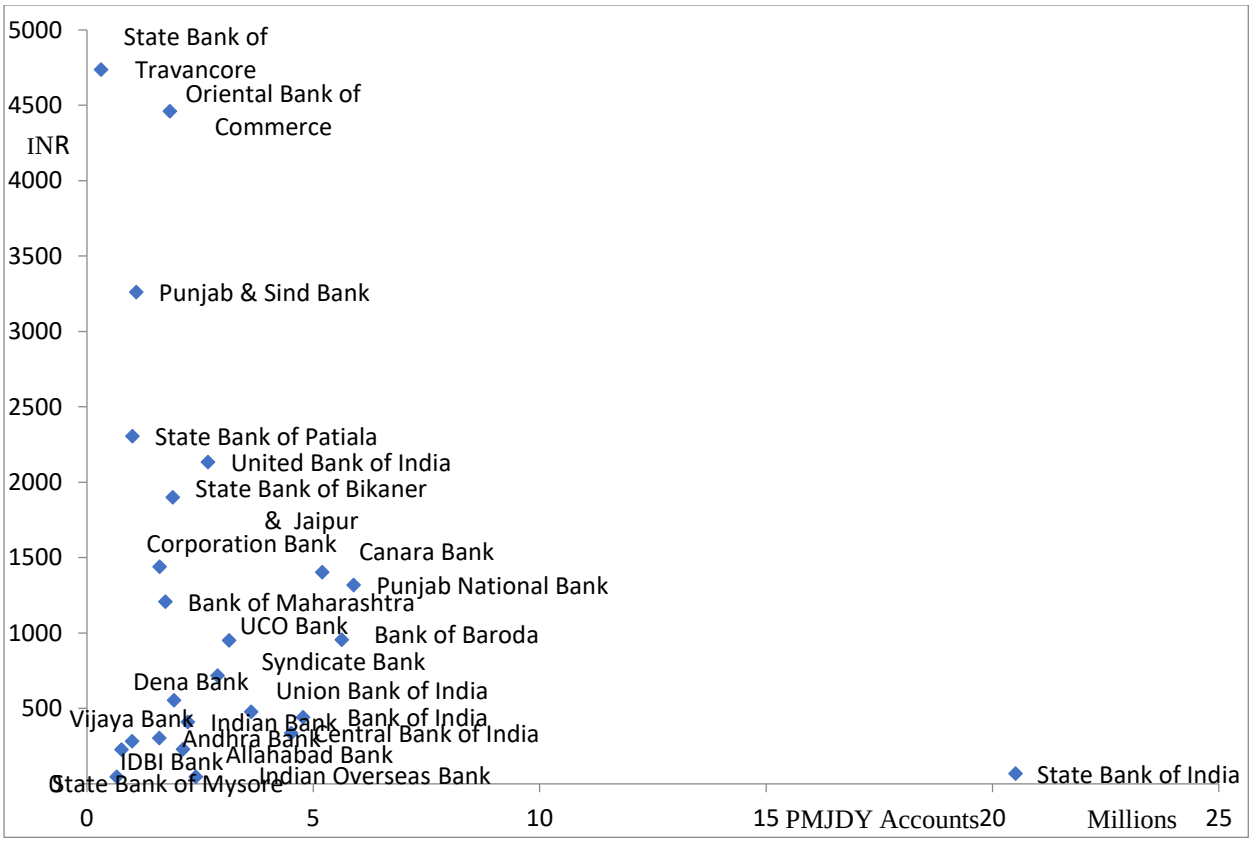



**Figure 3** gives the scatter plot that shows the changes in average PMJDY account balances for the levels of total PMJDY accounts from 2015 to 2016 for public sector

banks. What can be seen is a clear upward shift of the scatter plot for 2016 with the mean of the average PMJDY average balances growing from INR1802 in 2015 to INR 3276. The rightward shift in the scatter plot from 2015 to 2016 represents the mean number of PMJDY accounts for public sector banks rising from 6.1 million to 8.24 million (see **Appendix 3**). The outliers in **Figure 3** for 2016 and 2017 relate to State Bank of India, which recorded 75.29 million PMJDY accounts with average account balance of INR 1464 in 2016, compared to 47.86 million accounts with an average account balance of INR 757 in 2015.

**Figure 3 Public Sector Banks' Average PMJDY Account Balance (INR) vs Total Number of PMJDY Accounts (Millions): 2015 Square Series 2;2016 Diamond Series 1**

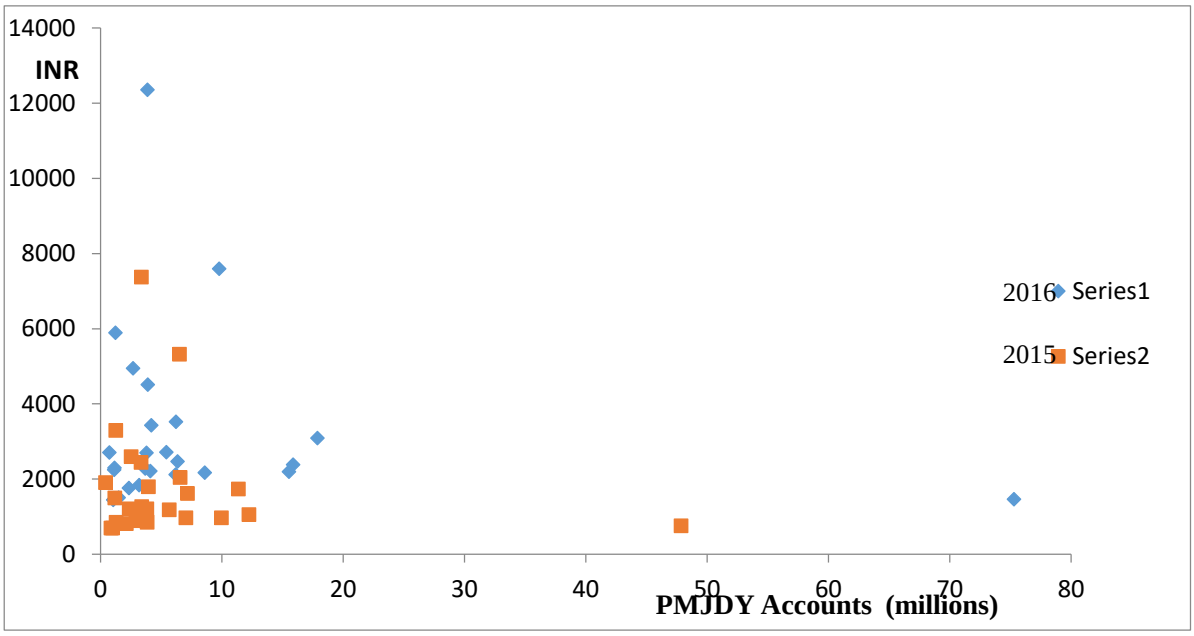



**Table 2** gives the sample statistics for the *constructed* costs averaged over total PMJDY accounts to capture the scale effects for the different bank outlays such as on RuPay cards (AvRuPC), opening urban account (AvUC), fielding bank mitras (AvBM) and also rural bank balance subsidy ($AvSub^R$). This was set out in equations (5) and (7) (see also **Appendix 2**). The average costs and subsidy will vary from bank to bank and also for each bank class. If for example there are more RuPay cards being issued as in the latter years by banks, and if the total number of PMJDY accounts grew faster, the average costs for RuPay cards, per PMJDY account for each bank, can fall. Also as private sector banks lack economies of scale from smaller number of total PMJDY accounts, they experience larger average costs. As the scale effects are evaluated in terms of the total unit of PMJDY

accounts, when we refer to this as average unit costs, the unit in question is a PMJDY account.

***Average Rural Balances Subsidy ($AvSub^R$)***

In **Table 2**, we see that for public sector banks the average rural subsidy $AvSub^R$ has grown from INR 4.99 to INR 8.37 in 2015 and this has witnessed further increase to INR15.48 million in 2016 and thereafter declined to INR 13.52 in 2017. This trend is similar for Rural and Regional banks with the average rural subsidy accrued being higher in the latter years. Private sector banks, as expected due to the smaller scale of their outreach in rural areas, receive a smaller average per unit amount of rural subsidy.

***Costs and Subsidy Sample Statistics: Table 2***

**Table 2 Summary Statistics for Cross Section of Banks for Constructed Average Costs and Subsidy (2014-2017) INR: Scale Economies from Averaging over Total PMJDY accounts**

| | | **Public Sector Banks (INR)** | | | | **Regional and Rural Banks (INR)** | | | | **Private Sector Banks (INR)** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Statistic** | **$AvSub^R$** | **AvBM** | **AvRuPC** | **AvUC** | **$AvSub^R$** | **AvBM** | **AvRuPC** | **AvUC** | **$AvSub^R$** | **AvBM** | **AvRuPC** | **AvUC** |
| **2014** | Mean | 4.91 | 36.46 | 182.57 | 61.38 | 4.21 | 160.16 | 120.19 | 19.49 | 4.41 | 6964.91 | 128.48 | 79.95 |
| | Median | 3.20 | 23.95 | 189.32 | 57.35 | 2.51 | 6.981 | 144.69 | 28.55 | 0.97 | 0 | 178.17 | 96.23 |
| | St Dev | 5.14 | 38.35 | 16.47 | 22.85 | 2.78 | 214.81 | 59.99 | 12.99 | 9.25 | 24384.44 | 80.35 | 41.57 |
| | Min | 0.12 | 0 | 136.50 | 26.90 | 0 | 0 | 0.515 | 2.46 | 0.13 | 0 | 0 | 15.33 |
| | Max | 21.32 | 133.51 | 200 | 123.65 | 9.88 | 677.46 | 199.44 | 48.83 | 33.92 | 88091.35 | 195.96 | 130.50 |
| **2015** | Mean | 8.37 | 20.29 | 178.85 | 58.01 | 9.45 | 157.02 | 148.24 | 20.12 | 4.96 | 3324.21 | 171.25 | 79.27 |
| | Median | 6.17 | 13.50 | 186.75 | 55.54 | 9.71 | 83.83 | 158.03 | 22.04 | 2.85 | 0 | 184.41 | 88.87 |
| | St Dev | 7.67 | 23.363 | 20.80 | 23.82 | 4.31 | 298.14 | 50.257 | 13.84 | 6.03 | 11381.55 | 34.44 | 41.78 |
| | Min | 1.58 | 0 | 124.56 | 23.05 | 2.46 | 0 | 0 | 1.56 | 0.37 | 0 | 96.52 | 13.42 |
| | Max | 35.61 | 97.62 | 199.71 | 125.66 | 18.83 | 1351.16 | 200 | 57.22 | 20.95 | 41158.54 | 200 | 126.94 |
| **2016** | Mean | 15.48 | 19.08 | 163.59 | 57.24 | 22.23 | 95.25 | 141.09 | 19.58 | 9.78 | 8729.71 | 179.41 | 77.66 |
| | Median | 14.04 | 18.25 | 167.30 | 55.10 | 20.62 | 79.33 | 149.09 | 21.09 | 5.75 | 0 | 188.76 | 89.25 |
| | St Dev | 11.57 | 23.59 | 27.71 | 26.04 | 10.33 | 112.22 | 39.18 | 14.32 | 11.57 | 30307.78 | 40.22 | 41.89 |
| | Min | 2.23 | 0 | 90.74 | 21.88 | 0 | 0 | 35.634 | 1.37 | 0.71 | 0 | 64.62 | 13.08 |
| | Max | 56.03 | 109.43 | 197.71 | 125.75 | 44.39 | 342.71 | 193.41 | 56.89 | 36.42 | 109536 | 236.84 | 127.27 |
| **2017** | Mean | 13.51 | 23.52 | 157.77 | 53.90 | 18.82 | 109.68 | 145.67 | 21.46 | 6.97 | 9484.20 | 175.56 | 79.79 |
| | Median | 11.46 | 18.27 | 166.14 | 54.98 | 16.43 | 86.21 | 162.63 | 21.57 | 3.12 | 0 | 184.85 | 99.83 |
| | St Dev | 10.26 | 29.78 | 37.38 | 22.21 | 7.59 | 156.06 | 43.85 | 14.24 | 9.15 | 33160.51 | 30.32 | 43.57 |
| | Min | 2.23 | 0 | 39.80 | 21.58 | 7.72 | 0 | 40.11 | 1.79 | 0.47 | 0 | 90.47 | 12.81 |
| | Max | 46.06 | 136.36 | 199.87 | 108.79 | 39.32 | 623.35 | 194.76 | 56.76 | 27.11 | 119803.2 | 200 | 127.08 |

Notes: **AvSub$^{R}$** :Average Rural Balances Subsidy; **AvBM**: Average Bank Mitra Costs ; **AvRuPC:**Average RuPay Card Costs**; AvUC:** Average Costs for Opening Urban PMJDY Accounts, see equations (5) and (7) and **Appendix 2**.

***Average Bank Mitra Costs (AvBMC)***

**Table 2** shows that the average cost of bank mitras, AvBMC, per PMJDY account for public sector banks fell from INR36.46 in 2014 to INR20.29 and INR19.08 in 2015 and 2016 respectively, and increased to INR 23.52 in 2017. For Rural and Regional Banks, the average unit bank mitra costs have been around INR160.16 in 2014 and fallen somewhat to INR95.25 in 2016 and was INR 109.68 in 2017. The greatest contrast here is with private sector banks, which experience very high average bank mitra costs of INR6964 in 2014 and growing to INR9484 in 2017 as some private sector banks (such as Yes bank and ICICI) have stepped up their investment in the rural banking infrastructure in these years without the large number of total PMJDY accounts that public sector and R&R banks have. Interestingly the standard deviation, showing the heterogeneity across the cross section of banks, is largest for the bank mitra costs and this is considerably larger for private sector implementation of the bank mitra based rural financial infrastructure.

***Average RuPay Card Costs (AvRuPC)***

The average Public Sector RuPay card unit cost was about INR182.57 in 2014 and falls to about INR163.59 in 2017. RuPay card average unit costs for Regional and Rural banks remain round the INR148.24 in the later years while Private sector banks have a higher figure of about INR 175.56 in 2016 and 2017.

***Average Costs for Opening Urban Accounts (AvUC)***

**Table 2** shows that the average public sector unit costs for opening an urban PMJDY account was around INR 60 – INR53 over the sample period. Given the lower presence of urban PMJDY accounts for Rural and Regional banks, the unit figures for urban accounts at INR 20 are half that of public sector banks. Again private sector banks having fewer total PMJDY accounts experience the highest unit cost of around INR79 for opening urban PMJDY accounts.

## 4. Panel Regression Results

### *4.1 Results for log specification for ratio of urban and rural PMJDY accounts and Profitability*

The panel regression results for the log specification based on equation (4) for the ratio of activities undertaken by banks to set up urban and rural PMJDY accounts highlight the significance of the so called pull and push factors. A specification of the panel regression with fixed effects is reported to account for heterogeneity for the given class of banks. Given the relative paucity of rural outreach by private sector banks, it is not surprising that the regression results yield the lowest R-squared at 76.6% for private sector banks, while Regional and Rural banks and public sector banks, respectively, achieve 98.78% and 98.85%. The highest R-squared for public sector banks also corresponds with better specification results in terms of signs of coefficients such as only public sector banks seem to have a positive coefficient for the rural bank subsidy. There is evidence that opening of PMJDY urban accounts has a positive and statistically significant impact on the opening of rural bank accounts for all three classes of banks. However, the actual per unit average costs of opening urban accounts have a statistically significant negative impacton rural accounts in the case of public sector and regional and rural banks. The coefficient for the unit average costs of bank mitras, AvBMC, have the required negative sign for all classes of banks, and has a sizable, but not statisticallysignificant impact only in the case of public sector banks. The cost of RuPay card issuance does not feature as an impactful variable for all classes of banks.

**Table 3 Panel Regression Results for the Log Ratio Specification for Rural (Dependent Variable) and Urban Bank Accounts and Profitability Based on Equation (4)**

Ln #Rur = f (Ln #Urb, Ln AvBal, $LnAvSub^R$, LnAvBMC, LnAvUC, Ln AvRuPC)

| | Private Banks | Public Banks | Regional Rural Banks |
|---|---|---|---|
| | Coefficient<br>(t-statistic)<br>((p-values)) | Coefficient<br>(t-statistic)<br>((p-values)) | Coefficient<br>(t-statistic)<br>((p-values)) |
| Constant | 1.548<br>(1.56)<br>((0.13)) | **10.398*****<br>**(3.59)**<br>**((0.001))** | 0.573**<br>(1.59)<br>((0.123)) |
| Ln#Urb | **1.067***<br>**(1.93)**<br>**((0.064))** | **0.713*****<br>**(28.43)**<br>**((0.000))** | **4.377*****<br>**(23.25)**<br>**((0.000))** |
| LnAvBal | 0.0001<br>(0.83)<br>((0.42)) | -0.0004<br>(-1.16)<br>((0.25)) | -0.00001<br>(-0.14)<br>((0.89)) |
| $LnAvSub^R$ | **-0.005*** | 0.006 | -0.015 |

| | | | |
|---|---|---|---|
| Average Rural subsidy | **(-1.74) ((0.09))** | (0.25) ((0.81)) | (-1.25) ((0.22)) |
| LnAvBMC: Averge Bank Mitra Cost | -0.00003 (-0.06) ((0.953)) | -0.121 (-1.29) ((0.208)) | -0.0001 (-0.02) ((0.98)) |
| LnAvUC:Average Urban Account Cost | -0.016 (-1.27) ((0.22)) | **-0.148*** (-2.85) ((0.008))** | **-0.030** (-2.13) ((0.04))** |
| LnAvRuPC AverageRuPay Card Cost | -0.0007 (-0.46) ((0.65)) | 0.003 (0.29) ((0.777)) | **0.002* (1.84) ((0.08)** |
| Fixed effect | Yes | Yes | Yes |
| Adj R2 | 76.91 | 98.85 | 98.78 |
| F-statistic | 9.09 | 179.51 | 162.78 |
| Obs | 52 | 59 | 49 |

### *4.2 Results for Estimated Per Capita PMJDY Bank Balance Shortfall/Surplus Model*

Here we report the estimation results for the economic viability model of the PMJDY accounts in terms of the scale effects given by the average size of account balances and the costs of opening and maintaining these accounts based on equation (11).

**Table 4** gives the panel regression results in the case where bank fixed effects are applied to control for heterogeneity within each class of banks (**Columns 2-4**) and across all banks in the case of the full sample of all banks (C**olumn 1**). The results show that the model specification is a good fit for all classes of banks with adjusted R-squared above 80%. The model best fits public sector banks (**Column 3**) both in terms of high adjusted R-squared of 90.93 % and also with most coefficients having the right sign and statistical significance at the 99 % confidence level and two at 95%. The latter is not the case for the class of private sector banks and Regional and Rural ones. In all cases the explanatory variable $AvSub^R$, the per PMJDY beneficiary average rural account subsidy ($0.01* \gamma * AvBal$) at 1% of balances in rural bank accounts have highly statistically significant and positive coefficients. The coefficient for the unit average costs for bank mitras, AvBMC, is again, not surprisingly, only significant for public sector and Rural and Regional banks. However, the latter has a wrong sign on it. Private sector banks have not made much investment in the rural outreach. Likewise, the coefficient for the cost of opening urban bank accounts has the correct sign only for public sector and private sector banks. The low take-up of RuPay cards implies that the coefficient (with wrong sign) is significant only for private sector banks. Thus, the impact of RuPay cards and urban bank accounts is not significant for Rural and Regional banks.

It is important to check if the coefficient estimates from the fixed effects panel regression model of economic viability of banks in the PMJDY financial inclusion scheme remain significant and free of endogeneity bias. For this, **Table 4** also reports the results from the Arellano and Bond (1991) General Method of Moments (GMM) first difference estimation, which is used to test for endogeneity problems (Baum et. al. (2003), Ullah et. al. (2020) and Schultz et. al. (2010)). In the presence of endogeneity, the statistical significance of coefficients of explanatory variables can be discounted as being biased and suffering from endogeneity effects unless they are also significant in the dynamic difference GMM specification estimation.

Firstly, the J-Statistic reported in **Table 4** for the GMM estimation shows that the null hypothesis moments conditions in the GMM are correctly specified in all cases. Note that the J-Statistic is the highest for Regional and Rural banks (**Column 4**), followed by public sector banks (**Column 3).** We find that for public sector banks, the two key average costs variables that reflect scale effects, viz the average bank mitra costs and the average costs of RuPay cards have statistically significant coefficients for both the panel regression and GMM (**Column 3**).

**Table 4. Panel Regression with Fixed Effects and Dynamic GMM Estimator Dependent Variable Per Capita PMJDY Bank for Balance Shortfall/Surplus Model of Economic Viability of Banks**

$AvBal_{it} = f\ (AvSub^{R}_{it}, AvBMC_{it}, AvUC_{it}, AvRuPC_{it})$ Panel Regression Specification

$\mathbf{\Delta}\ AvBal_{it}$ **= f(**$AvBal\ (-1), \mathbf{\Delta}\ AvSub^{R}_{it}, \mathbf{\Delta}\ AvBMC_{it}, \mathbf{\Delta}\ AvUC_{it}, \mathbf{\Delta}\ AvRuPC_{it}$) GMM Estimation; Δ is the difference operator.

| | Full Sample of All Banks Column 1 | | Private Sector Banks Column 2 | | Public Sector Banks Column 3 | | Regional Rural Banks Column 4 | |
|---|---|---|---|---|---|---|---|---|
| | Fixed effect OLS | GMM | Fixed effect OLS | GMM | Fixed effect OLS | GMM | Fixed effect OLS | GMM |
| | Coefficient (t-statistic) (p-value) | Coefficient (t-statistic) (p-value) | Coefficient (t-statistic) (p-value) | Coefficient (t-statistic) (p-value) | Coefficient (t-statistic) (p-value) | Coefficient (t-statistic) (p-value) | Coefficient (t-statistic) (p-value)) | Coefficient (t-statistic) (p-value) |
| Constant | 1308.16* (1.80) (0.07) | | 163.75 (0.10) ((0.92)) | | 2778.65** (2.41) ((0.02)) | | 636*** (0.86) ((0.395)) | |
| $AvBal_{(-1)}$ | | 0.361** (2.57) (0.01) | | -0.521*** (-6.68) ((0.000)) | | -0.273** (-2.09) ((0.045)) | | -0.204 (-1.08) ((0.297)) |
| $AvSub^{R}$ Average Rural Account Subsidy | 13.392*** (4.53) ((0.000) | 7.525* (1.79) ((0.07) | 14.893*** (3.86) ((0.001)) | 16.206*** (5.43) ((0.000)) | 18.459*** (4.80) ((0.000)) | -9.725 (-0.99) ((0.332)) | 90.976*** (5.15) ((0.000)) | 94.209*** (6.87) ((0.000)) |
| AvBMC Average Bank Mitra Cost | -0.024 (-0.29) (0.77) | -0.051*** (-3.25) ((0.00)) | -0.019 (-0.28) (0.781) | 0.002 (0.70) ((0.94)) | -137.52*** (-3.29) (0.002) | 74.676** (2.72) ((0.01)) | 11.769* (1.82) (0.080) | 12.639** (2.21) ((0.044)) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| AvUC Average Urban Account Cost | 3.359 (0.24) ((0.81)) | 12.367 (0.67) ((0.50)) | -0.384 (-0.02) ((0.985)) | -10.571 (-0.38) ((0.71)) | -42.058** (-2.29) ((0.09)) | 14.313 (0.063) ((0.54)) | 22.219 (0.79) ((0.437)) | 57.605 (1.22) ((0.243)) |
| AvRuPC AverageRuPay Card Cost | 1.299 (0.78) (0.439) | 4.246 (1.52) ((0.13)) | 5.724** (2.54) (0.02) | 9.525 (1.50) ((0.15)) | 9.631** (2.08) (0.04) | 11.676** (2.29) ((0.03)) | 1.786 (0.67) (0.508) | 7.008* (1.72) ((0.107)) |
| Fixed Effect | Yes | | Yes | | Yes | | Yes | |
| Adj $R^2$ | 81.61 | | 88.97 | | 90.93 | | 91.66 | |
| F-statistics | 15.42 | | 22.64 | | 26.74 | | 24.98 | |
| J-Statistic | | 2.18 | | 4.797 | | 1.113 | | 5.459 |
| Prob (J-stat) | | 0.336 | | 0.09 | | 0.573 | | 0.065 |
| Obs | 209 | 96 | 52 | 26 | 78 | 34 | 49 | 21 |
| | | | ***, **, * represent 1%, 5% and 10% significance levels | | | | | |

Note the J-Statistic for GMM estimation follows a chi-squared distribution with *(l-r)* degrees of freedom, where *l* is the number of moment conditions and *r* the parameters to be estimated; with H0: The moment conditions are correctly specified.

In **Table 4**, we see that Rural and Regional banks also have congruence between panel regression and GMM results signalling the robustness of the former coefficients for the average rural subsidy, the bank mitra costs and RuPay card costs. Indeed, the scale effects from the bank mitra costs can be taken to be free of endogeneity bias in the panel regression model for the economic significance of the rural outreach for public sector banks, Rural and Regional banks and for the whole bank sample. It is not surprising, given the lack of scale in their opening of PMJDY accounts, that the GMM estimator does not corroborate the robustness of the average cost economies of scale model for private sector banks (**Column 2**).

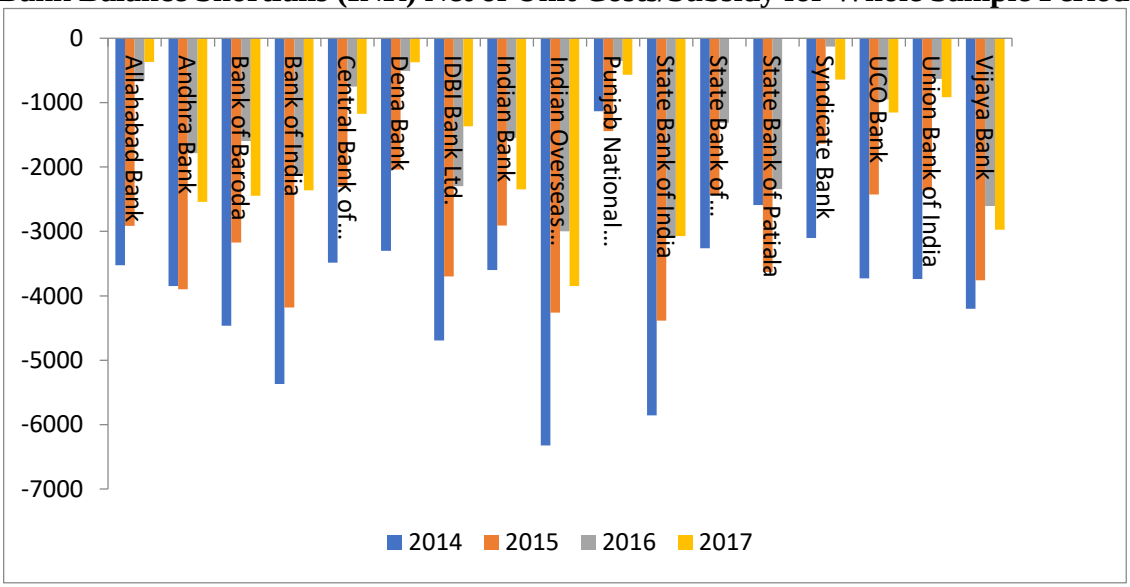
### 4.3 The Economic Viability of Financial Inclusion Drive for Public Sector Banks

Using the panel regression fixed effects coefficients from **Table 4** Column 3 for public sector banks, equation (12) yields the estimated shortfall/surplus relating to the per PMJDY average account balance and the estimated break even average account balance. This is based on the estimated net average fixed costs for every bank. This is reported in the bar charts below. [20] In **Figure 4**, we see that the majority, 17 of the 26, public sector banks suffer estimated shortfalls in terms of insufficient bank balance per PMJDY account relative to the estimated average net costs. In 2014, the negative positions were greatest for Indian Overseas Bank and State Bank of India, at around INR 6000. In particular, 8 out of the 11 public sector banks

[20] An example of the shortfall calculation is given here for the public sector bank Allahabad Bank for 2014, using the **Table 4** Panel Regression Column 3 OLS coefficients and equation (12) with unit costs/subsidy and average balance given in INR: $AvBal_{it}$ – Estimated Breakeven Average Balance $= AvBal_{it} - |+ 18.5 \times AvSub^{R}_{it} - 137.52 \times AvBMC_{it} - 42.05 \times AvUC_{it} - 9.631 \times AvRuC_{It}| = 228.22 - |+ 18.5 \times 1.027 - 137.52 \times 0.75 - 42.05 \times 43.45 - 9.631 \times 190.82| = -$ INR 3520.87. Note **Table 2** reports the average values for the subsidy and infrastructure costs for public sector banks in 2014 to be INR 4.91 **(**$AvSub^{R}_{t}$), INR 36.46 ($AvBMC_t$), INR61.38 ($AvUC_t$) and INR 182.57 ($AvRuC_t$).

that have been under the Prompt and Corrective Action of the Reserve Bank since 2017, viz.Allahabad Bank, Dena Bank, Bank of India, Central Bank of India, IDBI Bank, Indian Overseas Bank, UCO Bank, and Union Bank of India (see, Misra and Tankha, 2018), also feature in **Figure 4** as being burdened with a substantial lack of economic viability in their PMJDY operations. The remaining 3 public sector banks under Prompt and Corrective Action, Oriental Bank of Commerce, Bank of Maharashtra and the Corporation Bank as will be seen in the **Figure 5**, do post surpluses over this period with Oriental Bank of Commerce achieving large surpluses by what seems like a policy of restrictive PMJDY roll out (see, **Figure 2**). Though the State Bank of India shoulders large shortfalls on its PMJDY accounts over 2014-2017 and averaging about INR6000 in 2014, it is in the black overall when including its mainstream banking operations. It is clearly the case that the PMJDY account shortfalls are much reduced in 2016/2017.

**Figure 4 Majority (17) Public Sector Banks With Estimated Per Beneficiary PMJDY Bank Balance Shortfalls (INR) Net of Unit Costs/Subsidy for Whole Sample Period**




In **Figure 5**, we plot the 8 public sector banks which register positive estimated per beneficiary PMJDY bank balances net of unit costs/subsidy at least by 2017. Of these, Oriental Bank of Commerce and United Bank of India show surpluses in excess of INR 4000 for all of three or four years. In contrast, Bank of Maharashtra, Canara Bank, Corporation Bank, State Bank of Bikaner and Jaipur show small surpluses by 2016. State Bank of Travancore showed early promise, this seems to have been dissipated in 2015, but recovers in 2017. Punjab and Sindh Bank shows a healthy surplus of around INR 2000 by 2016.

**Figure 5: Eight (8) Public Sector Banks With Some Estimated Per Beneficiary PMJDY Bank Balance Surpluses (INR) Net of Unit Costs/Subsidy(2014-2017)**

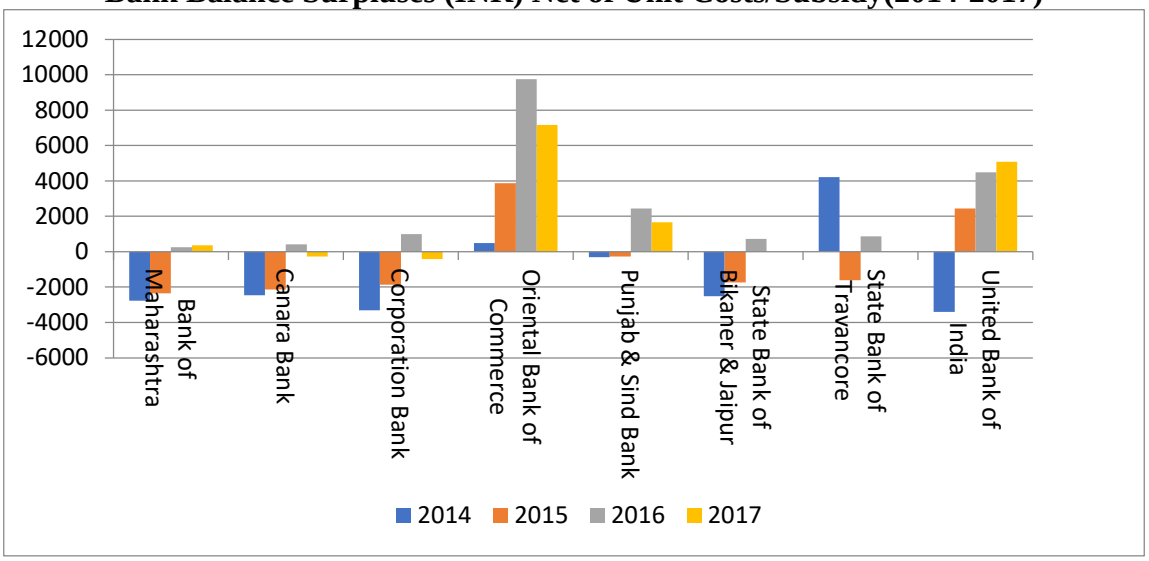
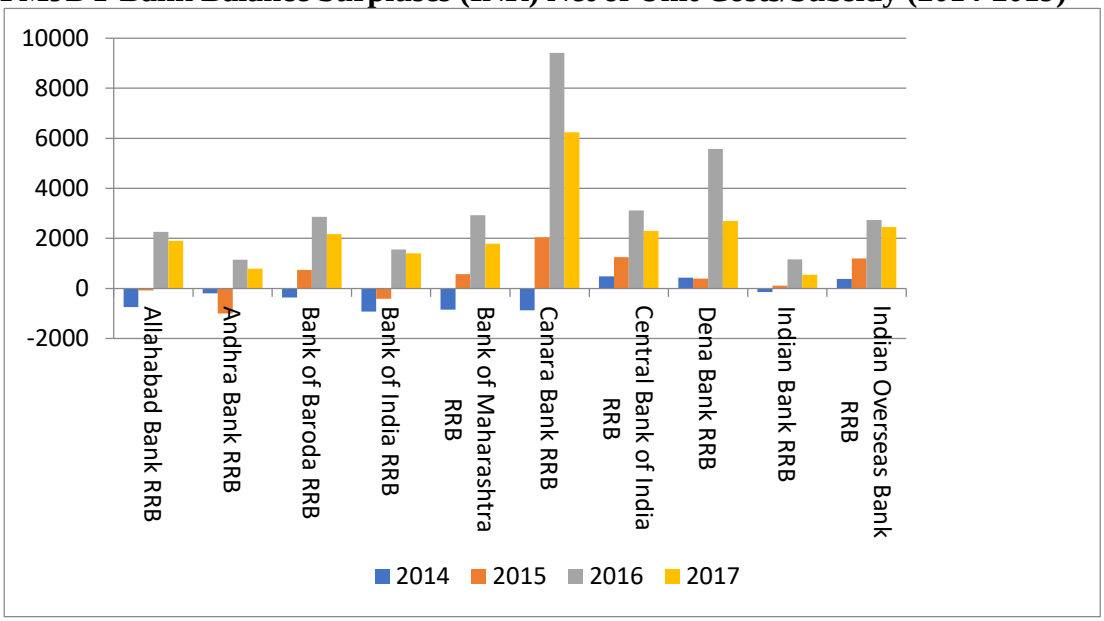


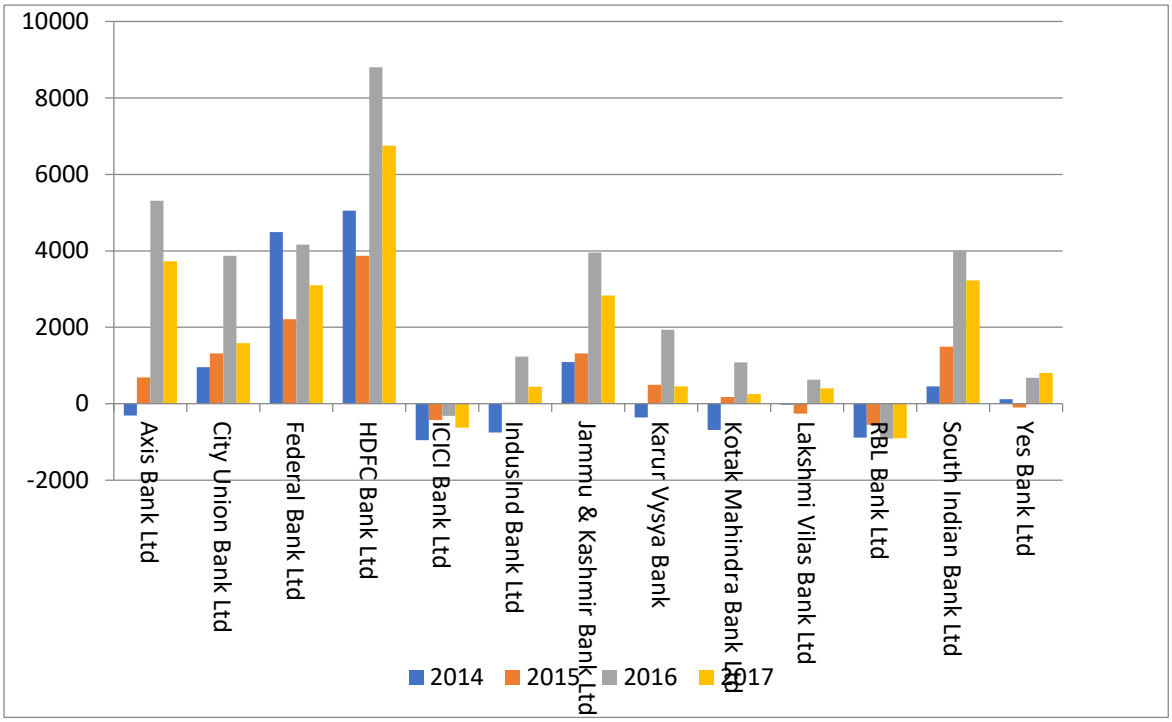

**Figure 6: 10 Rural and Regional Banks (RRBs) With Estimated Per Beneficiary PMJDY Bank Balance Surpluses (INR) Net of Unit Costs/Subsidy (2014-2019)**




In the class of Rural and Regional Banks (RRB) (**Figure 6**), which are subsidiaries of many of the public sector banks, Canara Bank RRB shows the greatest spurt in estimated surpluses of over INR8000 in 2016. It must be noted that the substantially larger coefficient for the rural subsidy variable in Table 4 contributes to the overall better sanding regarding surpluses for Rural and Regional banks than for public sector banks.

**Figure 7 Thirteen (13) Private Sector Banks With Some Estimated Per Beneficiary**

**PMJDY Bank Balance Surpluses (INR) Net of Unit Costs/Subsidy (2014-2017)**




In **Figure 7**, with the exception of ICICI Bank which suffers a small estimated shortfall in all of the 4 years, the private sector banks have done well in terms of their limited roll out of PMJDY accounts. HDFC bank enjoys the largest estimated surplus of over INR 4000 – INR 6000, followed by Federal Bank, Axis Bank, South Indian Bank and City Union Bank which have estimated surpluses of between INR 2000-INR 4000. ICICI Bank and RBL private sector banks are an exception remaining in the red from 2014-2017. However, it is interesting to note that ICICI and YES Bank which have made large rural financial services infrastructure investments, unlike those that have not, are also the private sector banks that have yet to recoup their outlay costs.

### 4. 3. Estimated Total Shortfall/ Surplus and Index for Target Shortfall for PMJDY

In this section, we will first answer the *what cost* to public sector banks question and give estimates for the total shortfalls suffered by this class of banks for the sample period. For this we use the estimated per PMJDY account for bank-level shortfalls given in **Section 4.2** for public sector banks and take an average of this over the banks that suffered shortfalls to give the average per PMJDY account shortfall for this sector.[21] The estimated total shortfalls

[21] The per PMJDY estimated shortfall for each of the public sector banks that registered negative positions in 2015 when summed up gave INR80982 (for 24 banks) in 2014; INR 61427.9 (for 23 banks) in 2015; INR25648.2 (16 banks) in 2016; INR 28984 (for 19 banks) in 2017. The averages per PMJDY account for public sector banks suffering shortfalls are given in row 1 of **Table** 5.

reported in the final row of **Table 5** is the product of the average per PMJDY account shortfall amount and the mean number of PMJDY accounts for public sector banks (see **Appendix 3**).

**Table 5: Estimated Total Shortfall in PMJDY Accounts of Public Sector Banks (INR)**

| | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|
| Average Estimated Per PMJDY Account Shortfall for Public Sector Banks (INR) | 3,374.25 | 2670.9 | 1603 | 1525.47 |
| Average number of PMJDY Accounts per bank (mn)(See **Appendix 3**) | 3.24 | 6.10 | 8.24 | 10.21 |
| Estimated Total Shortfalls ( INR mn) | 10,932.57 | 16,292.49 | 13,208.72 | 15,575.04 |

Note the values in the last row above for the Estimated Total Shortfalls for Public Sector Banks is obtained by multiplying the numbers in row 1 and row 2.

We find some interesting results from **Table 5**. There is a decline in the per PMJDY account balance shortfalls in **Table 5.** However, as the number of PMJDY accounts that need to be serviced increase considerably over this period, the total shortfall to public sector banks are estimated at about at INR10.93 bn in 2014, rising to INT16.29 bn in 2015, falling somewhat in 2016 to INR13.2 bn in 2016, only to rise again to INR15.57 bn in 2017.

We saw in the previous section and in **Table 5** the extent to which public sector banks bear the brunt of the costs of the PMJDY roll out in periods when zero and low balance accounts were the norm. This resulted in a majority of public sector banks (see **Figures 4 and 5**) with estimated average bank level shortfalls in **Section 4.2**. We use the latter variable taken to be positive[22], and expressed as a ratio of actual average bank account balance, normalized (by dividing by 100) in order to get a simple index between 0 and 1. Note, 0 is the case when banks breakeven. The index for estimated shortfall is denoted as $I(ES_{it})$ with

$$I(ES_{it}) = [ES_{it} / AvBal_{it}]/100 \text{ , } I(ES_{it}) \in (0, 1). \quad (13)$$

We aim to estimate the extent to which exogenous factors such as G2P payments linked to the PMJDY accounts are compensating for the net average unit costs of maintaining these

[22]Average surplus balance bank accounts are truncated at 0.

accounts as the roll out comes to maturity and public sector banks fully meet their PMJDY targets. For the latter we construct another simple index that can quantify the extent to which each public sector bank is meeting the maximum number of accounts in the target Subservice Areas(SSAs) assigned to the 26 public sector banks in the Annex 5 of the PMJDY GOI (2014). For this we multiply the bank-wise SSA targets by the maximum 1500 households in a SSA and adjusted for a minimum of 2 adults per household to get the target PMJDY accounts to be opened. The latter is denoted by $Tar_{it}$ and the bank-wise PMJDY accounts ($\#Tot_{it}$) is expressed as a ratio of $Tar_{it}$, and denoted as:

$$I(Tar_{it}) = Av\ \#Tot_{it}/Tar_{it} \text{ with } I(Tar_{it}) \in (0, 1). \quad (14)$$

$I(Tar_{it})$ gives a simple index that measures the extent to which the target PMJDY account numbers are met with 1 being the case that they are fully met. We run a panel regression with fixed effects for the public sector banks for 2014-2017 with the following specification

$$\mathbf{I(ES)} = \text{Constant} + b\mathbf{I(Tar)} + \boldsymbol{\varepsilon}. \quad (16)$$

The bold font indicates the vector notation for the panel data. The estimation results given in **Table 6** reveal that the coefficient on **I(Tar)** is around negative 25%, and is statistically significant at the 5% level. This indicates that as more PMJDY account target numbers are being met, the smaller the shortfall of PMJDY account balances for public sector banks. This implies that public sector banks that are able to meet their account target numbers tend to witness smaller shortfall in PMJDY account balances.

As it is beyond the scope of this paper to fully specify the exogenous DBT payments to PMJDY accounts at bank level, we rely on the above regression to quantify the extent to which our estimated shortfall variable falls as account targets are met. As indicated in **Table 5**, the estimated shortfalls for years going forward has a downward trajectory but can be projected to be kinked.

**Table 6. Panel Regression With Fixed Effects for Impact of 'account number targets' I(Tar) on 'estimated shortfall in account balances'I(ES)** (Dependent Variable):2014-2017

| | Coefficient<br>(t-statistic) | p-value |
|---|---|---|
| Constant | 0.0169*** | 0.001 |
| **I(Tar)** | -0.250**<br>(-2.63) | 0.0103 |

| | | |
|---|---|---|
| R-square | 29.91 | |
| Observations | 100 | |
| T-statistics are reported in parenthesis. ***, **, * represent 1%, 5% and 10% significance levels, respectively.<br>Periods 4; Cross section 25; Total Observations 100 | | |

As can be seen in **Appendix 4**, the data for the size of DBT payments shows a marked kink with a steeper growth trajectory precisely at about 2017. Hence, the 25% reduction in PMJDY average account shortfalls that follows from the regression result in **Table 6** for 1% improvement in meeting PMJDY account targets may be valid for the period before the electronic bank transfers for G2P payments took off. The latter can be expected to increase the absolute size of the coefficient in the regression relation currently at about -25% and thereby mitigate the account balance shortfalls borne by PMJDY banks sooner.

## 5. Conclusion

We explicitly identify the so called double bind problem that banks involved in financial inclusion initiatives face. Banks struggle to achieve scale economies to drive down average fixed financial infrastructure costs for the poor when the compensation from the latter is little or non-existent, Beck and de le Torre (2006). The intrinsic loss making aspects of providing financial services for low income customers have been known to result in poor service (Das, 2017 and Sriram, 2011), calling into question their viability as a vehicle for poverty reduction. The methodology developed in **Section 3.2** and illustrated in **Figure 1** for the quantification of the funding gap that opens up in financial inclusion schemes is one that needs to be adopted explicitly when designing such schemes. Further, these problems are exacerbated during conditions of financial fragility and/or can be the cause of financial instability (Collard and Kempson (2005), Rajan (2010) and Khan (2012)). Against the background of the financial fragility of Indian banks, we argue that it is important to identify and quantify the account balance shortfalls to estimate the speed with which public sector banks are likely to move into surplus for PMJDY accounts as the direct benefit transfer G2P trend strengthens.

While there is a large and growing literature on the demand side and financial literacy barriers to financial inclusion, few studies have focussed on the question of: *at what cost*? With banks unable to levy bank charges on no frills accounts and low balances in these

accounts, there are considerable costs to suppliers of financial services for the poor, with public sector banks bearing the brunt of this as is the case in India. In **Section 3.2** and illustrated in **Figure 1**, we develop an empirical specification to measure the economic viability for banks involved in PMJDY style universal provision of basic accounts that is based on the average fixed cost model. The latter captures the economies of scale problem in that average costs are driven down by increasing the number of low income customers. However, the incentive to increase scale is limited as average bank account balances are likely to fall when the scale increases. By specifying an estimation for a breakeven condition as one where the estimated average breakeven account balances equal the estimated average net costs, we have provided an empirical specification that can estimate the expected total shortfalls/surplus in PMJDY accounts using cross sectional bank level data on average cost outlays and account balances. For the public sector banks as whole, we find this to be around INR10 billion in 2014 and rising to INR 15 bn in 2017. This is despite the case that per account shortfalls are decreasing. Our cost estimates can be considered to be on the low side, especially for bank mitras, as we consider a bank mitra monthly wage to be at the lower end at INR3000 and we overlook other investments required for the last mile drive. Further, we found that eight of the eleven public sector banks in India under Prompt and Corrective Action since 2016 have suffered PMJDY account shortfalls from 2014-2017.

It is undoubtedly the case that DBT payments to PMJDY accounts will accelerate. As PMJDY account numbers grow, the results in **Table 6** in **Section 4.3** show that total costs to banks for PMJDY roll out may grow before they fall. Further, costs that are omitted in our model include bank overdrafts, which are very low at less than 1% of all PMJDY accounts currently, but will increase going forward. The tens of billions in INR outlays are not without economic consequences for the Indian public sector banks, which have considerable non-performing loans. Future work will aim to study the implications that PMJDY account balance surpluses/shortfalls have for the overall lending capabilities of banks. Our statistically significant estimated value for the coefficient of around 25% in **Table 6** is for the rate at which the PMJDY account shortfalls are mitigated as public sector banks achieve their full target for low income customers. The estimated per bank average shortfall is found to be around INR1525 (**Table 5**) for 2017. This implies at least a 4 year period before public sector banks move into PMJDY account surplus. While there will be some acceleration in the flow of DBT G2P transfers to PMJDY accounts (see Figure in **Appendix** 4), costs of overdrafts, RuPay cards and also commissions for bank mitras can be projected to grow.

It is clear that Indian private sector banks have to date, by and large, kept away from providing financial services to the poor. However, there is evidence, see **Section 4.2**, that private sector banks such as ICICI and YES bank are making costly investments in ICT based financial infrastructure for the rural population. This aims to capitalize on the prospect that the economic potential of rural India can be unlocked and as average incomes grow in rural areas, this becomes profitable sooner than later. As the size of PMJDY deposits are constrained by low incomes, it is not surprising that they constitute less than 1% (approximately 0.67% ) of the size of mainstream demand and time deposits in scheduled commercial banks (which include private sector, public sector and rural and regional banks) of over INR107.58 Trillion in 2016-2017[23]. By design, PMJDY with its link up with the fiscal social security budget of the Government of India is likely to give a jump start to bridging this gap between mainstream banking and PMJDY bank accounts.

[23] https://rbi.org.in/SCRIPTs/PublicationsView.aspx?id=17823

**Appendix 1: List of Banks Included in PMJDY (Source)**

| Public Sector Banks (27) | Rural and Regional Bank (19) | Private Sector Banks (13) |
|---|---|---|
| Allahabad Bank | Allahabad Bank RRB | Axis Bank Ltd |
| Andhra Bank | Andhra Bank RRB | City Union Bank Ltd |
| Bank of Baroda | Bank of Baroda RRB | Federal Bank Ltd |
| Bank of India | Bank of India RRB | HDFC Bank Ltd |
| Bank of Maharashtra | Bank of Maharashtra RRB | ICICI Bank Ltd |
| Canara Bank | Canara Bank RRB | IndusInd Bank Ltd |
| Central Bank of India | Central Bank of India RRB | Jammu & Kashmir Bank Ltd |
| Corporation Bank | Dena Bank RRB | KarurVysya Bank |
| Dena Bank | Indian Bank RRB | Kotak Mahindra Bank Ltd |
| IDBI Bank Ltd. | Indian Overseas Bank RRB | Lakshmi Vilas Bank Ltd |
| Indian Bank | Jammu & Kashmir Bank Ltd RRB | RBL Bank Ltd |
| Indian Overseas Bank | Punjab & Sind Bank RRB | South Indian Bank Ltd |
| Oriental Bank of Commerce | Punjab National Bank RRB | Yes Bank Ltd |
| Punjab & Sind Bank | State Bank of Bikaner & Jaipur RRB | |
| Punjab National Bank | State Bank of India RRB | |
| State Bank of Bikaner & Jaipur | State Bank of Mysore RRB | |
| State Bank of India | State Bank of Patiala RRB | |
| State Bank of Mysore | Syndicate Bank RRB | |
| State Bank of Patiala | UCO Bank RRB | |
| State Bank of Travancore | Union Bank of India RRB | |
| Syndicate Bank | United Bank of India RRB | |
| UCO Bank | | |
| Union Bank of India | | |
| United Bank of India | | |
| Vijaya Bank | | |

Note the shaded Public Sector Banks are those that also have Regional and Rural Banks as Subsidiaries while the private sector bank Jammu and Kashmir Bank Ltd is the only one that has a Regional Rural bank as a subsidiary.

**Appendix 2: Glossary of terms, the formulae for the construction of variables used and their acronyms.**

$\#Rur_{it}$ = Number of Rural beneficiary bank i (Source, GOIPMJDY website

$\#Urb_{it}$ = Number of Urban beneficiary (Source, GOI PMJDY website)

$\#\ Tot_{it} = \#Rur_{it} + \#Urb_{it}$: Number of total PMJDY beneficiary bank i (Source, GOI PMJDY website).

$TotBal_{it} = Bal^{R}_{it} + Bal^{U}_{it}$ (INR millions)

$AvBal_{it} = TotBal_{it} / \#\ Tot_{it}$

$Bal^{R}_{it} = \gamma\ xTotBal_{it} = [\ (\#Rur_{it}/\#Tot_{it})\ x\ 0.81]\ xTotBal_{it}$

$\#BM_{it}$: Number of bank mitras and ultra small rural branches (Source, Bank Annual Financial Accounts)

$\#RuP_{it}$: Number of Rupay Cards (Source, GOI PMJDY website)

The per unit ($\#\ Tot_{it}$) PMJDY account balances, costs and subsidies are calculated as follows at the bank level:

$AvBal_{it}$: Average unit total PMJDY account balance: Tot $Bal_{it}$ / $\#Tot_{it}$.

$AvSub^{R}_{it}$:Per PMJDY beneficiary rural account subsidy ($0.01^{*}\ \gamma\ *AvBal$)

$AvBMC_{it}$:Per PMJDY beneficiary cost for bank mitra (($\#BM_{it}$ *36,000 per annum)/$\#Tot_{it}$))

$AvUC_{it}$ : Per PMJDY beneficiary cost of opening urban account (($\#Urb_{it}$@ Rs 140)) / $\#\ Tot_{it}$)

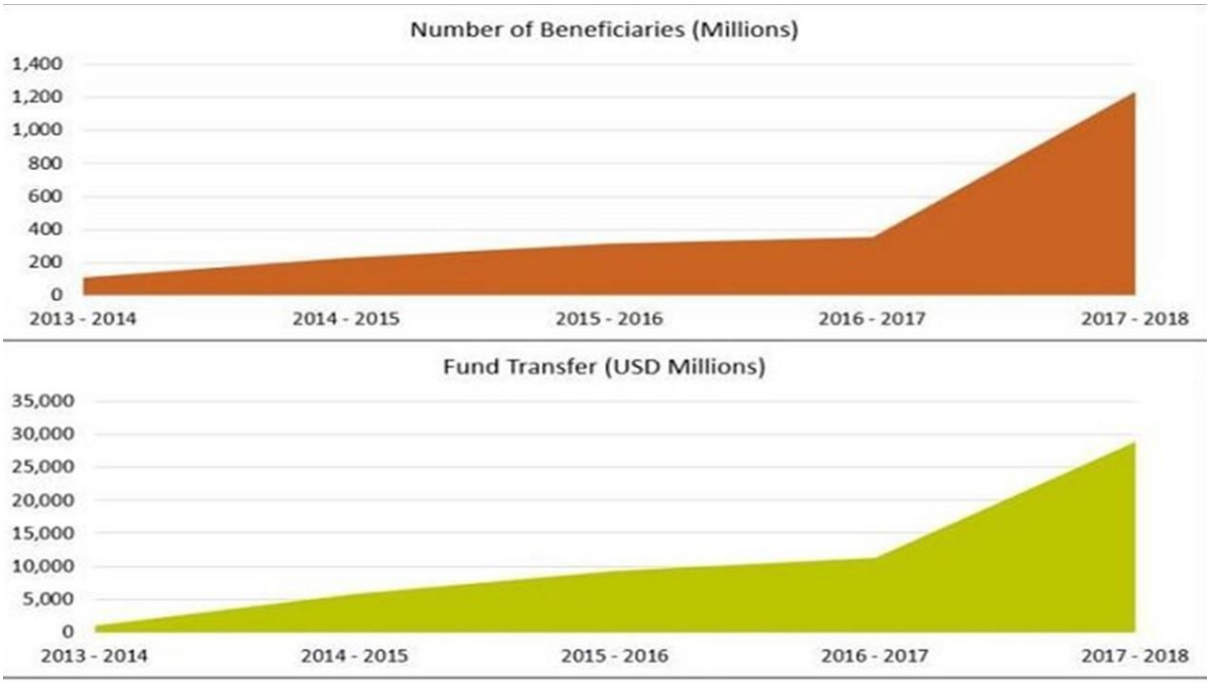
$AvRuC_{it}$ :Per PMJDY beneficiary cost of Rupay card ( (($\#RuP_{it}$@ Rs200)/ $\#\ Tot_{it}$)).

Note, when the subscript i is absent for variables prefixed Av, then they denote the average for the class of banks. The figures for this are reported in **Table 2**.

**Appendix 3**: Cross Sectional Sample Statistics for Publicly Available Data on PMJDY Accounts **(NB- #Rur: Number of Rural PMJDY Accounts; #Urb: Number of Urban PMJDY Accounts)**

| | | Public Sector Banks | | | | | | Regional and Rural Banks | | | | | | Private Sector Banks | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | #Rur (mn) | #Urb (mn) | #Tot (mn) | TotBal (INRmn) | #RuP (mn) | AvBalTot (INR) | #Rur (mn) | #RUrb (mn) | #Tot (mn) | TotBal (INRmn) | #RuP (mn) | AvBalTot (INR) | #Rur (mn) | #RUrb (mn) | #Tot (mn) | TotBal (INRmn) | #RuP (mn) | AvBalTot (INR) |
| 2014 | Mean | 1.77 | 1.46 | 3.24 | 2599.56 | 2.84 | 1208.18 | 0.76 | 0.13 | 0.89 | 633.89 | 0.46 | 624.53 | 0.11 | 0.11 | 0.22 | 383.88 | 0.19 | 1058.51 |
| | Median | 1.24 | 0.81 | 2.12 | 2071.58 | 2.02 | 717.015 | 0.41 | 0.064 | 0.54 | 279.97 | 0.26 | 604.32 | 0.02 | 0.05 | 0.08 | 35.66 | 0.09 | 406.49 |
| | St Dev | 1.77 | 2.34 | 3.93 | 2438.66 | 3.15 | 1303.88 | 0.54 | 0.14 | 0.69 | 716.718 | 0.53 | 357.54 | 0.17 | 0.15 | 0.25 | 818.75 | 0.24 | 1636.55 |
| | Min | 0.04 | 0.16 | 0.31 | 30.30 | 0.31 | 45.8504 | 0.01 | 0.001 | 0.01 | 4.22 | 0.001 | 35.87 | 0.003 | 0.002 | 0.01 | 1.56 | 0.01 | 58.02 |
| | Max | 8.34 | 12.16 | 20.51 | 8160.01 | 16.36 | 4735.89 | 2.75 | 0.47 | 3.23 | 2498.16 | 1.59 | 1460.38 | 0.52 | 0.61 | 0.76 | 2908.95 | 0.74 | 5391.72 |
| 2015 | Mean | 3.40 | 2.69 | 6.10 | 9114.97 | 5.33 | 1803.47 | 1.42 | 0.23 | 1.66 | 2298.36 | 1.26 | 1361.88 | 0.33 | 0.22 | 0.56 | 896.18 | 0.51 | 1302.67 |
| | Median | 2.02 | 1.26 | 3.419 | 6639.69 | 3.33 | 1213.14 | 0.32 | 0.08 | 0.51 | 646.689 | 0.45 | 1228.21 | 0.05 | 0.09 | 0.18 | 135.51 | 0.14 | 945.12 |
| | St Dev | 4.21 | 5.35 | 9.29 | 9971.20 | 7.78 | 1547.03 | 1.61 | 0.29 | 1.83 | 2666.35 | 1.26 | 622.30 | 0.65 | 0.32 | 0.76 | 1402.36 | 0.73 | 908.34 |
| | Min | 0.04 | 0.21 | 0.44 | 617.73 | 0.30 | 695.84 | 0.01 | 0.001 | 0.02 | 20.09 | 0.01 | 395.56 | 0.007 | 0.01 | 0.01 | 12.4 | 0.01 | 493.99 |
| | Max | 20.52 | 27.34 | 47.86 | 36241.38 | 40.01 | 7376.88 | 5.48 | 0.93 | 6.42 | 7792.14 | 3.86 | 2759.73 | 2.25 | 1.24 | 2.58 | 4765.47 | 2.48 | 3165.54 |
| 2016 | Mean | 4.60 | 3.64 | 8.24 | 21873.24 | 6.52 | 3276.76 | 1.78 | 0.28 | 2.06 | 6407.18 | 1.54 | 3422.33 | 0.39 | 0.25 | 0.65 | 2016.77 | 0.63 | 2690.77 |
| | Median | 2.81 | 1.36 | 3.91 | 13421.86 | 3.65 | 2388.61 | 0.89 | 0.10 | 1.06 | 3319.66 | 0.74 | 3128.47 | 0.06 | 0.11 | 0.21 | 466.58 | 0.16 | 1747.86 |
| | St Dev | 6.92 | 8.10 | 14.75 | 26058.06 | 10.45 | 2387.21 | 2.02 | 0.34 | 2.25 | 6185.56 | 1.73 | 1437.72 | 0.80 | 0.36 | 0.91 | 3169.95 | 0.91 | 1930.18 |
| | Min | 0.07 | 0.22 | 0.76 | 1536.91 | 0.38 | 1448.40 | 0.01 | 0.001 | 0.01 | 267.08 | 0.01 | 1676.47 | 0.01 | 0.01 | 0.01 | 22.31 | 0.01 | 234.06 |
| | Max | 34.48 | 40.81 | 75.29 | 110293.31 | 51.91 | 12356.59 | 7.08 | 1.06 | 7.28 | 19920.66 | 6.24 | 6856.48 | 2.88 | 1.36 | 3.23 | 10954.75 | 3.17 | 6351.35 |
| 2017 | Mean | 5.46 | 4.75 | 10.21 | 23794.57 | 7.69 | 2888.92 | 2.11 | 0.37 | 2.49 | 6116.61 | 1.81 | 2749.27 | 0.46 | 0.29 | 0.75 | 1646.19 | 0.71 | 1903.74 |
| | Median | 3.05 | 1.46 | 4.38 | 12754.66 | 3.76 | 2296.52 | 0.98 | 0.12 | 1.08 | 2829.72 | 0.76 | 2402.11 | 0.05 | 0.13 | 0.21 | 282.04 | 0.18 | 1649.94 |
| | St Dev | 8.88 | 12.03 | 20.60 | 34443.01 | 14.12 | 2107.93 | 2.78 | 0.54 | 3.21 | 7221.90 | 2.11 | 1132.89 | 0.97 | 0.39 | 1.12 | 2589.91 | 1.12 | 1461.42 |
| | Min | 0.07 | 0.22 | 0.76 | 1536.91 | 0.38 | 1273.003 | 0.01 | 0.001 | 0.02 | 29.33 | 0.01 | 1249.81 | 0.01 | 0.01 | 0.01 | 21.93 | 0.01 | 231.38 |
| | Max | 44.38 | 60.65 | 105.04 | 152798.32 | 70.31 | 10037.02 | 10.68 | 2.16 | 12.85 | 27247.97 | 6.67 | 4915.81 | 3.45 | 1.44 | 4.01 | 8547.57 | 4.01 | 4824.51 |

**Appendix 4: Number of Direct Benefit Transfer Beneficiaries and DBT Value**




**Source :https://dbtbharat.gov.in.**

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