

# **Banking the Unbanked: What do 255 Million New Bank Accounts Reveal about Financial Access?**

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## **Abstract**

In this ongoing study, we use the largest financial inclusion program in the world to study the role of financial inclusion on the unbanked and the real economy. Using administrative account level micro data, we find that the program led to 255 million new bank account openings in India (as of November 2016). About 77% of the new accounts maintain a positive balance and usage increases over time with inward and outward remittances being the most common transaction performed by the individuals. While the average usage remains initially quite infrequent, the usage patterns under the program gradually converge over time to those of similar households who had prior access to formal banking products. This evidence is consistent with learning by individuals that results in an increase in usage over time as they gain familiarity with banking services. Exploiting regional variation in ex-ante financial access, we find an increase in lending and defaults on new loans in regions with low ex-ante access to banking services. These results are consistent with banks catering to the new demand for formal banking credit by previously unbanked borrowers.

Keywords: Banking, Financial Inclusion, Financial Literacy, Big Data, Financial Access, Savings, Spending, Debit Card, Consumer Finance, Household Finance

JLE Codes: C93; D14; G21; O16; O12

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## I. Introduction

There is a big debate about the role of financial markets and products in shaping consumer welfare and real economic activity.<sup>1</sup> In developed economies, such as the U.S., there is an increasing discussion that financial sector may have become inefficiently large and products offered to households may have become excessively complex.<sup>2</sup> In contrast, in many developing countries, there has been a significant push to increase the usage of financial products – to “complete” the market (Beck et al (2008)). While there are several studies that evaluate the real effects of access to finance for firms, lack of data has meant there is limited evidence on how access to formal financial products impacts households (Dupas et al. (2016)). This paper takes a step in this direction by using micro and regional data to evaluate household usage of banking services and lending patterns around the largest financial inclusion program in the world.

Our paper studies the Pradhan Mantri Jan Dhan Yojna (“JDY”) launched in India on August 28, 2014. JDY was the world’s largest financial inclusion program, with the aim to provide access to banking services for all unbanked households in India. It provided convenient access to saving accounts through a debit card and mobile banking.<sup>3</sup> Our study has two modest objectives. First, we document the initial uptake (extensive margin) and subsequent usage (intensive margin) of banking services -- that includes a savings account, overdraft facilities, and insurance benefits -- by the unbanked targeted by the program. We compare the usage patterns of banking services of households who got access to banking under JDY with similar households who already had access to banking services before the program. Second, we exploit the regional variation in ex-ante financial access to explore how expanding access to financial services is related to broader outcomes such as GDP growth, lending, consumption expenditure, retail commodity prices and house prices. Our analysis here compares relative changes in economic outcomes in regions with greater exposure to financial access to those with lower exposure around program implementation.

Financial inclusion programs can directly benefit the lower income households at the micro level through savings, spending, and reduction in transaction costs. First, access to a bank account allows consumers to earn interest on their savings and provides incentives to save

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<sup>1</sup> More than 60 countries have adopted financial inclusion as one of the key reform agendas. Financial inclusion is a key aspect of several of the United Nations sustainable development goals (2014). This thrust is driven by the fact that a large section of the population all over the world lack financial access. Approximately two billion adults all over the world do not have access to finance. Of those who have access, approximately 40% actually use it. In India alone, there were approximately 450 million unbanked adults as of 2013 ([http://rbi.org.in/Scripts/BS\\_SpeechesView.aspx?Id=827](http://rbi.org.in/Scripts/BS_SpeechesView.aspx?Id=827) [accessed on January 8<sup>th</sup>, 2016]).

<sup>2</sup> See for example Greenwood and Scharfstein (2013) and Philippon (2015).

<sup>3</sup> Easier access is important in developing countries where formal access to bank branches may be costly due to larger distances and lack of proper infrastructure. Similar to earlier work on phone banking services for the unbanked, debit cards provides for easier access through unmanned ATMs and kiosks

more. Second, savings in the bank account could help circumvent behavioral biases that would otherwise have caused them to spend this money (Benartzi and Thaler (2004), Ashraf et al (2006)). Finally, allowing access to a bank account reduces transaction costs of transferring money to family for subsistence and saving needs. These benefits to households notwithstanding, banks may not supply this service to such households -- in absence of a financial inclusion initiative like JDY -- for profitability reasons.

Financial inclusion can also have broader regional implications through at least two channels. First, such a program could allow new capital to come into the formal banking system by means of new deposits, relaxing the capital constraints. This would allow banks to increase lending to their clients. Second, information asymmetry between new customers and lenders or other costs in acquiring new customers may imply that a program like JDY may allow banks to meet the unmet demand for credit for some households. To the extent that this increase in credit is large, one would see such programs stimulating local economic growth through increased consumption, investments, and employment.

Our micro level analysis relies on proprietary micro level data on a random sample of approximately 1.5 million accounts opened under JDY during August 2014 to May 2015 by one of the largest banks in India. This allows us to capture the usage of banking services during the first ten months of the program.<sup>4</sup> This bank is one of the largest Indian banks based on deposit and lending base. In addition, we obtain data from the same bank on two distinct comparison groups: (i) around 50 thousand regular accounts of individuals similar to JDY households opened during the same period (“non-JDY” accounts) and, for robustness, (ii) around 1 million accounts for low-income individuals -- with similar demographic profile like JDY households – opened just prior to the program and tracked over the same time period (“pre-JDY” accounts). This dataset provides us with precise account level information on monthly account balance, withdrawal, deposit, inward and outward remittance transactions, along with demographic information on the consumers. We also supplement this data with regional and aggregate statistics provided by the central bank, which is available to us over a longer time period (till November 2016).

We begin by documenting substantial outreach of the program (i.e., the extensive margin). In particular, the program led to a large increase in the number of households having access to the formal banking services. The number of accounts steadily increased at a rate of 14% new accounts per month since the start of the program. As of Nov 11, 2016 we find 255 million new accounts and 190 million debit cards issued under JDY. Moreover, 77% of the accounts maintain some positive balance. These facts are consistent with those obtained by using the micro data from our bank and extrapolating the estimates to national level over the

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<sup>4</sup> We are currently extending our data to capture a longer program history.

longer horizon. We also find that the average monthly balance maintained in JDY accounts is INR 482 (USD 7)<sup>5</sup> or about 60% of the rural poverty line in India.

Along the intensive margin, we find that approximately 81% of the new consumers do not deposit any money after account opening in the first six months since the account opening. About 12% of individuals perform one deposit transaction while only 7% perform two or more deposit transactions. The statistics are qualitatively similar for cash withdrawals, with approximately 87% of the sample not withdrawing any cash after opening the account, about 5% withdrawing cash only once and 8% withdrawing cash two or more times.

In terms of types of transactions done by households banked under JDY, inward and outward remittances are the most common transactions. Approximately 34% (21%) of individuals receive (send) money in their account via inward (outward) remittance during the first six months since the account opening. Examining the frequency of transactions, we find that 17% (15%) of individuals receive inward remittance only once during our sample period, while about 17% (8%) receive (send) remittance two or more times. The percentage of heavy users performing such transactions – i.e., those performing such transactions more than once a month -- is extremely low at less than 1%.

Overall, our micro-evidence suggests that there was substantial uptake by households under JDY. Moreover, both savings and transactions go up over time for individuals that are banked under the program. This evidence is consistent with learning by individuals that results in an increase in usage over time as they gain familiarity with banking services. The initial usage is quite infrequent and concentrated among a subset of the consumers with stronger intensity among married account holders. However, the usage patterns under the program gradually converge over time to those of similar individuals who were banked outside the program. Our estimates suggest this convergence occurs within six to twelve months since an account opens. We note that these micro effects are established using a limited time series. Thus, longer time series data is needed to evaluate the long-run validity of these facts.

Next, we exploit spatial (regional) variation in implementation of this program to investigate how access to consumer savings accounts is related to broader economic outcomes such as lending and local GDP growth. To do this, we construct four ex-ante measures of JDY program exposure: (i) number of adults per unit bank branch in a region – this captures the extent of bank branch penetration, (ii) fraction of bank branches owned by state-owned banks in a region -- since privately owned banks are more likely to open branches in higher income areas with greater financial inclusion, (iii) fraction of unbanked households in a region – this

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<sup>5</sup> INR 482 translates into USD 7 at the current nominal exchange rate of INR68 per USD. On a PPP basis this translates into USD 23.

captures the extant level of banking access in each area and (iv) a comprehensive financial inclusion index obtained from CRISIL<sup>6</sup> that uses three parameters as inputs to the index: bank branch penetration, deposit penetration and credit penetration. A higher value of all four measures indicates a lower level of financial inclusion. We compare changes in the regional GDP growth, lending growth, consumer expenditure, consumer prices and house prices in regions with greater ex-ante program exposure relative to regions with lower program exposure around program implementation.

We begin our regional analysis by verifying that our ex-ante measures of regional JDY exposure in a region before the program indeed correlates with the subsequent intensity of treatment from the program. We observe that there is a strong positive association between our ex-ante exposure measures with both the number of JDY accounts opened and the total amount deposited in these accounts. Next, we examine whether JDY is associated with an increase in bank lending. In districts with high ex-ante exposure to JDY, using aggregate data provided by the central bank of India, we observe an increase in aggregate lending in areas with greater ex-ante JDY exposure. We verify these effects are present in our micro data and find an increase in both the number of new loans granted and the amount of loans granted in regions with greater JDY exposure relative to those with lower exposure. We find that the total amount of new deposits brought under JDY is small relative to overall deposits in the banks before the program. In particular, the INR 460 billion deposited in JDY accounts is a mere 0.06% of the pre-JDY deposits in the banking sector. Thus, it is unlikely that the additional lending in more exposed regions reflects a relaxation of bank financial constraints due to new deposit inflow. Rather, our findings suggest that JDY may have allowed banks to meet the unmet demand for credit for some households that did not have prior access to formal banking products.

We also examine the impact of JDY on a number of other macroeconomic outcomes at the regional level. First, we do not observe an economically significant change in the GDP growth rate in more affected areas. However, given our near term focus, it is possible that the overall impact of the program on GDP growth rate will manifest itself over the longer-term as more and more individuals gradually start using these services. Moreover, an increase in lending associated with the program implementation that we document may also require time to affect GDP. Second, we observe an increase in consumption expenditure (proxied by debit card transactions). However, this measure should be interpreted with caution since it does not capture the changes in expenditures financed with cash and may simply reflect a relative shift of expenditure activity to JDY accounts from cash transactions. Third, we find some evidence suggesting that the program was associated with an increase in investments, though the data underlying this test is very limited. Finally, we do not observe

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<sup>6</sup> CRISIL is a global analytical company providing Ratings, Research and Risk & Policy Advisory services.

any significant relative change in the inflation rate in more exposed areas. This suggests that one of the common concerns -- that the program may have led to substantially higher price level due to a higher circulation of money and creation of additional demand -- may be unwarranted at least in the near term.<sup>7</sup>

This paper makes several contributions to the existing literature on financial inclusion. First, unlike the prior literature, which relies on field experiments and financial inclusion interventions with limited breadth and scope, we study the largest financial inclusion program in the world. Extant literature has used survey instruments to measure access, usage of financial services, and other household outcomes. Prior literature highlights that survey instruments particularly when asking questions about finance could be biased (Johnson, Parker, and Souleles (2006)). In contrast, we rely on administrative data, which allows us to directly measure usage of banking services by targeted households.

Our work is also related to the broad theoretical and empirical literature on financial inclusion. Theoretical work in this literature highlights that access to financial services can help low-income individuals move out of poverty (Aghion and Bolton (1997), Banerjee and Newman (1993)). The focus of several empirical papers that have examined this issue is on understanding the broader impact of increased access to banks on aggregate income and labor market outcomes. However, barring a recent paper by Dupas et al (2016), there is scant micro-level evidence on the usage of banking services by poor individuals. Dupas et al conduct an RCT study of 6000 accounts across three countries (Chile, Malawi, and Uganda) and find that while the rate of account opening was high, only a small fraction actually used the account. Our findings on initial account usage -- when evaluating the largest financial inclusion program in the world -- are broadly consistent with this finding. While we don't have the benefit of a well-designed RCT, we do find additional evidence that suggests that poor households learn as they become more familiar with banking services over time. This suggests that the real impact of financial inclusion programs could manifest over the longer-term as more and more individuals gradually start using these services.

Our work is related to the large literature highlighting the positive link between financial development and economic growth (King and Levine 1995; Rajan and Zingales 1996; Black and Strahan 2002; and Jayaratne and Strahan 1996). However, much of this literature focuses on the broader country level financial development and the impact of access to finance for firms on economic growth. In contrast, the literature evaluating the role of increased access to consumer level financial products on both micro-level individual outcomes and broader aggregate economy is small. We further work in this area by studying the largest experiment in expanding access to banking services for low-income individuals.

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<sup>7</sup> <https://macroscan.wordpress.com/2013/02/15/prof-kaushik-basus-observation-on-inflation-vs-financial-inclusion/>  
[accessed on 10 December, 2015]

Finally, our work is also broadly related to empirical studies evaluating the micro and regional effects of large-scale programs aimed at mortgage and consumer credit markets (e.g., Mayer et al. 2014, Agarwal et al. 2015a, 2015b, 2016) as well to studies evaluating policies aimed at stimulating household consumption (e.g., Johnson et al. 2006, Mian and Sufi 2010).

## **II. Institutional Context, Data and Summary Statistics**

### *II.A Prime Minister Jan Dhan Yojna's Program Background and Objectives*

Based on the idea that access to financial services is an essential pre-condition to ensuring overall economic growth and more equitable distribution of wealth, the incumbent Prime Minister of India, Mr. Narendra Modi launched the Pradhan Mantri Jan-Dhan Yojna (JDY from now), a national financial inclusion mission program, on 28 August 2014. The primary stated objective of this program is to ensure access to basic financial services (e.g., savings and deposit accounts, remittance) in an affordable manner to the low-income strata of India. JDY's ultimate aim is to ensure a bank account access for each household in India.

The main features of JDY that distinguish this scheme from earlier financial inclusion programs are: (i) universal access to banking facilities along with financial literacy programs to improve the understanding of financial products for effective use, (ii) provision of basic bank accounts such as zero-balance accounts with RuPay debit card and overdraft facility of INR 5,000 (USD 73) after six months of satisfactory transaction record, (iii) provision of insurance facilities such as accidental insurance cover of INR 1 lakh to all account holders and life insurance cover of INR 30,000 (USD 440) to those who have opened the account by January 26, 2015<sup>8</sup> (iv) provision of mobile banking to conduct simple transactions such as transferring funds and checking balance and (v) access to micro insurance and pension schemes in the second phase of the program.

JDY has spurred a heated debate amongst both the policy circles and academics regarding the long-term implications of the program for household welfare and the real economic activity. Similar initiative called the “no-frills” account scheme launched by the Reserve

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<sup>8</sup> The accidental insurance will initially be period of 5 years while the life insurance covers a person until they turn 60. The eligibility criteria stipulates that the insured needs to have a valid RuPay debit card. Only one person in every household can avail this insurance. A Claim under the Personal Accidental Insurance under PMJDY is payable if the RuPay Card holder has performed minimum of one successful financial or non-financial card transaction within 90 days prior to date of accident including accident date.

Bank of India in 2005 did not see much activity among those who opened the accounts. Some commentators have therefore suggested that JDY might also follow a similar trajectory.<sup>9</sup>

## *II.B Data Sources*

Our main data is based on a proprietary dataset obtained from the largest public bank in India. This bank is one of the largest Indian banks based on deposit and lending base. For instance in the pre-program period, this bank was about 22% of the deposit base in the country. We obtain data on three types of accounts. First, our JDY group comprises of a random sample of 1,514,307 accounts opened under the JDY launched by the government of India. We have ten months of information on these accounts – i.e., between August 2014 and May 2015.<sup>10</sup>

In addition, we obtain data on a random sample of 50,089 non-JDY accounts opened during the same sample period. These accounts are selected to be demographically close to JDY sample, with the difference being that these individuals have access to banking services outside JDY. For robustness, we also obtain data on 1,080,938 accounts opened in the six months leading to the program (between Jan 2014 to July 2014) and tracked over the same time period. These accounts are for individuals that closely resemble our JDY group in terms of most demographics. For all individuals in our sample, we have monthly information on the average monthly balance; cash deposit transactions, cash withdrawal transactions, remittances and access to debit cards among other things. The data also contains a rich set of demographics about each individual, including age, gender, marital status, mobile ownership, education, occupation and district of residence.<sup>11</sup>

Our micro data is aggregated at account-month level. For instance, Cash Deposit Amount (Cash Withdrawal amount) is computed by summing all deposit (Withdrawal) transactions by an individual in a month. Likewise, we aggregate all monthly inward and outward remittance transaction for each account. Average monthly balance is the average of daily account balance in a month.

We supplement this dataset with district level data on GDP from Indicus Analytics, literacy rate and population from the latest Census of India (2011), aggregate district level lending data from the Reserve Bank of India (RBI), consumer price indices from the Ministry of Statistics and house price index from the National Housing Bank of India.

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<sup>9</sup> <http://www.thehindubusinessline.com/opinion/a-pointless-number-chase/article7735093.ece> [accessed on Jan 15, 2016]

<sup>10</sup> We are currently extending our time series to allow us to cover longer period after the program.

<sup>11</sup> Districts are territorial administrative units in India that are similar to counties in the USA.



## *II.C Aggregate Summary Statistics*

The Department of Financial Services, Ministry of Finance, runs JDY. Using the data provided by the central bank that coordinates with ministry of finance, we are able to get an aggregate picture of the program. Table 1, Panel B shows that as of 9th November 2016, 255 million accounts were opened under JDY.<sup>12</sup> In addition, 190 million debit cards were issued with around INR 456,000 million (US\$7 billion) deposited in these JDY accounts. Thus, an additional capital approximating US \$7 billion became part of the Indian financial system as a result of the JDY program as of mid-November. Notably, since the deposits before the program are INR 7500 billion, this increase is a very small relative increase in the banking system. The numbers of accounts with positive balance has progressively increased – from around 68.0% in December 2015 to about 77% as of 9th November 2016.<sup>13</sup> These statistics closely track the positive balance trends in a random sample of accounts that form our micro data.<sup>14</sup>

The banks participating in the JDY program are divided into three kinds: public sector -- i.e., owned by government and with national presence, rural regional --i.e., owned by government and with local presence created with the mandate to primarily service the rural areas, and major private banks. A vast fraction of accounts opened under JDY were in public sector banks. Specifically, around 80% of the accounts opened as of 9th November 2016 were in public sector banks, with the largest players being State Bank of India (SBI) (30.7%), Punjab National Bank (PNB) (8.1%) and Bank of Baroda (7.3%).

A majority of unbanked in India are in rural regions. As a result, the expectation of the government was that a majority of the new accounts opened under JDY will be in rural regions. Consistent with this view, of the total number of accounts opened, 61% were from rural regions and 39% were from urban regions. Interestingly, for reasons that remain unclear, around 40% of urban residing low-income individuals did not have bank accounts prior to JDY.

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<sup>12</sup> We get very similar aggregate statistics when we take the information on account openings in our micro data and scale them to the national level. In particular, the new account openings in our micro data in the first ten months are 1.5 million (approximately 4% random sample of the total JDY accounts opened by our bank). Scaling this by the ratio of aggregate deposits (INR 75000 billions) to deposits in our bank (INR 17000 billions) in the period before JDY implementation (as of end of 2013), we find that the number of new account openings in the first 10 months are 165 million. This is very comparable to 158 million new JDY accounts opened based on the data we obtain from the central bank.

<sup>13</sup> On the inauguration day of JDY, 1.5 crore (i.e. 15 million) bank accounts were opened. Guinness World Records recognized the achievements made under JDY and provided a certificate that says the most bank accounts opened in 1 week as part of financial inclusion campaign is 18,096,130 and was achieved by Banks in India from 23 to 29 August 2014.

<sup>14</sup> In particular, in our micro data about 43% (46%) of the accounts had positive balance as of April 2015 (May 2015) (tenth month). In the data obtained from the central bank, this statistic is 44% and 46% as of April 2015 and May 2015 respectively.

## *II.D Account Level Summary Statistics*

Table 2 reports the summary statistics for key variables used in account level analysis. Panel A shows monthly amounts for financial transactions across the three samples used in our analysis. The average monthly balance is INR 482 (approximately \$7) for the JDY sample, INR 2729 for the non-JDY sample and INR 715 (\$11) for the pre-JDY group. The low balances for the JDY and pre-JDY sample are not surprising given that these accounts cater to individual below poverty line or just above the line. The poverty line in India is INR 816 (\$ 12) per month for rural areas and INR 1000 (\$ 15) per month for urban areas. In percentage terms, INR 482 is 60% of the monthly poverty line. Thus, the average monthly balance maintained in these accounts is economically consequential, given their monthly income levels. The average monthly balance maintained by individuals in the non-JDY sample is about 6 times those in the JDY sample. In addition, the average balance of individual pre-JDY sample is about 1.5 times the JDY sample. These trends are sensible since individuals in both non-JDY and pre-JDY samples consist of individuals with higher income levels as compared to those in the JDY sample. Consequently, the average monthly balance and transaction amounts are higher for such individuals.

In Panel B, we report dummy variables that identify individual-months for each of the five kinds of transactions. Approximately, 36% individuals in JDY sample, 94% individuals in non-JDY sample and 47% individuals in pre-JDY sample operate accounts with a positive balance. Focusing on the last row of Panel B that relates to overall usage, we can see that about 18% of individuals in JDY sample, 60% in non-JDY and 7% in pre-JDY sample use the accounts monthly for at least one of the four purposes: deposit, withdrawal, inward or outward remittance. We note that these statistics are not directly comparable as they do not account for potential differences across these groups, such as the average age of the accounts. Consequently, in our empirical analysis we will compare the usage patterns of banking services over time among individuals in each of these groups, controlling for a number of observable characteristics.

## **III. Empirical Methodology**

In our micro-level analysis, we are interested in assessing behavior of individuals – such as usage patterns – who open accounts under JDY (treatment sample). As a comparison group, we use non-JDY accounts opened since the commencement of the program. We focus on the period that spans 10 months after the commencement of the program. Our tests rely on comparing the savings and usage patterns of our treatment sample relative to the comparison group. This comparison allows us to assess the activity of individuals who opened accounts

under the program relative to low income individuals who have access to formal banking outside the program. Formally, we use the following regression specification:

$$Y_{it} = \beta_0 + \beta_1 \text{JDY}_{it} + \beta_2 \text{Age}_{it} + \beta_3 \text{JDY}_{it} \times \text{Age}_{it} + \mathbf{X}_{it} + \text{Account Opening Month}_t + \varepsilon_{it},$$

where the dependent variable,  $Y_{it}$ , is a bank account related outcome variable for individual  $i$  at time  $t$  (year-month). JDY is a dummy variable that takes a value 1 if the account is opened under the JDY program and 0 if it is opened in the non-JDY sample.  $\beta_1$  captures the baseline time-invariant difference between JDY and non-JDY individuals. Age is the number of months since account opening. Thus,  $\beta_2$  captures the differences in account usage over time. The coefficient of interest is  $\beta_3$ , which captures the monthly change in outcome variables for the JDY accounts relative to those in the non-JDY group.  $\mathbf{X}_{it}$  is a vector of control variables that includes account holder's age, sex, marital status and per capita GDP in the region. We also include account opening month fixed effects to control for potential seasonality.

Accounts opened for very low-income (Below Poverty Line, BPL) individuals after the commencement of the program would, by definition, be a part of JDY sample. As we have noted, our comparison group consists of non-JDY accounts opened for low-income individuals who are close to, but above the BPL. Recall from Table 2 (Panels A and B) that the average account balance and usage statistics for these non-JDY individuals is higher than individuals in the JDY sample. To the extent these differences are time-invariant, this should be captured by the coefficient  $\beta_1$  and would not confound our key coefficient of interest  $\beta_3$ .

Nonetheless, for robustness, we repeat our analysis with the second comparison group (pre-JDY accounts). This group comprises of individuals who are observationally very similar to our JDY sample but whose bank accounts were opened in the time period leading to the program. Recall again from Table 2 (Panels A and B) that average account balance and usage statistics for the pre-JDY individuals is in fact much closer to the JDY sample. This validates our assertion that individuals with accounts in the pre-JDY sample might be better matched to those who opened accounts under the program, although the pre-JDY accounts are opened a bit before the program.

Our regional analysis exploits variation in ex-ante financial access to explore how expanding access to financial services is related to broader outcomes such as GDP growth, lending, consumption expenditure, retail commodity prices and house prices. We compare these economic outcomes in regions with greater exposure to financial access to those with lower exposure. We elaborate more on the methodology in Section V.

#### **IV. Account-Level Evidence**

#### *IV.A Program Reach (Extensive Margin)*

We begin by providing some aggregate statistics on the program take-up. The program started with a bang with about 15 million accounts opened up the first day itself. Since then the number of accounts opened have done so at a significant pace. Figure 1, panel (a), presents time series data on the number of JDY accounts opened. Starting with approximately 54 million account at the end of September 2014, the total number of accounts opened have been growing at a monthly rate of 14% and have gone up to approximately 255 million accounts opened as of November 9, 2016. The largest fraction of these accounts have been opened by the public sector (state-owned banks), followed by regional rural banks and finally privately owned banks. Similarly, the number of debit cards issued have gone up from about 19 million as of September, 2014 to 190 million as of November 2016 representing a monthly growth of about 35%. State-owned banks have opened a large fraction of the new accounts opened as well as debit cards issued.

We also find that the fraction of accounts with positive balance (Figure 1, panel (c)) has been growing over time. In our sample -- covering first ten months of the program -- about 36% of maintain some positive account balance in our account. This fraction is higher (44%) for accounts that are more than 6 months old. This is comparable to the aggregate average of 44% of accounts with positive balance as of May 2015. Since then the percentage of JDY accounts with positive balance nationally has gone up to 77%.

There is cross-sectional variation in the number of positive-balance accounts across both the type of banks and individual banks. The fraction of users with positive balance seems to be highest for rural banks followed by state-owned banks. The fraction is lowest for the private sector banks. The unbanked living in urban areas may have easier access to banks but given their low income and saving may not have found it optimal to open a bank account. To the extent that private banks cater to urban areas, it may explain why they have opened fewer JDY accounts with zero balance.

With regards to individual banks as of November, 2016, the number of positive-balance JDY accounts opened with SBI, the largest state-owned bank in India went up from about 30% in May 2015 to 64% as of November, 2015. The number of positive-balance JDY accounts with ICICI, the largest private sector bank in India also came went up about 55% in May 2015 to about 62% in November 2016.<sup>15</sup> Consistent with an increase in the fraction of positive-balance accounts, the total amount deposited in these accounts (Figure 1, panel(d)) went up from INR 43,000 million to INR 456,000 million.

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<sup>15</sup> Source: <http://pmjdy.gov.in/Archive> [accessed on November 9th 2016]

## *IV.B Usage of Banking Products under the Program (Intensive Margin)*

### *IV.B.1 Frequency of Usage and Cross-sectional Heterogeneity*

While a large number of accounts have been opened and an economically significant number of consumers maintain some savings in these accounts, initial usage of these accounts remains quite low. Figure 2 presents the summary for frequency four kinds of banking transaction performed by consumers: Cash Deposits (Panel (a)), Cash Withdrawals (Panel (b)), Inward Remittances (Panel (c)), and Outward Remittances (Panel (d)) during first six months since an account opening. Panel A suggests that around 81% of our consumers do not deposit any money after account opening. About 12% of individuals perform one deposit transaction and about 7% perform two or more deposit transactions. The statistics are qualitatively similar for cash withdrawals, with approximately 87% of the sample not withdrawing cash, about 5% withdrawing cash only once and about 8% withdrawing cash two or more terms.

Focusing on panels (c) and (d) of Figure 2, we learn that remittance seems to be the most common transaction performed by the individuals in our sample. This suggests that remittances are important for low-income individuals in India. This is not surprising given that many workers in India migrate to other states away from their family for employment (Banerjee and Duflo (2007), Morten (2016)). Thus, the increase in ease and reduced transaction costs of remittances through JDY bank account may be an important benefit of the program. In percentage terms, approximately 34% (see panel (c)) of individuals receive money in their account via inward remittance. When we look at the distribution of number of such transactions, we find that 17% of individuals receive inward remittance only once during first six months since an account opening, while about 17% receive remittance two or more times. Similarly, about 21% of account holders send remittance (see panel (d)) at least once. With regards to number of transactions, about 15% of individuals send remittance only once while about 8% send remittances two or more times. However, the percentage of heavy users, that is those performing these transactions 10 or more times is extremely low at less than 1%.

Next, we explore heterogeneity in the usage of these accounts. In Figure 3, we present the frequency of usage by males and females in our sample. Similar to our baseline summary Figure 2, we find that overall usage is low both for males and females. However, the frequency of cash withdrawal and remittance transactions is relatively higher for males as compared to females. In Figure 5, we split our sample into married and non-married account holders. Here, we find that frequency of banking transactions is significantly higher for married individuals. For instance, we find that the proportion of married consumers performing at least 1 deposit transaction is substantially higher at 36% (Figure

3, Panel (a)) compared to the sample average of 19%. In comparison, only 16% of the unmarried individuals performed one or more deposit transaction. In terms of frequency of usage, the proportion of married individuals with just 1 deposit transaction is 23% while those with two or more transactions is approximately 10%. The proportion of married individuals performing at least 1 cash withdrawal transaction is also higher for the married consumers at 80% (Figure 4, panel (b)) compared to 11% for unmarried sample.

The difference in relative terms is not as stark as that for deposit transactions: we don't find a significant difference across married and unmarried individuals in terms on inward remittances. However, again the fraction of married guys performing at least one outward remittance transaction is significantly higher 37% compared to 18% for the unmarried sample. This is consistent with married individuals using these accounts for savings and sending money home to family for consumption needs. In Figure 5, we report these statistics after splitting the sample in to 4 quartiles based on the age of the account holder. Here we find that usage remains similar across individuals of different age groups.

Overall, we learn from these figures that usage of the JDY bank accounts is initially quite infrequent]. Marital status appears to be the most significant characteristic with regards to predicting the likelihood of relatively high usage of these accounts. This suggests that the impact of such financial inclusion programs is likely to vary across individuals.

#### *IV.B.2 Time-Series Dynamics*

Before estimating regressions, we present the raw data and discuss some of the patterns that seem salient. Figures 6 to 13 present a graphical representation of the dynamics of evolution of use of banking services over time. Figure 6 (panel (a) and (b)) shows that there is an upward trend in monthly balance for both JDY and non-JDY accounts. However, the slope of increase is greater for JDY sample. Interestingly, there appears to be decline in account balance and account usage in the pre-JDY sample for the first few months after account opening before stabilizing. One possibility is that before JDY, in the absence of the government mandate, the banks did not service accounts of low-income individuals very well.<sup>16</sup>

In Figure 7, we similarly assess cash and deposit transactions. The pattern is broadly similar to that in Figure 6. There is a sharper upward trend in withdrawal and deposits for

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<sup>16</sup> In the absence of a physical branch for transactions with low-income accounts, servicing is done through “Bank Mitras” (customer service correspondents). The evidence in the figures is consistent with the anecdotal evidence that the number of service correspondents employed increased significantly under JDY (<http://economictimes.indiatimes.com/industry/banking/finance/banking/banks-open-10-3-cr-jan-dhan-accounts-issue-7-28-cr-rupay-cards/articleshow/45730379.cms> [accessed on Jan 8<sup>th</sup> 2016 ]).

the JDY sample. The magnitude of withdrawals is larger than cash deposits. We observe that the amount of cash deposits and withdrawals remains relatively flat for the Non-JDY individuals. These accounts likely represent banking customers who both deposit (income or savings) and withdraw (regular consumption) roughly the same amount every month. Similar to Figure 6, we again observe a drop in both withdrawals and deposits by individuals in the pre-JDY sample for first few months after account opening, before stabilizing.

Figure 8 shows that there is no sharp dynamic pattern in inward and outward remittance transactions. In Figure 9, we examine the trend in the fraction of individuals maintaining positive balance and performing banking transactions. While the fraction of non-JDY individuals maintaining positive balance in their accounts remains relative flat over time, there is a sharp increase for individuals with JDY account since account opening. Finally, the fraction of pre-JDY individuals maintaining positive balance also remains between 40 to 47%. We do observe a small dip in account usage by these individuals between 2 to 4 months after account opening before rising again. Interestingly, there is a sharp dip in fraction of non-JDY individuals performing some banking transaction after 6 months since account opening. In contrast, usage by pre-JDY individuals declines until around 5 months after account opening and remains flat consequently. In general, the trends are similar for both the cash transactions and the fraction of individuals performing transactions.

In Figures 10-13, we analyze whether there is heterogeneity in the usage of banking services across individuals. We exploit demographics and geographical location information of individuals to assess heterogeneity. While we observe some difference in the levels of financial transactions based on the gender (Figure 10), age (Figure 11), GDP of the region (Figure 12) and literacy rate of the region (Figure 13), we do not find any differential trends across different groups of individuals based on these parameters.

#### *IV.B.2.i Average Monthly Balance and Overall Account Usage*

We begin our formal analysis by analyzing the average monthly balance maintained and financial transactions performed by individuals with JDY accounts. More specifically, we focus on understanding the dynamics of usage of banking services over time in a regression framework.

Table 3, Panel A reports our results based on our analysis of monthly account balance maintained and overall account usage by individuals. The dependent variable in these tests is average monthly balance in column (1), positive balance dummy in column (2), and positive usage dummy in column (3). We estimate specification discussed in Section III.

The coefficient of interest  $\beta_3$  measures the relative increase in monthly transaction by JDY individuals relative to the non-JDY individuals.

Consistent with graphical evidence presented in sub-figures (a) and (b), the results in column (1) show that the average monthly balance maintained by individuals increases with time since account opening. The coefficient on *Age of Account* suggests that the monthly balance maintained by non-JDY sample increases by INR 46 (2%)<sup>17</sup> with each month since opening. This simply captures the increase in savings over time. However, the magnitude of the increase in average monthly balance with age of account is significantly greater for the JDY sample. The coefficient on the interaction term ( $\beta_3$ ) shows that relative to the non-JDY sample, average monthly balance maintained by JDY sample increases by INR 58 every month subsequent to account opening. This effect is both economically and statistically significant. In percentage terms INR 58 represents a 12% monthly increase in account balance.

Even amongst the low income households, there can be substantial variation in the income and consequently in their savings and account balances. Thus, it may be more meaningful to analyze whether or not these individuals maintain some positive balance in their accounts. Consequently, in column 2, we seek to understand whether there is an increase in the proportion of accounts with some positive balance. As mentioned above the dependent variable in these tests is (positive balance dummy) which takes the value one for account-months with positive balance and zero otherwise. Column (2) shows that, relative to the non-JDY accounts, there is a 4% increase in the number of JDY accounts that maintain a positive balance. Relative to the average proportion of one month old JDY accounts maintaining positive balance during our sample period, this represents an approximately 18% monthly increase.<sup>18</sup> This suggests that while many of the JDY individuals may not maintain any balance in their accounts initially, they start maintaining some savings in these accounts as time passes.

In column (3), we investigate the evolution of the banking transactions performed by JDY individuals. The dependent variable (positive usage dummy) takes the value one for account-months in which some banking transaction was performed and zero otherwise. Consistent with earlier results, we find that relative to non-JDY individuals, the proportion JDY individuals performing at least one banking transaction in a month increase over

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<sup>17</sup> The average month balance maintained by the Non-JDY group is approximately INR 2700. INR 46 represents a 2% increase in account balance.

<sup>18</sup> About 22% of the one month old JDY account-months are associated positive account balance during our sample period. Thus 4% represents an 18 percentage points relative increase.



time. Interestingly, as the coefficient on *Age of Account* suggests, this fraction is decreasing for the non-JDY sample.

In Panel A of Table B1 of Appendix B, we repeat this analysis using our proprietary account level data for pre-JDY accounts. We remember that these accounts correspond to observationally similar individuals who had prior access to formal banking products. Panel A of Table B1 indicates that initial usage on the above dimensions is initially lower for JDY accounts as manifested by the negative and statically significant estimates for *JDY* dummies. However, the positive and statistically significant estimate of *Age of Account X JDY* suggests that these usage patterns under the program gradually converge over time to those of similar individuals who had prior access to formal banking products. The relative magnitudes of these estimates suggest that such convergence take place within the first six to eight months since the account opening. This evidence is also broadly consistent with Figure 9(d) that suggests that after few months since an account opening the frequency of initial usage by JDY households is broadly similar to comparable households who already had prior access to banking services (pre-JDY sample).

Overall, these results indicate that the use of banking services gradually increases with time since account opening. This suggests some learning on the part of JDY individuals likely due to them getting increasingly familiar with banking services over time. These results suggest that the real effects of JDY may fully manifest over the longer-term as more individuals gradually start using the account.

#### *V.B.2.ii Types of Banking Transactions*

We next study the type of banking transactions performed on the individual's bank accounts. We begin by analyzing deposit and withdrawal transactions and report these results in Table 3 (Panel B). We use three variables to capture the deposit and withdrawal transactions: (i) cash deposit amount (cash withdrawal amount) captures the total cash deposit (withdrawal) by an individual in his account in a month, (ii) number of deposit transactions (number of withdrawal transactions) and (iii) a dummy variable, cash deposit Dummy (cash withdrawal Dummy), that identifies whether an individual performed at least one deposit (withdrawal) transaction in a month.

Columns (1) to (3), presents the results for deposit transactions. As can be seen, the amount of cash deposited, the number of monthly deposit transactions and the likelihood of a deposit increase with age of the account. Column (1) suggests that the coefficient estimate of INR 38 translates into an approximately 36% increase in the withdrawal amounts relative to one month old JDY accounts in our sample. In likelihood terms, an absolute increase in probability of a withdrawal transaction is 0.5%. This represents a 10%

increase in the likelihood of withdrawals relative to the average likelihood of a withdrawal transaction (5%) by the JDY individuals during the first month since account opening.

We report the results for withdrawal transactions in columns (4)-(6). Consistent with our results on deposit transactions, we find that both the amount of withdrawal and the likelihood of withdrawal are higher for older accounts. Finally, in Panel C of Table 3, we analyze inward and out remittances performed by individuals. Consistent with the evidence presented in Figure 8, we do not observe any economically significant dynamic increase or decrease in these kinds of transactions.

In Panel B and C of Table B1 of Appendix B, we repeat the above analysis using our proprietary account level data for pre-JDY accounts. These tables indicate that the initial amount of cash deposits, withdrawals, and outward and inward remittances are lower for JDY accounts. However, the positive and statistically significant estimate of *Age of Account X JDY* suggests that the usage patterns along these dimensions gradually converge over time to those of similar individuals who had prior access to formal banking products. The relative magnitudes of the estimates suggest that such convergence takes place in about six to twelve months since an account opening.

Overall, the results in this section support our conclusion from Section IV.B.2.i. There appears to be some learning and consequently an increase in the usage of banking services by individuals who open an account under JDY.

## **V. Regional Analysis**

In this section, we explore the impact of the JDY program on regional outcome variables such as bank lending and GDP growth. The broad goal is to inform on the effect of large-scale financial inclusion programs such as JDY, on economic outcomes. The challenge in using JDY as an experiment to infer its effect on the larger economy is that the effect may be confounded by other contemporaneous macroeconomic policy changes or time trends. We circumvent this challenge by exploiting regional heterogeneity in the level of financial inclusion just prior to the program.

In particular, we construct four ex-ante measures that capture different dimensions of financial inclusion. Our first main measure is a proxy for bank branch penetration. It captures the average number of adults serviced by one bank branch in an area (*Adults per Unit Bank Branch*). Our second measure is based on the idea is that private banks are less likely to expand in financially excluded lower income areas. In contrast, given their mandate to promote social welfare, state-owned branches are more likely to open branches in such areas. Hence, we use the percentage of state-owned bank branches as a second

proxy for financial inclusion (*%State-Owned Branches*). Our third measure is the percentage of households without bank account Households (*%Without Bank Accounts*), which is simply the fraction of households without bank accounts. It is important to note that the mandate for the first phase of JDY program was to provide 100% banking access to all households. Finally, we also use a comprehensive district level measure of financial inclusion annually released by CRISIL which combines three critical parameters of basic financial services: branch penetration, deposit penetration, and credit penetration into one single metric in the form of an index. It is a relative index that has a scale of 0 to 100 with higher number indicating lower levels of financial inclusion. Higher value of all four measures indicates lower level of financial inclusion.

Because new JDY accounts are likely to be opened in regions that had lower levels of banking access prior to the program, we can trace out the association between JDY intensity and relative changes indifferent economic outcomes using variation in these ex-ante measures of the program exposure. The idea is to compare the economic outcomes in regions that had lower levels of financial/banking access before the program and therefore were also regions more likely to experience a surge in account openings for the poor under JDY to regions with a higher level of prior banking access. This approach is similar to that used by Mian and Sufi (2010) and Agarwal et al. 2016 in their studies.

#### *VI.A Ex-Ante JDY Exposure and Program Intensity*

We begin by examining the differences in regional income across areas based on our ex-ante exposure measures. In Table 4, we split our sample into two based on median cuts for our four exposure measures. Each observation represents a district and there are 621 districts in India. Districts in India are similar to counties in the USA and represent a territorial administrative unit. Consistent with financially excluded areas being those with lower income levels, GDP per capita is lower for districts with higher values of all our four exposure measures.

We next verify that our ex ante measures of regional JDY exposure in a state before the program indeed correlate with the subsequent intensity of treatment from the program. The results from these tests are reported in Table 5. In Panel A, we present the results of a regression in which the dependent variable is Log (# of JDY accounts opened in each state). To account for regional differences in output, we control for Log(GDP) in all our tests. As we observe, there is a strong positive association between the number of JDY accounts opened and our ex-ante exposure measures. Note that we scaled each exposure measure by its standard deviation. Hence the reported coefficient estimates the change in dependent variable for one standard deviation change in our exposure measures.

In percentage terms, a one standard-deviation increase in the number of adults per unit bank branch (about 50% relative increase) is associated with a 77% absolute increase in the number of JDY accounts opened in a district. Similarly, a one standard deviation increase in fraction of state-owned bank branches, the fraction of households without a bank account and the financial inclusion index is associated with a 43%, 50% and 67% increase in the number of JDY accounts opened respectively.

In Panel B of Table 5, we repeat these tests with the Log (total deposits in JDY accounts opened in each state) as the dependent variable. Again, we observe a positive correlation between the total amounts deposited in JDY accounts in each state and the ex-ante exposures measures. This relationship is both statistically and economically significant. In unreported tests, we repeat this analysis using our proprietary micro level data. Specifically, we aggregate the number of accounts opened and the total amount deposited in these accounts in each state. These tests also confirm a strong correlation between ex-post intensity of the program and our four ex-ante exposure measures.

Overall, consistent with our loan-level analysis, the above results confirm that the program led to a significant number of account openings. Moreover, banks saw positive deposit inflows, with stronger intensity in more exposed areas. However, this does not necessarily mean that the program increased the overall number of accounts and deposits. The reason is that the program may have adversely affected the private account activity that would have been undertaken in the absence of the program. To shed light on this issue, we also analyze the evolution of deposits for non-JDY accounts and present the results in Table 6.

As we observe from Table 6 we do not find evidence that the program led to substitution of private accounts with JDY ones. This suggests that the program did indeed lead to a net overall increase in the number of accounts and the amount of deposits in India. Figure 14 (Panel (a)) confirms this inference by showing the annual growth rate of total deposit amount (for all accounts) in more or less exposed areas based on the pre-program percentage of households without bank accounts. More exposed regions experience a relative increase in deposits after the program starts, relative to less exposed ones. However, in line with our discussion in Section I, Table 6 Panel B indicates that the overall increase in deposits associated with the program is economically very small.

### *V.B Bank Lending*

In this subsection, we investigate whether there was an increase in growth rate of bank lending around the program. As we noted before, there can be two reasons for why banks might increase lending following the introduction of JDY. We first establish that there

was such an increase using aggregate regional data. We then use additional data from our micro dataset to sort out which of the two reasons might be more consistent with this fact.

Panel B of Figure 14 shows the annual growth rate of bank lending in more and less exposed regions, with exposure defined based on pre-program percentage of households without bank accounts. As we observe, more exposed areas experience a relative increase in bank lending after the program starts, relative to less exposed ones.

To investigate this more formally, we examine if regions with a greater exposure to JDY experienced a greater increase in bank lending relative to those with limited exposure. Formally, we estimate the following regression model:

$$Y_i = \beta_0 + \beta_1 \text{Exposure Measure}_i + \varepsilon_i \quad (1)$$

Here  $i$  refers to unique district.  $Y_i$  is the difference between the average annual growth in bank lending during the program period and the annual growth in bank lending in pre-program period. The coefficient of estimate  $\beta_1$  is essentially similar to a difference-in-differences estimate that captures the change in growth rate of bank lending before and after JDY program in districts with high exposure relative to those with low exposure.

Table 7 shows the estimation results. Consistent with Panel B of Figure 14, we find evidence that regions more exposed to the program experienced a significant relative increase in bank lending. In particular, a one standard deviation increase in the exposure measure is associated with between 1.1 percentage points to 2.3 percentage points annual increase in lending. At the same time, we note that the total amount deposited in JDY accounts is approximately 0.06% of the pre-JDY deposits in the banking sector (INR 460 billion; \$7 Billion). In terms of state-level variation, the ratio of the JDY deposits to total pre-JDY deposits in the banks varies from a minimum of about 0.01% to a maximum of 0.35%. This suggests that the increase in deposits due to JDY program is unlikely to fully explain the relative increase in the lending in more exposed areas.

Next, we investigate this issue further exploiting our micro data which allows us to explore the reason behind this increase in bank lending.

#### *V.C Bank Lending and Defaults using Regional Data*

In Tables 8 and 9, we use our proprietary account level loan data to examine how aggregate lending at the district level changes around the program. Formally, in Table 8, panel A, we estimate equation (1), where the dependent variable is the difference between

the average annual growth in total loans extended by our bank after the program started and the average of the same variable during the pre-program period.

We find a statistically and economically significant increase in credit growth in areas with higher ex-ante exposure to JDY relative to those with lower exposure. Specifically, a one standard deviation increase in the exposure measure is associated with between 3.1 percentage points to 5.5 percentage points annual increase in lending. As noted earlier, since the deposits coming in due to JDY were very economically small, this meaningful increase in lending is not likely on potentially additional capital being available to financially constrained banks. Rather, JDY may have allowed banks to meet the unmet demand for credit for some households. If so, households with lower credit worthiness would get new credit. We now explore if this conjecture is borne out in the data.

In particular, we seek to examine defaults on new loans being approved in the program period. The dependent variables in these tests is the difference between the average monthly default rate on newly originated loans during the program period minus the average default rate on loans originated just prior to the program period, where default rate is defined as the proportion of loans originated in a given month that become 60 day delinquent (panel A) or 90 day delinquent (panel B) within a year from loan origination. These results are presented in Table 9, panels A and B. Focusing on Table 9, we find that the default rates are higher for loans granted during the post-JDY period. In percentage terms, the number of new loans granted that are 60-day delinquent (Panel A) increase by between 0.2 to 0.4 percentage points. This is economically significant given that average 60-day delinquency rate in our sample is 2.1 percent. In Panel B, we repeat these tests with 90-day delinquent loans and obtain qualitatively similar results.

#### *V.D GDP, Consumer Expenditure, Investment, and CPI*

In this section, we examine the differences in a number of other key outcome variables in regions on the basis of their exposure to the program. We note that the large-scale financial inclusion of previously unbanked individuals can create a positive stimulus for the local economy. First, as we discussed above it can lead to increased bank lending. Second, it could relax credit barriers for the unbanked allowing them to access capital for entrepreneurial activities. Third, in addition to affording the poor an opportunity for superior financial planning and saving, it may allow them to smooth consumption. Fourth, prior research highlights that increasing financial inclusion is associated with greater employment and improvement in labor productivity. The macro level thesis of this literature is all of these potential effects taken together may result in higher economic growth.

Accordingly, we are interested in examining if regions with a greater exposure to JDY experienced a greater increase in economic activity relative to those with limited exposure. Formally, we estimate the regression model similar to (1) where the dependent variable is the difference between the average annual growth in region GDP during the program period and the average annual growth in GDP in pre-program period. We complement this analysis by also investigating the relative changes in consumer expenditure, investment, and inflation in more and less JDY exposed areas. Table 8 reports the results from these tests.

Panel A of Table 10 shows that overall, the ex-ante exposure measures appear to be negatively related to GDP in the short term. The economic magnitudes, however, are not large. Since a large fraction of the unbanked in India is agricultural workers, we next focus on agricultural GDP. We find very similar results as total GDP: there is no evidence that agricultural GDP growth increases in more exposed areas relative to less exposed ones after the program implementation.

In Panel B of Table 10, we examine how the consumer expenditure on debit cards is associated with the program implementation. The dependent variable in these tests is the difference between the regional average quarterly growth in debit card expenditure during the program period and the average quarterly growth in debit card expenditure in pre-program period. The results using the % of households without bank accounts as the exposure measure suggests that there was a relative increase in consumer expenditure on debit cards in more exposed areas relative to less exposed ones. We note, however, that this finding should be interpreted with caution. The reason is that this measure does not capture the changes in expenditures financed with cash and may simply reflect relative shift of expenditure activity to JDY accounts from cash transactions. Moreover, for other exposure measures the estimated association is statistically insignificant.

Panel C of Table 10 shows that there was a relative increase in investment in more exposed areas relative to less exposed ones, although the sample over which such data is available to us is quite limited (only at the state level) and the results are statistically insignificant. This result taken together with our evidence on bank lending from Section V.C suggests that part of an increased lending by banks may have been used to finance new investment.

Finally, Panel D of Table 10 shows that -- in the near term -- there was no significant relative change in inflation rate in more exposed areas relative to less exposed ones. This suggests that one of the common concerns -- that the program may have led to substantially higher price level -- may be unwarranted at least in the near term.

### *V.E Discussion and Robustness*

Overall, the regional evidence suggests that the JDY program led to a very large increase in the number of accounts in India. We find some evidence that this increase has been associated with increased bank lending, investment, and higher growth rate in agricultural areas. We note however, that these results need to be interpreted with caution for a number of reasons.

First, our regional analysis focuses on the first year and half of the program. As a result, we cannot assess any longer-term effects associated with the program. Second, it is possible that some of the effects describe above can represent the relative differences in evolution of economic outcomes that are unrelated to the program and instead reflect some fundamental differences across these regions. To shed some light on this concern about comparability of the regions we reassess these findings using the “synthetic control” method pioneered by Abadie et al., (2010) and Abadie and Gardeazabal, (2003).

In particular, we use the percentage of households without bank accounts as an exposure measure to designate states as either a treatment or control group – i.e., based on whether a state is below or above median in terms of exposure. Using this, we classify 17 treatment states and 17 control ones. The treatment states are then combined to form one “treatment” region by simple averaging outcomes across treatment states. We then create one synthetic control state outcome as the weighted average of control outcomes where weights are chosen to closely match GDP, credit, and deposit growth in 2012-2013 period (pre-program period) in the synthetic control and treatment state. We then track the evolution of outcomes in our treatment state relative to the synthetic control state.

Overall, applying this synthetic matching method, we find evidence that is broadly consistent with our main regional analysis. In particular, we find that more exposed areas experienced a relative increase in bank lending (Figure 15 (a)). Consistent with our earlier results we find no evidence of economically significant increase in deposits in the treatment state as well as no relative changes in inflation rate. The main notable difference is that we find no significant differences in the overall GDP growth in the treatment group relative to the synthetic control group (Figure 15 (b)). This suggests that our prior evidence indicating a negative association between overall GDP growth rate and program exposure may have been driven by pre-existing differences in evolution of GDP growth rates between more and less exposed areas.

Finally, due to the nature of our empirical setting, we are not able to comment on any economy-wide effects of the program since such effects will be differenced out in our setting.



## **VII. Conclusion**

In this ongoing study, we use the largest financial inclusion program in the world to study the role of financial inclusion on the unbanked. Using administrative account level micro data, we find that the program led to 255 million new bank account openings in India (as of November 2016). These individuals received bank account, debit cards as well as an overdraft facility. There is evidence of learning behavior that results in usage of banking services over time on the intensive margin as individuals gain familiarity with banking services. About 77% of the new accounts maintain a positive balance and usage increases over time, with inward and outward remittances being the most common transaction performed by the individuals. While the initial usage may appear quite small, it gradually converges over time to those of similar individuals who were banked outside the program (within six to twelve months since an account opening). Exploiting regional variation in ex-ante financial access, we find an increase in lending and default rate on new loans in regions with low ex-ante access to banking services. These results are consistent with banks catering to the new demand for formal banking credit by previously unbanked borrowers.

Our paper has implications for the growing body of work in financial inclusion and for policy makers. 40% of the world's population is still unbanked and governments around the world – such as in Indonesia, Malaysia, Philippines, Brazil -- have been thinking of implementing such inclusion programs. Our results can inform policy makers in these countries by presenting evidence on the usage of banking services by previously unbanked and on the evolution of economic outcomes in the first phase of the large scale financial inclusion program.

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**TABLE 1: Summary Statistics – Aggregate Statistics**

This table presents descriptive statistics for the period before and after the Jan Dhan Yojna (JDY) program. In addition, the number of potential customers (unbanked adults) before the JDY program was 852 million while there were 400 million customers with access to bank accounts before the program. The data on minimum wage, average wage, balance of payments and per capita GDP is obtained from planning commission of India as of February 2014. The poverty line estimates are from Tendulkar Committee report (2005) constituted by the planning commission of India. Data on Pre-JDY aggregate household deposits and total banking assets is as of December, 2013 and was obtained from the Reserve bank of India. INR to USD conversion is based on the current nominal exchange rate of INR 68 per USD. Statistics regarding the JDY program is obtained from the website <http://pmjdy.gov.in/Archive> maintained by government of India.

Panel A: Pre Jan-Dhan Yojana Statistics		
	(1)	(2)
	USD	INR
Minimum wage in Currency/day	1.3	89
Average wage in Currency/day data	3.7	256.52
Poverty Line (Avg monthly per capita expenditure) - Rural	12	816
Poverty Line (Avg monthly per capita expenditure) - Urban	15	1000
Balance of payments in Billions	15	1,000
Aggregate household deposits in the Indian Banking sector in Billions	110	7,500
Overall Banking assets In Trillion	1.7	115
India GDP per capita	1,431	97,500
Panel B: Jan-Dhan Yojana Progress Statistics		
Number of accounts opened under JDY in Millions	255	
Number of Debit Cards issues in Millions	190	
Number of Individuals Provided Accident Insurance in Millions	93	
Number of Individuals Provided Health Insurance in Millions	29	
Total Deposits in JDY Accounts in INR (Millions)	456,000	

**TABLE 2: Summary Statistics -- Account-level banking data**

This table presents descriptive statistics for (i) JDY, (ii) non-JDY and (iii) pre-JDY samples. The JDY sample comprises of 1,514,307 accounts opened under Jan Dhan Yojna program during the period August 2014 to May 2015. The non-JDY sample comprises of 50,000 regular Non-JDY accounts that were opened during the same period. The Pre-JDY sample comprises of 1,082,858 accounts opened for low-income households in the six months before JDY started tracked over the horizon of the program. The number of observations,  $N$  corresponds to account-months. Note that account openings are staggered across months. Proprietary data was obtained from one of the largest banks in India. All variables are defined in the appendix A.

	Panel A: Cash Amounts								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	JDY Accounts			Non-JDY Accounts			Pre-JDY Accounts		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Average Monthly Balance	6656783	482	4913	216937	2729	13717	13239990	715	3832
Cash Deposit Amount	6656783	136	2049	216937	1707	13448	13239990	164	2145
Cash Withdrawal Amount	6656783	141	2591	216937	4666	24373	13239990	233	2828
Inward Remittance Amount	6656783	258	4046	216937	4413	32234	13239990	443	3939
Outward Remittance Amount	6656783	145	3862	216937	1320	23999	13239990	325	3138
	Panel B: Usage Dummy								
	JDY Accounts			Non-JDY Accounts			Pre-JDY Accounts		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Positive Balance Dummy	6656783	0.36	0.48	216937	0.94	0.24	13239990	0.47	0.5
Cash Deposit Dummy	6656783	0.04	0.2	216937	0.15	0.36	13239990	0.02	0.15
Cash Withdrawal Dummy	6656783	0.03	0.17	216937	0.38	0.49	13239990	0.04	0.19
Inward Remittance Dummy	6656783	0.12	0.33	216937	0.31	0.46	13239990	0.11	0.31
Inward Remittance Dummy	6656783	0.12	0.33	216937	0.31	0.46	13239990	0.07	0.26
Overall Usage Dummy	6656783	0.18	0.39	216937	0.6	0.49	13239990	0.07	0.26

**TABLE 3: Panel A – JDY Account Level Analysis of Average Balance and Usage Relative to Non-JDY Accounts**

This table reports the coefficient estimates from the following regression model:

$$Balance_{it} = \beta_0 + \beta_1 JDY_{it} + \beta_2 Age_{it} + \beta_3 JDY \times Age + X_{i,t} + Account\ Opening\ Date_t + \varepsilon_{it}$$

Where *i* refer to unique bank account, and *t* refers to year-month. *Balance* is *Average monthly balance* in column (1), a dummy variable that takes the value 1 for accounts-months with positive balance in columns (2) and a dummy variable that takes the value 1 for accounts-months if at least one transaction was performed by the account holder in column (3). *Age* is the number of months since account opening. *JDY* is a dummy variable that identifies accounts opened under the JDY program. In these baseline tests, we focus on the periods up to 10 months after the commencement of Jan Dhan Yojna (JDY) (August (2014) to May (2015)). The excluded category is non-JDY accounts as defined in Section III. All variables are defined in detail in appendix A. Proprietary data was obtained from one of the largest banks in India. Account-clustered robust standard errors are reported in parentheses. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels respectively.

	Average Monthly Balance	Positive Balance Dummy	Positive Usage Dummy
	(1)	(2)	(3)
JDY	-2370.967*** (91.073)	-0.724*** (0.002)	-0.441*** (0.002)
Age of Account	46.776** (18.858)	0.005*** 0.000	-0.008*** (0.001)
Age of Account X JDY	57.791*** (18.773)	0.044*** 0.000	0.011*** (0.001)
N	6698136	6698136	6698136
R <sup>2</sup>	0.007	0.079	0.046

**TABLE 3: Panel B – JDY Account Level Analysis of Cash Deposits and Withdrawals Relative to Non-JDY Accounts**

This table reports the coefficient estimates from the following regression model:

$$Transaction_{it} = \beta_0 + \beta_1 JDY_{it} + \beta_2 Age_{it} + \beta_3 JDY \times Age + X_{i,t} + Account\ Opening\ Date_t + \varepsilon_{it}$$

Where *i* refer to unique bank account, and *t* refers to year-month. *Transaction* in panel B is one of the 12 variables defined in appendix A based on deposit and withdrawal transactions. *Age* is the number of months since account opening. JDY is a dummy variable that identifies accounts opened under the JDY program. In these baseline tests, we focus on the periods up to 10 months after the commencement of Jan Dhan Yojna (JDY) (August (2014) to May (2015)). The excluded category is non-JDY accounts as defined in Section III. Proprietary data was obtained from one of the largest banks in India. Account-clustered robust standard errors are reported in parentheses. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels respectively.

	Cash Deposit Amount	# Cash Deposit Transactions	Cash Deposit Dummy	Cash Withdrawal Amount	# Cash Withdrawal Transactions	Cash Withdrawal Dummy
	(1)	(2)	(3)	(4)	(5)	(6)
JDY	-1667.757*** (72.667)	-0.186*** (0.004)	-0.115*** (0.002)	-4819.868*** (135.149)	-1.214*** (0.015)	-0.375*** (0.003)
Age of Account	-32.856** (14.295)	-0.013*** (0.001)	-0.010*** 0.000	-77.230*** (29.457)	-0.005* (0.003)	-0.005*** (0.001)
Age of Account X JDY	38.371*** (14.411)	0.008*** (0.001)	0.005*** 0.000	103.159*** (29.452)	0.018*** (0.003)	0.012*** (0.001)
N	6698136	6698136	6698136	6698136	6698136	6698136
R <sup>2</sup>	0.008	0.016	0.015	0.025	0.097	0.109



**TABLE 3: Panel C - JDY Account Level Analysis of Inward and Outward Remittances Relative to Non-JDY Accounts**

This table reports the coefficient estimates from the following regression model:

$$Transaction_{it} = \beta_0 + \beta_1 JDY_{it} + \beta_2 Age_{it} + \beta_3 JDY \times Age + X_{i,t} + Account\ Opening\ Date_t + \varepsilon_{it}$$

Where *i* refer to unique bank account, and *t* refers to year-month. *Transaction* in Panel C is one of the 12 variables defined in appendix A based on remittance transactions. *Age* is the number of months since account opening. *JDY* is a dummy variable that identifies accounts opened under the JDY program. In these baseline tests, we focus on the periods up to 10 months after the commencement of Jan Dhan Yojna (JDY) (August (2014) to May (2015)). The excluded category is non-JDY accounts as defined in Section III. Proprietary data was obtained from one of the largest banks in India. Account-clustered robust standard errors are reported in parentheses. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels respectively.

	Inward Remittance Amount	# Inward Remittance Transactions	Inward Remittance Dummy	Outward Remittance Amount	# Outward Remittance Transactions	Outward Remittance Dummy
	(1)	(2)	(3)	(4)	(5)	(6)
JDY	-4193.301*** (166.631)	-0.335*** (0.033)	-0.186*** (0.002)	-1238.127*** (140.342)	-0.329*** (0.010)	-0.194*** (0.002)
Age of Account	-18.304 (39.136)	0.003 (0.002)	0.004*** (0.001)	-10.922 (28.713)	0.023*** (0.002)	0.004*** 0.000
Age of Account X JDY	22.173 (39.038)	0 (0.002)	-0.001 (0.001)	17.852 (28.535)	-0.021*** (0.002)	-0.003*** 0.000
N	6698136	6698136	6698136	6698136	6698136	6698136
R <sup>2</sup>	0.011	0.003	0.028	0.001	0.01	0.037

**Table 4: Regional Summary Statistics**

This table presents summary statistics for the districts in our sample. Panels A and B report the statistics based on the exposure measures, *Adults per Unit Bank Branch* which is the ratio of total adult population to the total number of bank branches in a district and *%age State-Owned Bank Branches* in a district which is the ratio of total number of bank branches that are owned by state-owned banks to the total number of bank branches in each district. Higher values for both these measures imply greater ex-ante JDY exposure. We split our sample into two based on these measures. So, columns (1) and (2) (columns (3) and (4)) report statistics for the districts with above (below) median value of *Adults per Unit Bank Branch* (Panel A) and *%age State-Owned Bank Branches* (Panel B). All variables are defined in the appendix A.

Panel A: Exposure Measure - Adults per Unit Bank Branch				
	(1)	(2)	(3)	(4)
	Above Median		Below Median	
	Mean	SD	Mean	SD
Total Region GDP Per Capita in INR Per Capita	50051	25849	195000	1530000
All Industry GDP Per Capita in INR Per Capita	12511	11207	40171	138000
Agriculture GDP Per Capita in INR Per Capita	7717	8769	9316	9046
Agriculture and Related Per Capita in INR Per Capita	13187	10479	15815	13869
Manufacturing GDP Per Capita in INR Per Capita	3584	5014	19823	72157
Banking GDP Per Capita in INR Per Capita	4387	2470	62272	753000
Adults Per unit Bank Branch	9461	2976	4390	1335

Panel B: Exposure Measure - %age State-Owned Bank Branches				
	Above Median		Below Median	
	Mean	SD	Mean	SD
Total Region GDP in INR Per Capita	55414	33480	190000	1530000
All Industry GDP in INR Per Capita	14704	16674	37867	137000
Agriculture GDP in INR Per Capita	7870	9187	9157	8642
Agriculture and Related in INR Per Capita	13752	11152	15236	13408
Manufacturing GDP in INR Per Capita	3999	6668	19351	72003
Banking GDP in INR Per Capita	4975	3687	61490	751000
% State-Owned Branches	94	3	79	13

**Table 4: Regional Summary Statistics [continued]**

This table presents summary statistics for the districts in our sample. Panels C and D report the statistics based on the exposure measures, *% Households Without Bank Accounts* which is the ratio of total number of households without any bank account to the total number of households in a district and *Financial Inclusion Index* which is a comprehensive measure of financial inclusion released by CRISIL which combines three critical parameters of basic financial services: branch penetration, deposit penetration, and credit penetration into one single metric in the form of an index. It is a relative index that has a scale of 0 to 100 with higher number indicating lower levels of financial inclusion. Higher values for both these measures imply greater ex-ante JDY exposure. We split our sample into two based on these measures. So, columns (1) and (2) (columns (3) and (4)) report statistics for the districts with above (below) median value of *%age Households Without Bank Accounts* (Panel C) and *Financial Inclusion Index* (Panel D). All variables are defined in the appendix A.

Panel C: Exposure Measure - %age Households Without Bank Accounts				
	(1)	(2)	(3)	(4)
	Above Median		Below Median	
	Mean	SD	Mean	SD
Total Region GDP in INR Per Capita	60282	29472	185000	1530000
All Industry GDP in INR Per Capita	16015	12469	36544	138000
Agriculture GDP in INR Per Capita	8971	9558	8045	8250
Agriculture and Related in INR Per Capita	14754	11645	14224	13015
Manufacturing GDP in INR Per Capita	5528	7169	17808	72251
Banking GDP in INR Per Capita	6379	6679	60073	751000
% Households Without Bank Accounts	56	10	28	9
Panel D: Exposure Measure - Financial Inclusion Index				
	(1)	(2)	(3)	(4)
	Above Median		Below Median	
	Mean	SD	Mean	SD
Total Region GDP in INR Per Capita	54556	32558	189000	1520000
All Industry GDP in INR Per Capita	14541	16987	37806	137000
Agriculture GDP in INR Per Capita	7776	9115	9238	8709
Agriculture and Related in INR Per Capita	13803	11605	15171	13007
Manufacturing GDP in INR Per Capita	4013	7040	19190	71641
Banking GDP in INR Per Capita	4754	4332	61166	748000
Financial Inclusion Index	68	8	38	14

**Table 5: Regional Exposure Measures and Ex-Post JDY Intensity**

This table reports the coefficient estimates from the following regression model:

$$y_i = \beta_0 + \beta_1 \text{Exposure Measure}_i + \beta_2 \text{Log(GDP)}_{i,\text{lag}} + \varepsilon_i$$

where  $i$  refers to unique state.  $y_i$  is the *Log of Total Number* of JDY accounts opened in each state during the period August, 2014 to December 2015 in Panel A. Similarly,  $y_i$  is the *Log of Total INR Amount Deposited in JDY accounts* during the same period in panel B. The exposure measure is one of the following: *Adults per Unit Bank Branch*, *% State-Owned Branches*, *% Households With Bank Accounts* and a comprehensive *Financial Inclusion Index*. The detailed description and summary statistics for these variables are provided in appendix A. Note that the coefficient  $\beta_1$  reported in this table is scaled such that it measures the change in dependent variables for one standard deviation increase in the corresponding exposure measure. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels respectively.

Panel A: Log(# of JDY Accounts)				
	(1)	(2)	(3)	(4)
Adults Per unit Bank Branch	0.573*** (0.098)			
% State-Owned Branches		0.357** (0.137)		
% Households Without Bank Accounts			0.410*** (0.122)	
Financial Inclusion Index				0.512*** (0.107)
N	32	32	32	32
R <sup>2</sup>	0.929	0.874	0.888	0.913
Panel B: Log(Total JDY Deposits)				
	(1)	(2)	(3)	(4)
Adults Per unit Bank Branch	0.390*** (0.109)			
% State-Owned Branches		0.224** (0.131)		
% Households Without Bank Accounts			0.140*** (0.127)	
Financial Inclusion Index				0.315*** (0.115)
N	32	32	32	32
R <sup>2</sup>	0.898	0.866	0.859	0.883

**Table 6: JDY Exposure and Total Deposits on Non-JDY Accounts**

This table reports the coefficient estimates from the following regression model:

$$y_i = \beta_0 + \beta_1 \text{Exposure Measure}_i + \beta_2 \text{Log(GDP)}_{i,\text{lag}} + \varepsilon_i$$

where  $i$  refers to unique state.  $y_i$  is the *Log of Total Deposits in Non-JDY accounts* in each state during the period August, 2014 to August 2015 in Panel A.  $y_i$  is the difference between the average annual growth in deposits during JDY period and the average annual growth in deposits in pre-JDY period in Panel B. The exposure measure is one of the following: *Adults per Unit Bank Branch*, *% State-Owned Branches*, *% Households with Bank Accounts* and a comprehensive *Financial Inclusion Index*. The detailed description and summary statistics for these variables are provided in appendix A. Note that the coefficient  $\beta_1$  reported in this table is scaled such that it measures the change in dependent variables for one standard deviation increase in the corresponding exposure measure. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels respectively.

Panel A: Log(Total Non-JDY Deposits)				
	(1)	(2)	(3)	(4)
Adults Per unit Bank Branch	1.158 (0.762)			
% State-Owned Branches		0.470 (0.786)		
% Households Without Bank Accounts			0.792 (0.773)	
Financial Inclusion Index				1.137 (0.781)
N	32	32	32	32
R <sup>2</sup>	0.260	0.211	0.229	0.255
Panel B: Change in Annual Growth Rate of Non-JDY Deposits				
	(1)	(2)	(3)	(4)
Adults Per unit Bank Branch	-0.000 (0.009)			
% State-Owned Branches		0.013 (0.009)		
% Households Without Bank Accounts			0.003 (0.009)	
Financial Inclusion Index				0.001 (0.009)
N	32	32	32	32
R <sup>2</sup>	0.145	0.203	0.148	0.146

**Table 7: JDY Exposure and Bank Lending**

This table reports the coefficient estimates from the following regression model:

$$y_i = \beta_0 + \beta_1 \text{Exposure Measure}_i + \varepsilon_i$$

where  $i$  refers to unique district.  $y_i$  is the difference in the average annual lending growth rate during the JDY period (2015-2014) and the average lending growth rate in pre-JDY period (2013-2012). The exposure measure is one of the following: *Adults per Unit Bank Branch*, *% State-Owned Branches*, *% Households With Bank Accounts* and a comprehensive *Financial Inclusion Index*. The detailed description and summary statistics for these variables are provided in appendix A. Note that the coefficient  $\beta_1$  reported in this table is scaled such that it measures the change in dependent variables for one standard deviation increase in the corresponding exposure measure. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels respectively.

	(1)	(2)	(3)	(4)
Adults Per unit Bank Branch	0.023*** (0.0045)			
% State-Owned Branches		0.026*** (0.0045)		
% Households Without Bank Accounts			0.011* (0.0046)	
Financial Inclusion Index				0.018*** (0.0045)
N	600	600	600	600
R <sup>2</sup>	0.043	0.055	0.011	0.026

**TABLE 8: Regional Exposure Measure and Bank Loans (Bank Data)**

This table reports the coefficient estimates from the following regression model:

$$y_i = \beta_0 + \beta_1 \text{Exposure Measure}_i + \varepsilon_i$$

where  $i$  refers to unique district.  $y_i$  is the difference in the average annual lending growth rate during the JDY period (2015-2014) and the average lending growth rate in period before JDY (2013-2012). The exposure measure is one of the following: *Adults per Unit Bank Branch*, *%age State-Owned Branches*, *%age Households With Bank Accounts* and a comprehensive *Financial Inclusion Index*. The detailed description and summary statistics for these variables are provided in appendix A. Note that the coefficient  $\beta_1$  reported in this table is scaled such that it measures the change in dependent variables for one standard deviation increase in the corresponding exposure measure. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels respectively.

Panel A: Monthly Growth in Total Loan Amount				
	(1)	(2)	(3)	(4)
Adults Per unit Bank Branch	0.055*** (0.011)			
%age State-Owned Branches		0.032*** (0.011)		
%age Households Without Bank Accounts			0.031*** (0.011)	
Financial Inclusion Index				0.041*** (0.011)
N	600	600	600	600
R2	0.039	0.013	0.012	0.022

**TABLE 9: Regional Exposure Measure and Bank Loan Delinquency (Bank Data)**

This table reports the coefficient estimates from the following regression model:

$$y_i = \beta_0 + \beta_1 \text{Exposure Measure}_i + \varepsilon_i$$

where  $i$  refers to unique district.  $y_i$  in panels C and D is the difference between the average default rate on newly originated loans during the JDY period minus the average monthly default rate (2014, September to 2015 September) on loans originated just prior to the JDY period (2014, January to 2014 July), where default rate is defined as the proportion of loans originated in a given month that become 60-day delinquent (panel A) or 90-day delinquent (panel B) within a year from loan origination. The exposure measure is one of the following: *Adults per Unit Bank Branch*, *%age State-Owned Branches*, *%age Households With Bank Accounts* and a comprehensive *Financial Inclusion Index*. The detailed description and summary statistics for these variables are provided in appendix A. Note that the coefficient  $\beta_1$  reported in this table is scaled such that it measures the change in dependent variables for one standard deviation increase in the corresponding exposure measure. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels respectively.

Panel A: Default Rate – 60-day delinquency				
	(1)	(2)	(3)	(4)
Adults Per unit Bank Branch	0.004*** (0.001)			
%age State-Owned Branches		0.001 (0.001)		
%age Households Without Bank Accounts			0.004*** (0.001)	
Financial Inclusion Index				0.002* (0.001)
N	439	439	439	438
R2	0.030	0.003	0.026	0.006

Panel B: Default Rate – 90-day delinquency				
	(1)	(2)	(3)	(4)
Adults Per unit Bank Branch	0.003*** (0.001)			
%age State-Owned Branches		0.001 (0.001)		
%age Households Without Bank Accounts			0.003*** (0.001)	
Financial Inclusion Index				0.002* (0.001)
N	439	439	439	438
R2	0.027	0.003	0.018	0.007



**Table 10: JDY Exposure and Region GDP, Consumer Expenditure, Investment & Inflation**

This table reports the coefficient estimates from the following regression model:

$$y_i = \beta_0 + \beta_1 \text{Exposure Measure}_i + \varepsilon_i$$

where  $i$  refers to unique district.  $y_i$  is the difference in growth in outcome variable during the JDY period (2015-2014) and the pre-JDY period (2013-2012). The exposure measure is one of the following: *Adults per Unit Bank Branch*, *%age State-Owned Branches*, *%age Households With Bank Accounts* and a comprehensive *Financial Inclusion Index*. The detailed description and summary statistics for these variables are provided in appendix A. Note that the coefficient  $\beta_1$  reported in this table is scaled such that it measures the change in dependent variables for one standard deviation increase in the corresponding exposure measure. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels respectively. Panel A shows the results for the change in the GDP growth rate, Panel B for change in the debit card expenditure growth rate, Panel C for change in the investment growth rate, and Panel D for change in consumer price index (CPI).

Panel A: Total Region GDP				
	(1)	(2)	(3)	(4)
Adults Per unit Bank Branch	-0.012*** (0.002)			
% State-Owned Branches		-0.005** (0.002)		
% Households Without Bank Accounts			-0.000** (0.000)	
Financial Inclusion Index				-0.012*** (0.002)
N	595	595	595	595
R <sup>2</sup>	0.090	0.014	0.012	0.078

Panel B: Debit Card Expenditure				
	(1)	(2)	(3)	(4)
Adults Per unit Bank Branch	-0.027 (0.051)			
% State-Owned Branches		-0.073 (0.050)		
% Households Without Bank Accounts			0.087* (0.049)	
Financial Inclusion Index				-0.070 (0.050)
N	101	101	101	101
R <sup>2</sup>	0.000	0.021	0.031	0.020

**Table 10 [continued]**

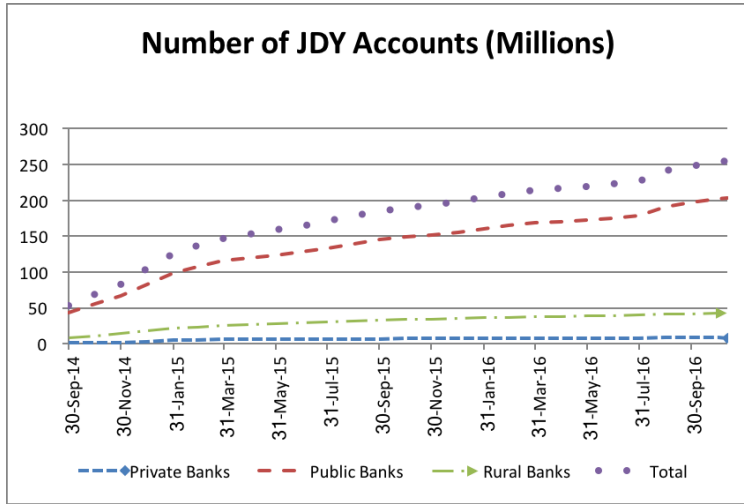
Panel C: Total Investments				
	(1)	(2)	(3)	(4)
Adults Per unit Bank Branch	-0.014 (0.026)			
% State-Owned Branches		0.012 (0.026)		
% Households Without Bank Accounts			0.005 (0.026)	
Financial Inclusion Index				0.000 (0.026)
N	24	24	24	24
R <sup>2</sup>	0.013	0.009	0.002	0.000

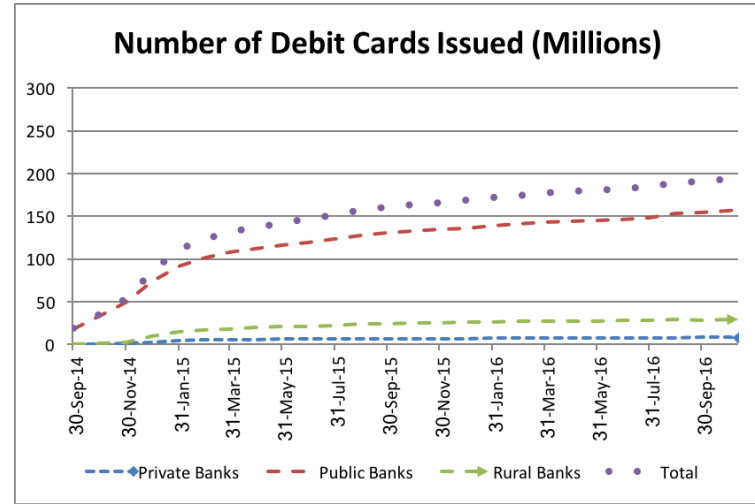
Panel D: Total CPI				
	(1)	(2)	(3)	(4)
Adults Per unit Bank Branch	0.000 (0.003)			
% State-Owned Branches		0.000 (0.003)		
% Households Without Bank Accounts			0.002 (0.003)	
Financial Inclusion Index				-0.001 (0.003)
N	34	34	34	34
R <sup>2</sup>	0.000	0.000	0.019	0.001

**Figure 1: Time Series of Aggregate Extensive Margin Statistics on JDY**

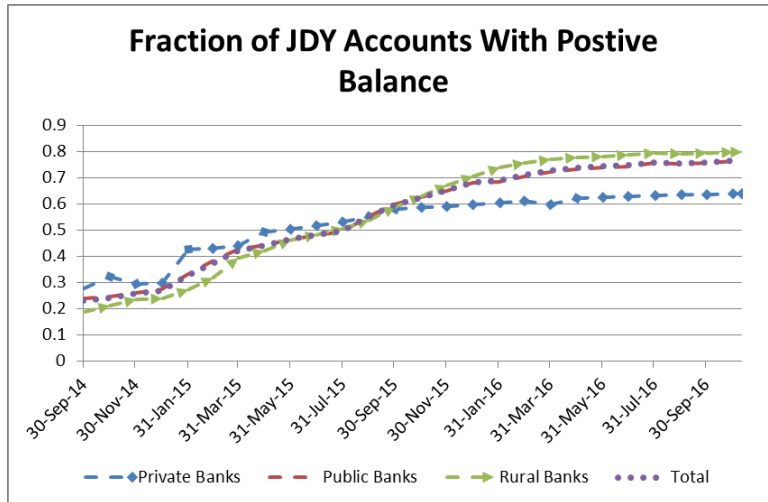
The figure shows time series of aggregate statistics related to JDY program: Number of Accounts Opened (Panels (a)), Number of Debit Cards issued (Panel (b)), Fraction of accounts with positive balance (panel (c)), and Total amount deposited in JDY accounts (panel (d)). The four lines represent the statistics respectively for JDY accounts opened by private banks, public (government owned) banks, regional rural banks and the total across all banks.



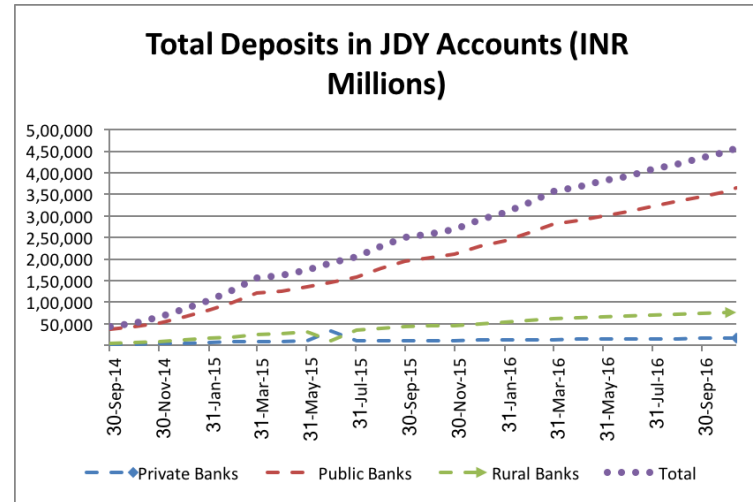
(a) # Accounts Opened



(b) # Debit Cards Issued



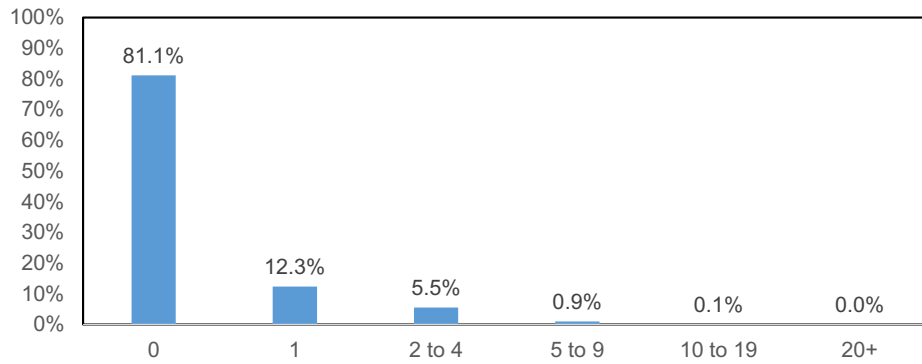
(a) # Accounts with Positive Balance



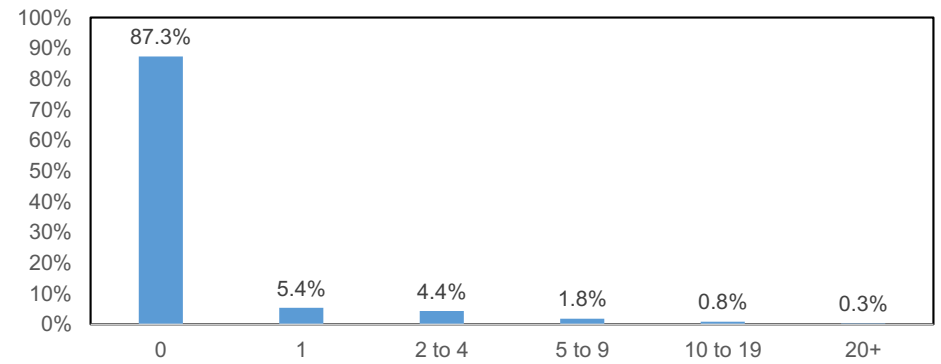
(b) Total Deposits in JDY Accounts

**Figure 2: Summary of Banking Transactions Performed**

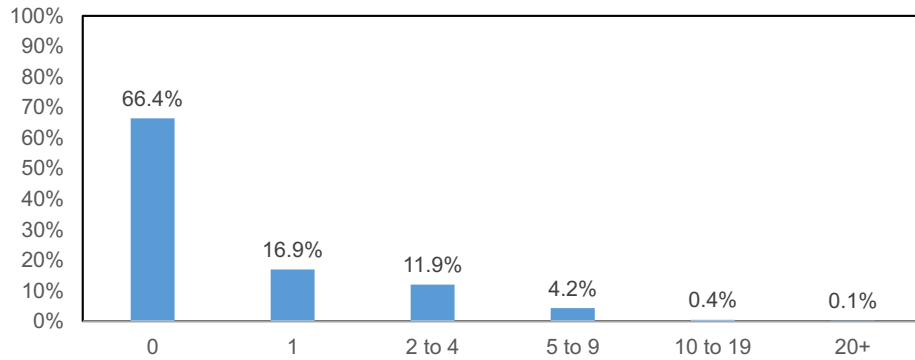
The figure shows the distribution of number of one of four banking transactions: Cash Deposits (Panels (a)), Cash Withdrawals (Panel (b)), Inward Remittances (panel (c)), and Outward Remittances (panel (d)) during the first six months since an account opening.



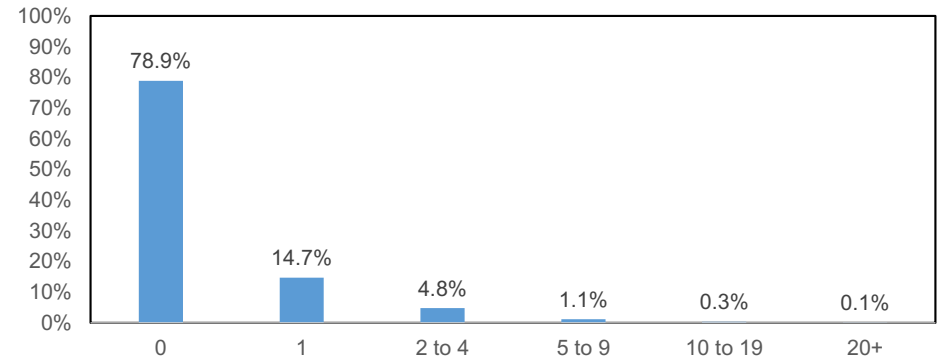
(a) Cash Deposits



(b) Cash Withdrawals



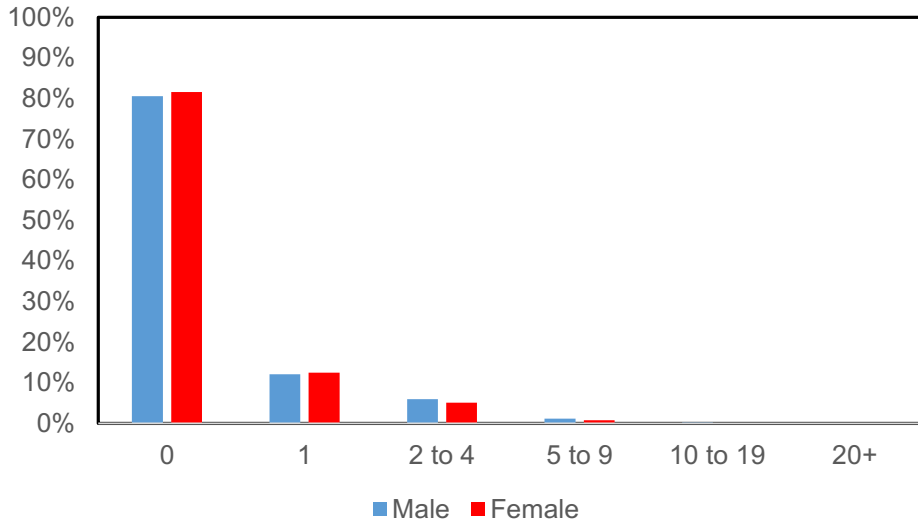
(c) Inward Remittances



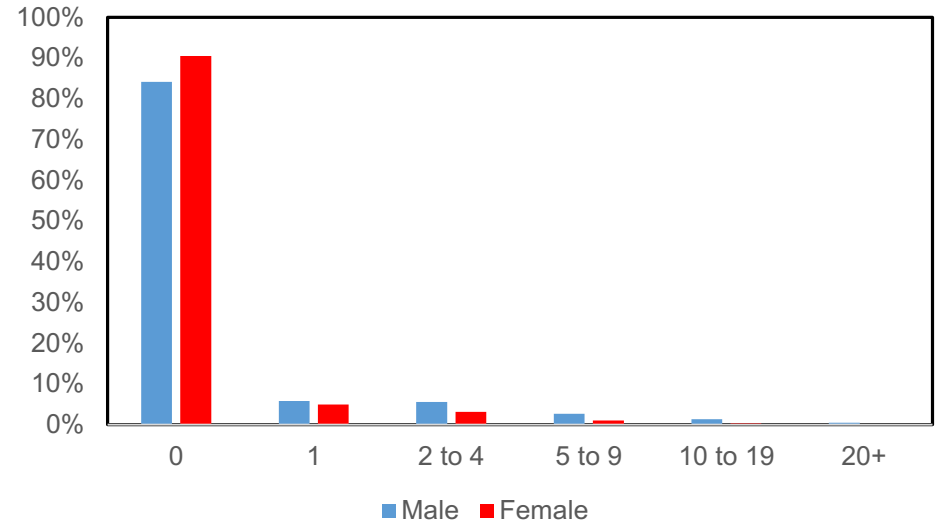
(d) Outward Remittances

**Figure 3: Summary of Banking Transactions Performed (by Gender)**

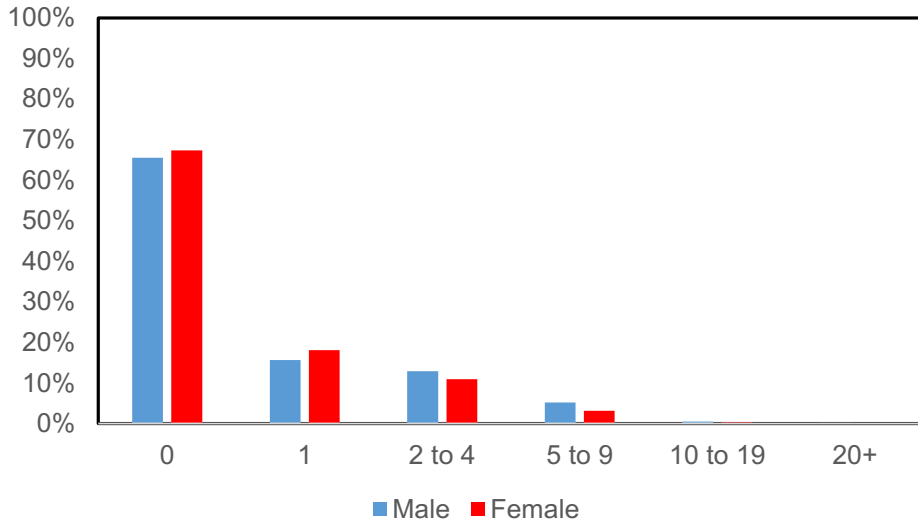
The figure shows the distribution of number of one of four banking transactions: Cash Deposits (Panels (a)), Cash Withdrawals (Panel (b)), Inward Remittances (panel (c)), and Outward Remittances (panel (d)) during the first six months since an account opening across accounts split by the sex (male, female) of the account holder.



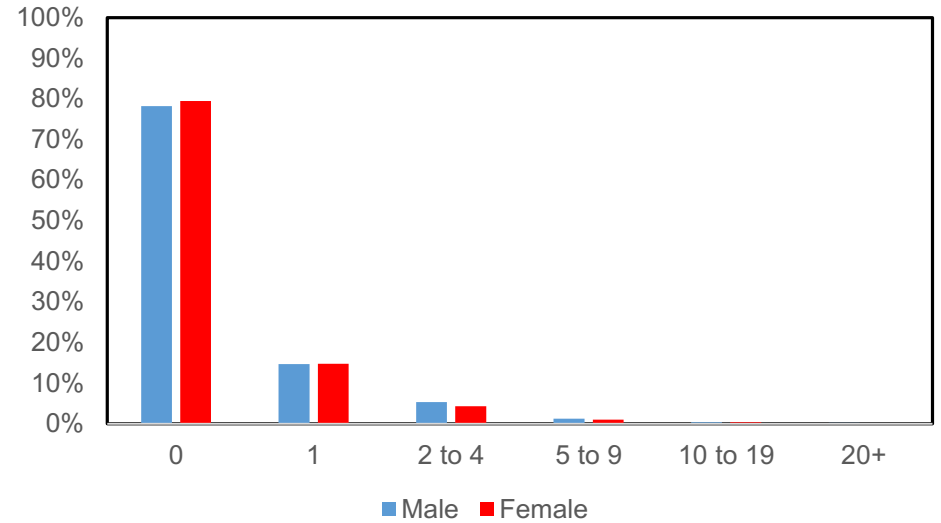
(a) Cash Deposits



(b) Cash Withdrawals



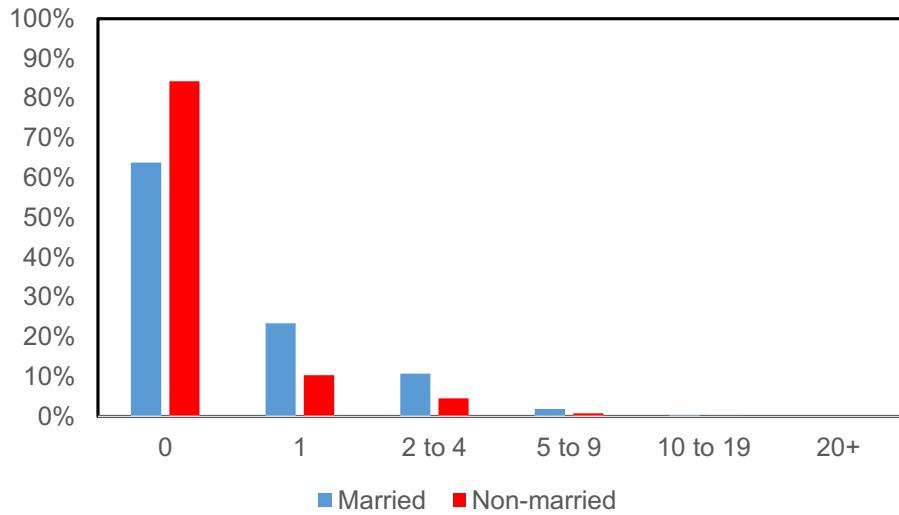
(c) Inward Remittances



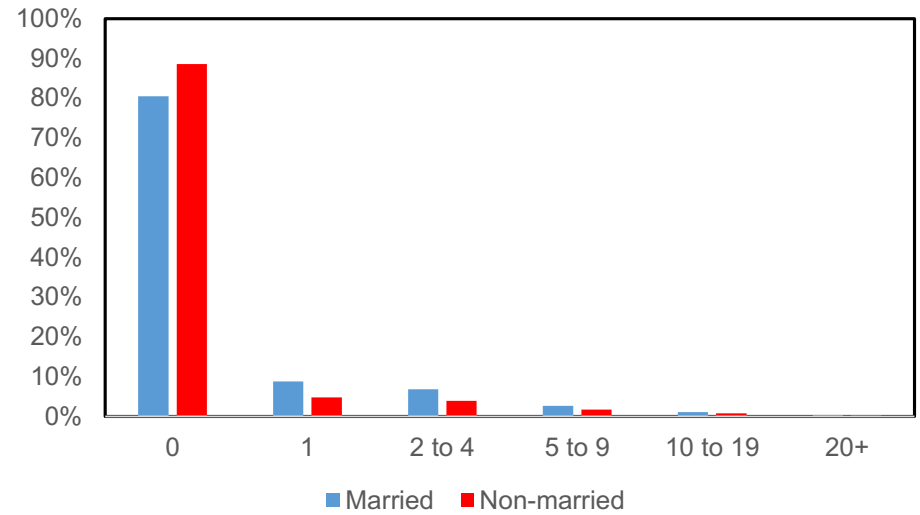
(d) Outward Remittances

**Figure 4: Summary of Banking Transactions Performed (by Marital Status)**

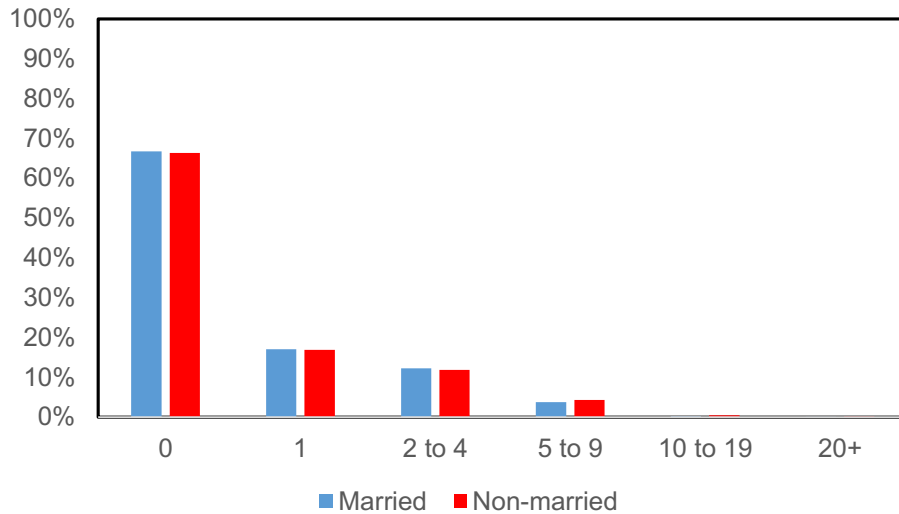
The figure shows the distribution of number of one of four banking transactions: Cash Deposits (Panels (a)), Cash Withdrawals (Panel (b)), Inward Remittances (panel (c)), and Outward Remittances (panel (d)) during the first six months since an account opening across accounts split by the marital status (married, unmarried) of the account holder.



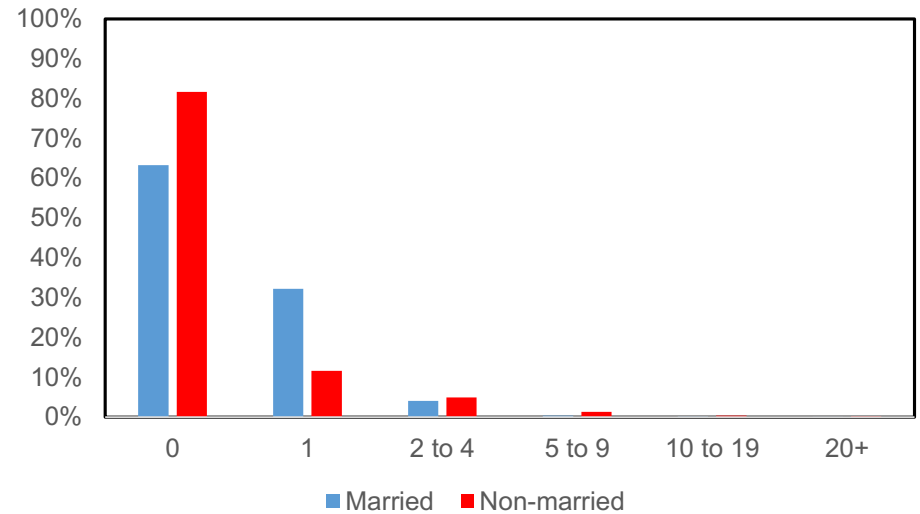
(a) Cash Deposits



(b) Cash Withdrawals



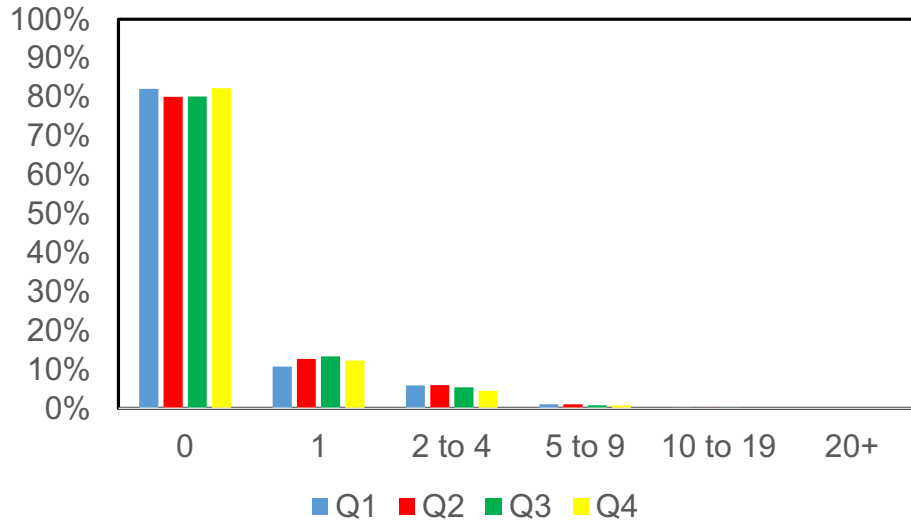
(c) Inward Remittances



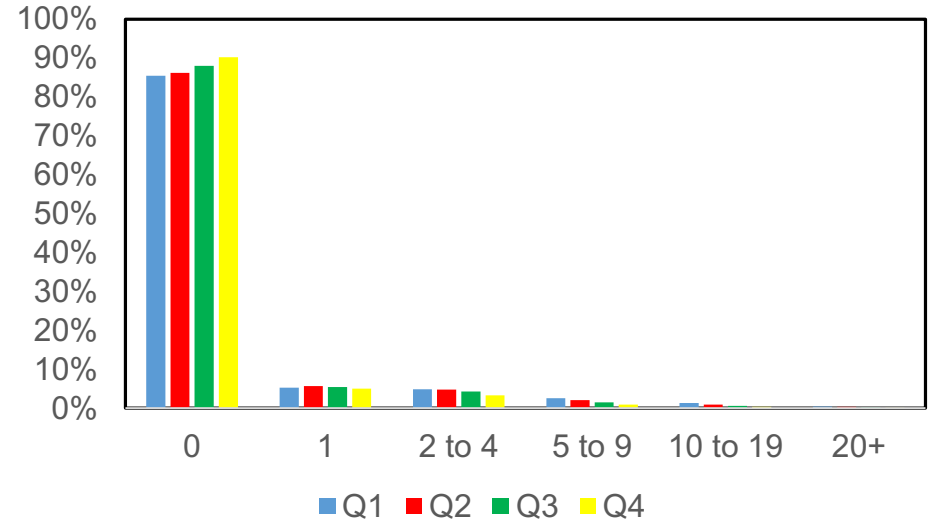
(d) Outward Remittances

**Figure 5: Summary of Banking Transactions Performed (by Age Quartiles)**

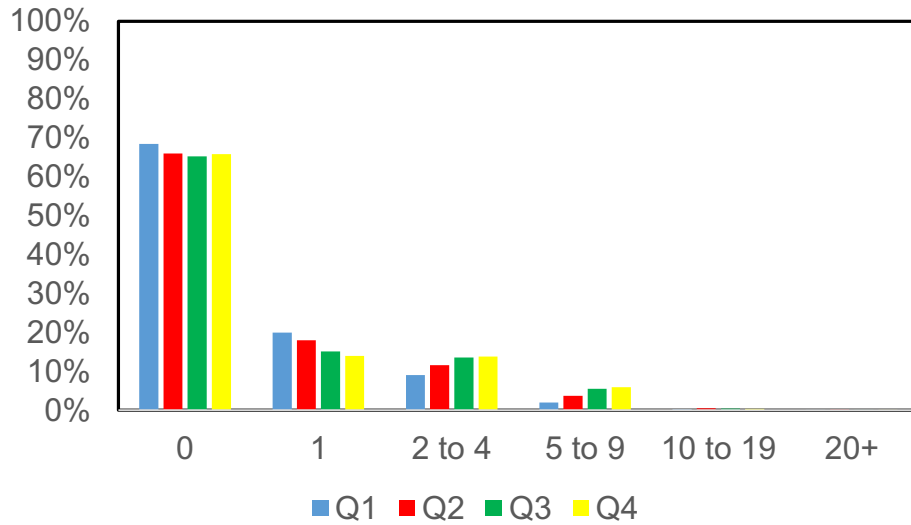
The figure shows the distribution of number of one of four banking transactions: Cash Deposits (Panels (a)), Cash Withdrawals (Panel (b)), Inward Remittances (panel (c)), and Outward Remittances (panel (d)) during the first six months since an account opening across accounts split by the age quartile of the account holder.



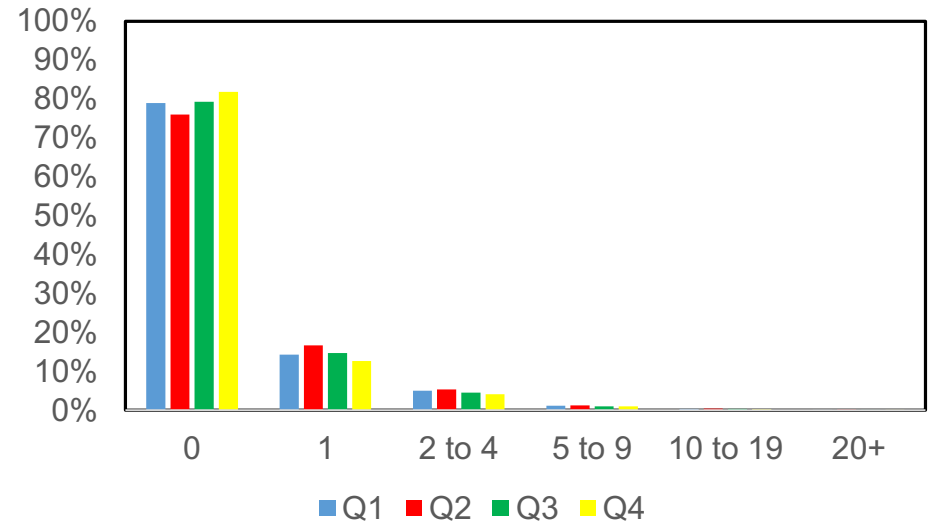
(a) Cash Deposits



(b) Cash Withdrawals



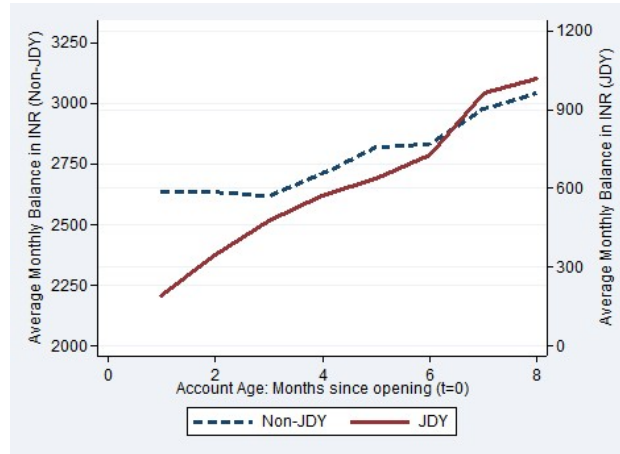
(c) Inward Remittances



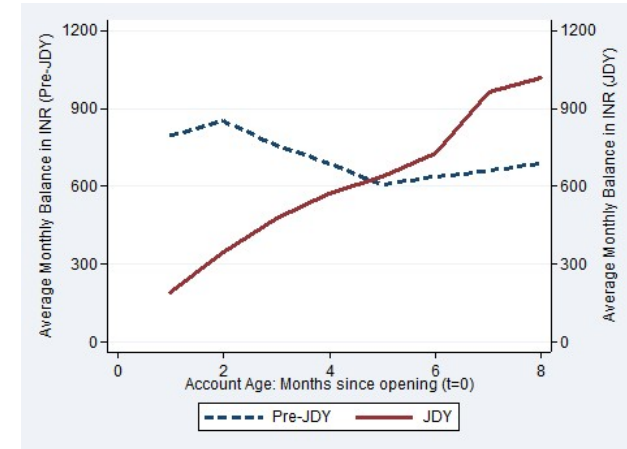
(d) Outward Remittances

**Figure 6: Evolution of account balance and overall usage across JDY and non-JDY accounts**

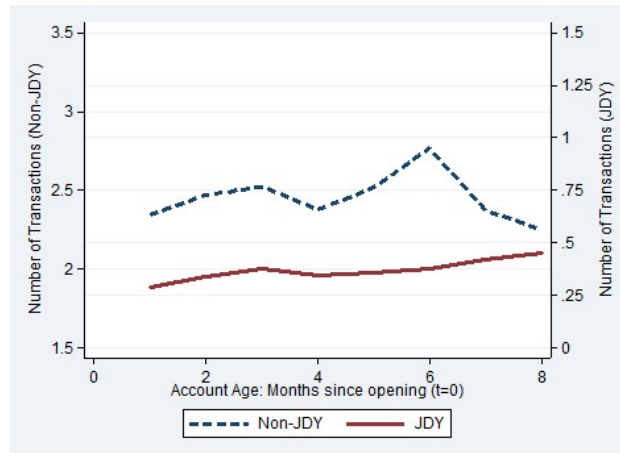
The figure shows time series evolution of aggregate statistics related to JDY program: Average monthly account balance (JDY vs. non-JDY in Panel a and Pre-JDY vs JDY in Panel b) and Number of Transactions (JDY vs. non-JDY in Panel c and Pre-JDY vs JDY in Panel d).



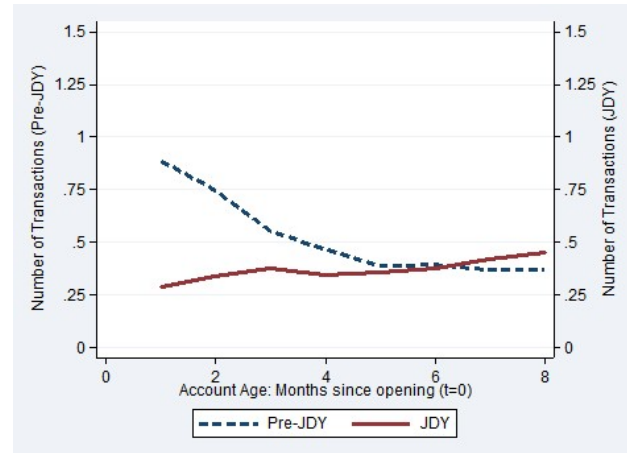
(a)



(b)



(c)

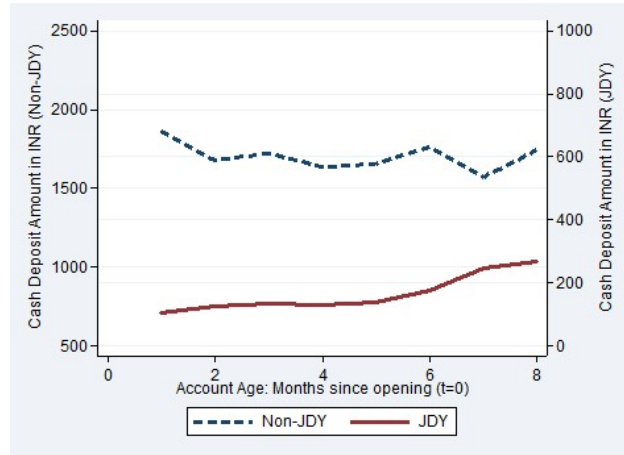


(d)

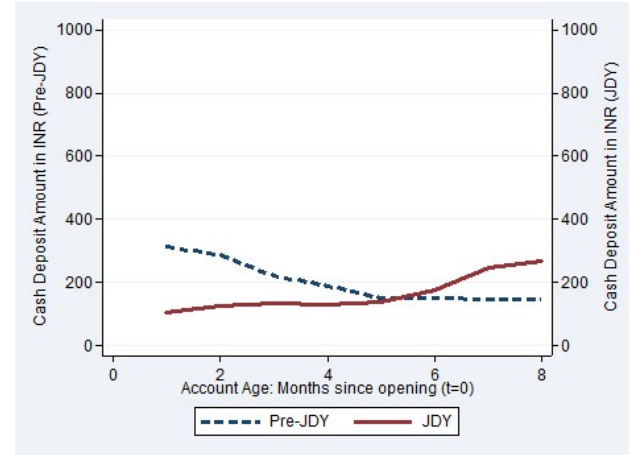


**Figure 7: Evolution of cash balance and cash withdrawal across JDY and non-JDY accounts**

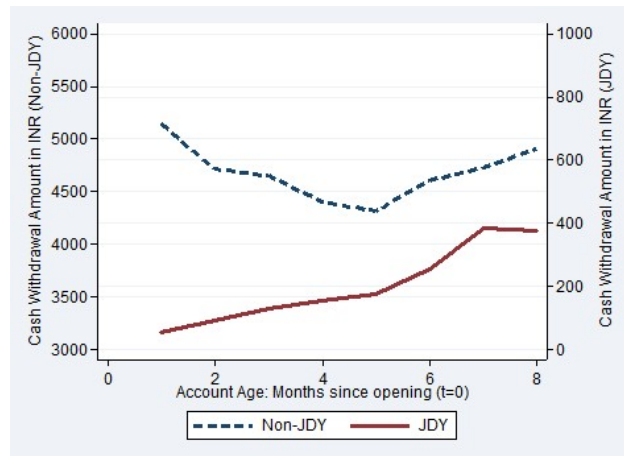
The figure shows time series evolution of aggregate statistics related to JDY program: Cash deposit amount (JDY vs. non-JDY in Panel a and Pre-JDY vs JDY in Panel b) and Cash withdrawal amount (JDY vs. non-JDY in Panel c and Pre-JDY vs JDY in Panel d).



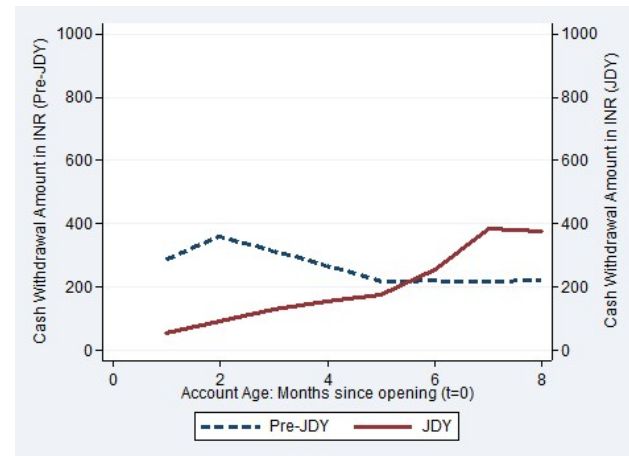
(a)



(b)



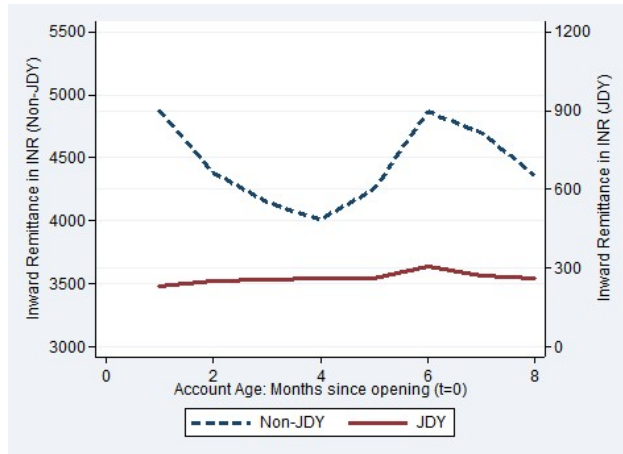
(c)



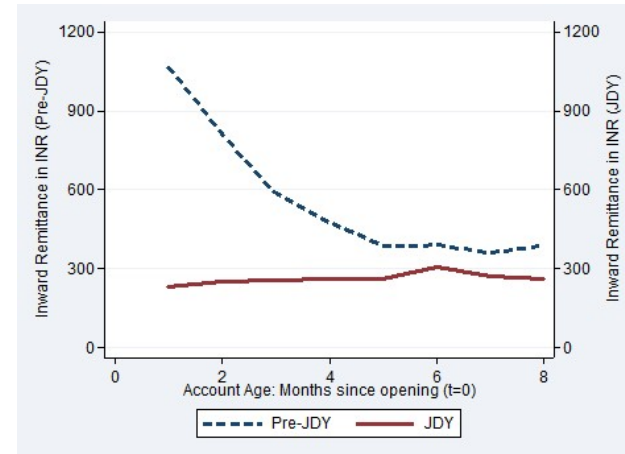
(d)

**Figure 8: Evolution of inward remittance and outward remittance across JDY and non-JDY accounts.**

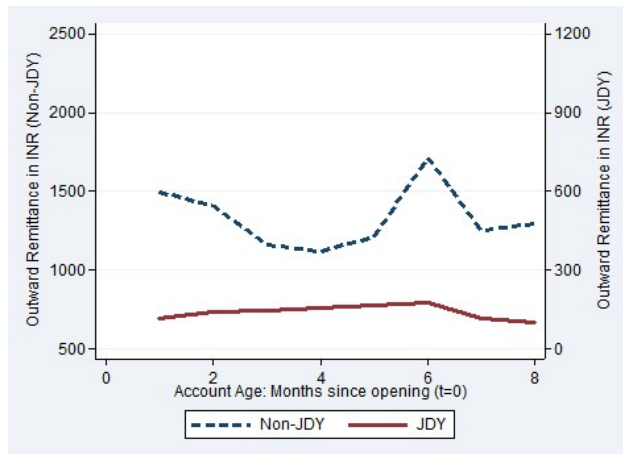
The figure shows time series evolution of aggregate statistics related to JDY program: Inward remittance amount (JDY vs. non-JDY in Panel a and Pre-JDY vs JDY in Panel b) and Outward remittance amount (JDY vs. non-JDY in Panel c and Pre-JDY vs JDY in Panel d).



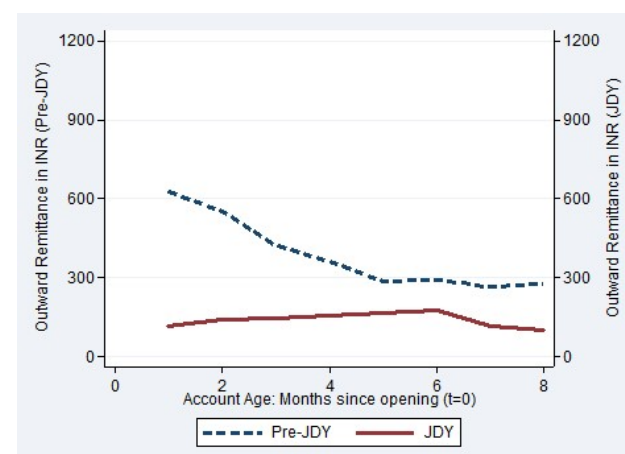
(a)



(b)



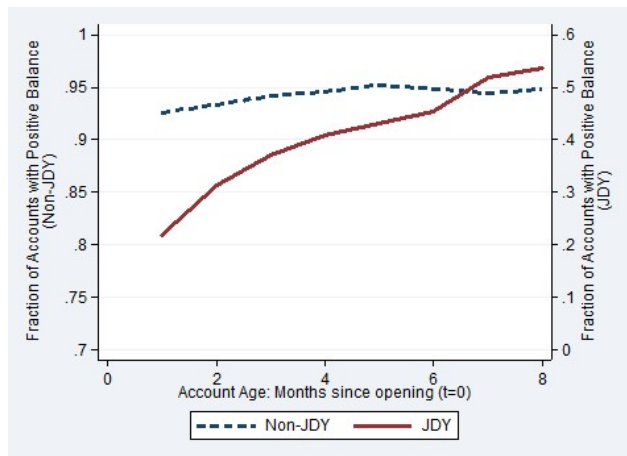
(c)



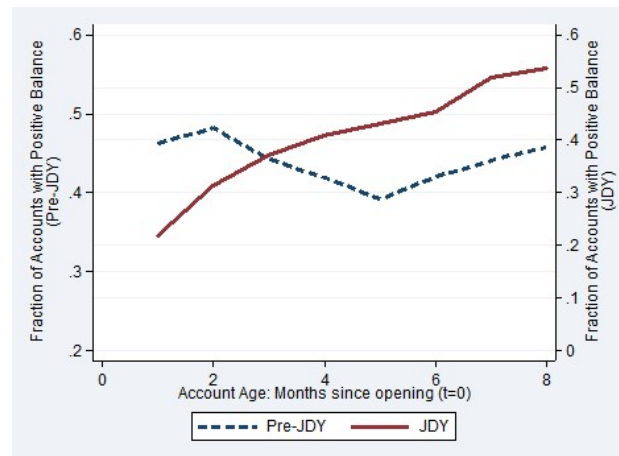
(d)

**Figure 9: Evolution of fraction of accounts with positive balance and positive usage across JDY and non-JDY accounts**

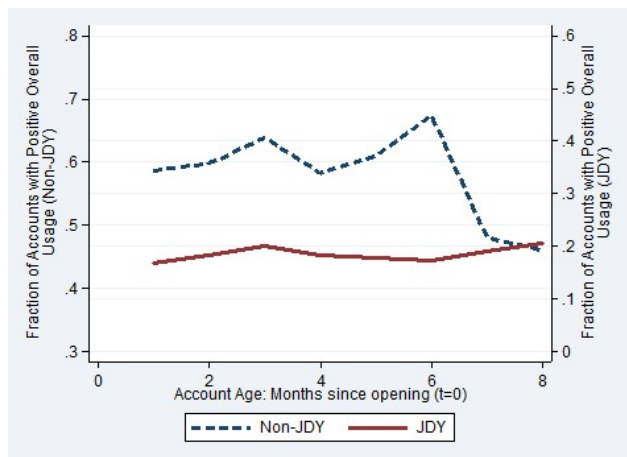
The figure shows time series evolution of aggregate statistics related to JDY program: Fraction of accounts with positive balance (JDY vs. non-JDY in Panel a and Pre-JDY vs JDY in Panel b) and Fraction of accounts with positive usage (JDY vs. non-JDY in Panel c and Pre-JDY vs JDY in Panel d).



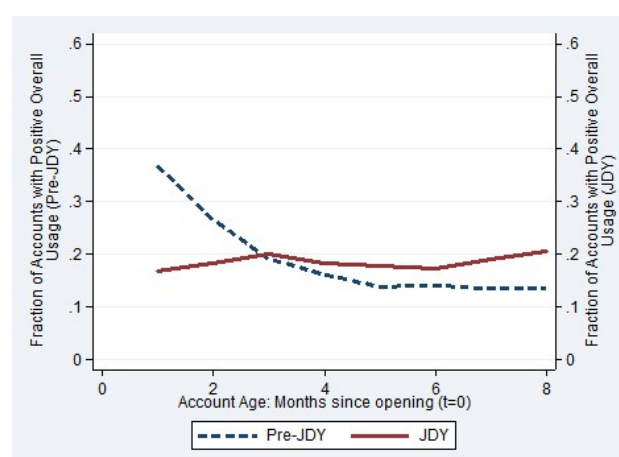
(a)



(b)



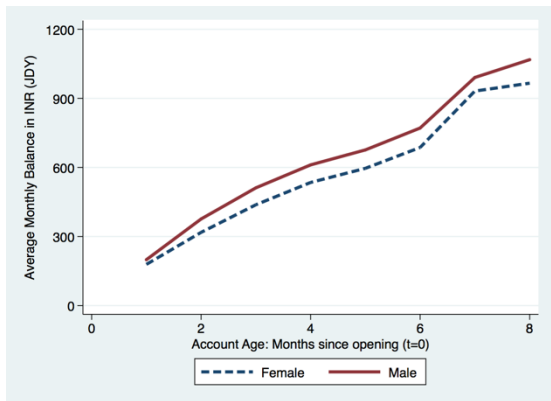
(c)



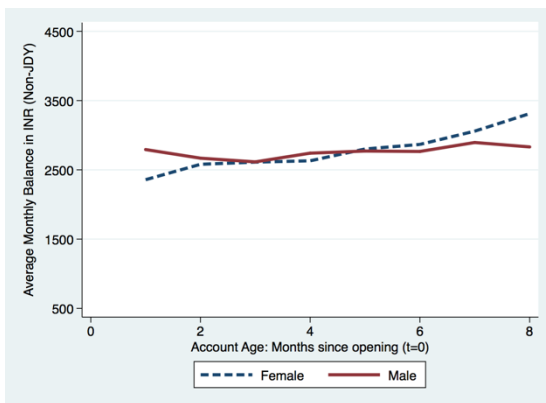
(d)

**Figure 10: Heterogeneity by Gender**

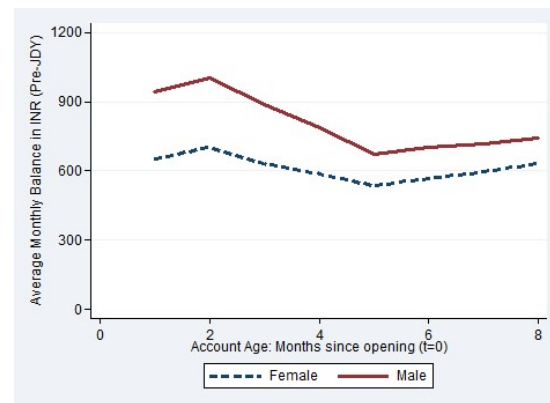
The figure shows time series of aggregate statistics related to JDY program: Average monthly balance (JDY in Panel a, Non-JDY in Panel b and Pre-JDY in Panel c) and Fraction of accounts with positive overall usage (JDY in Panel d, Non-JDY in Panel e and Pre-JDY in Panel f).



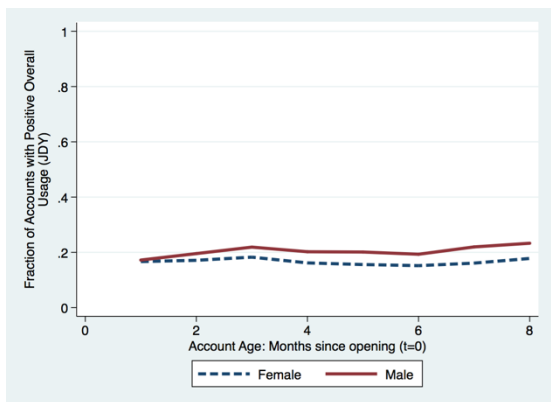
(a)



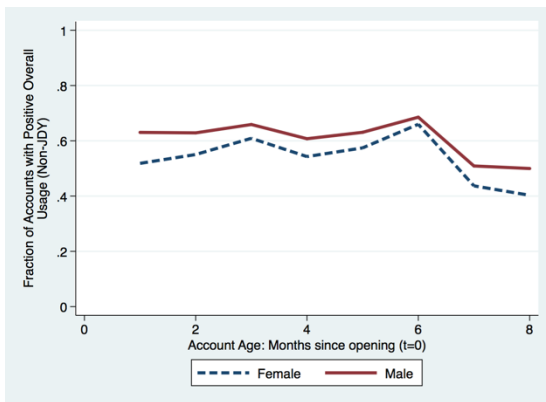
(b)



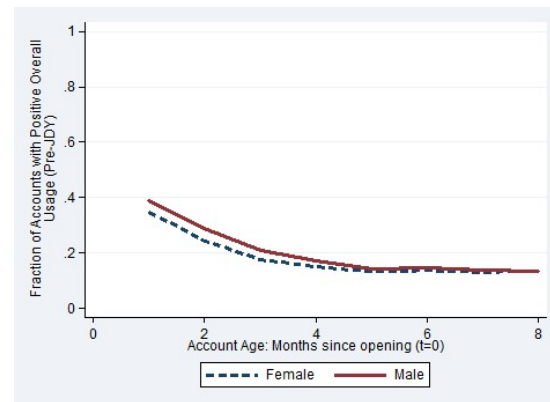
(c)



(d)



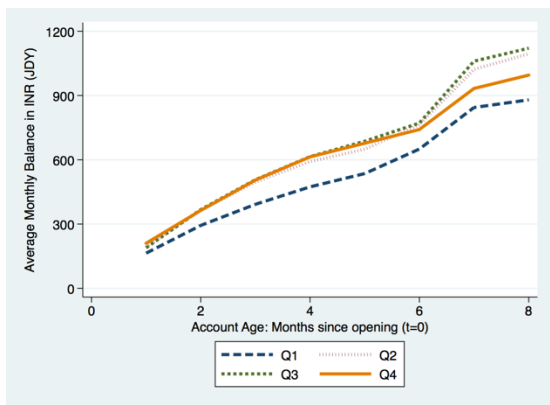
(e)



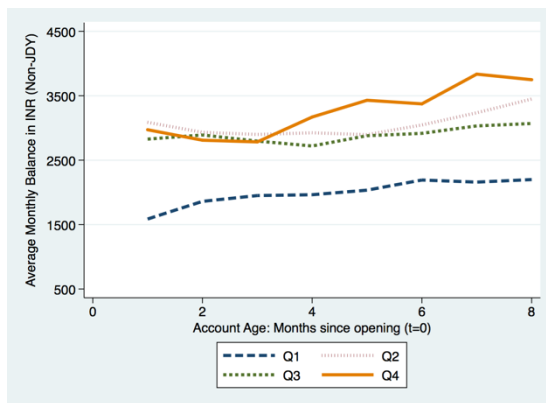
(f)

**Figure 11: Heterogeneity by Age of Depositor**

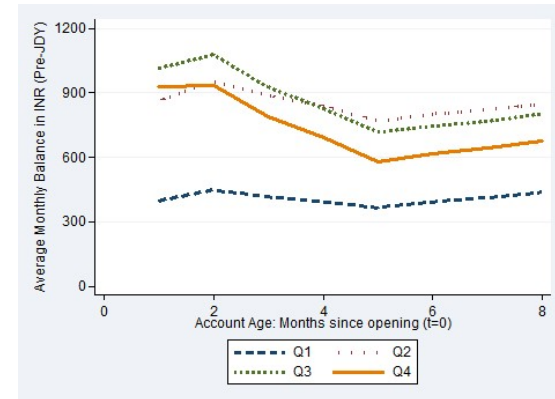
The figure shows time series of aggregate statistics related to JDY program: Average monthly balance (JDY in Panel a, Non-JDY in Panel b and Pre-JDY in Panel c) and Fraction of accounts with positive overall usage (JDY in Panel d, Non-JDY in Panel e and Pre-JDY in Panel f).



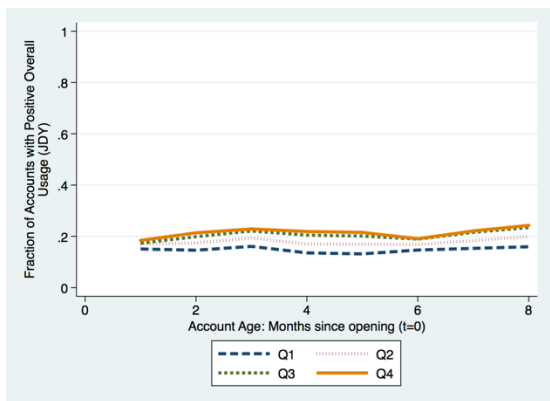
(a)



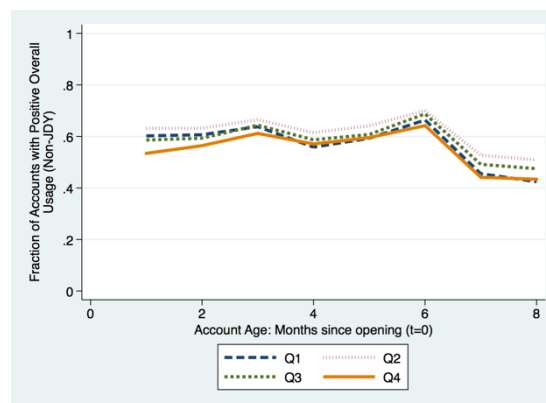
(b)



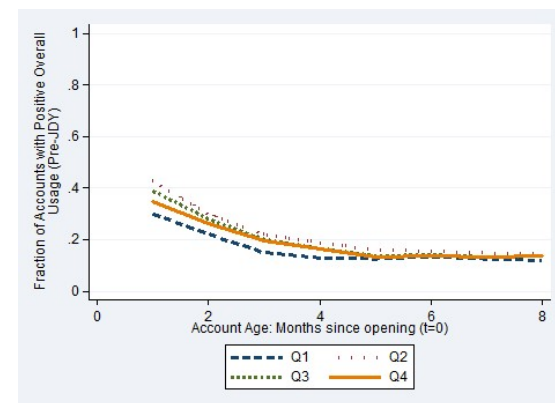
(c)



(d)



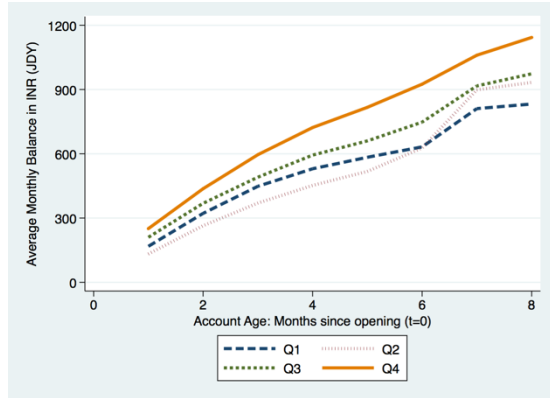
(e)



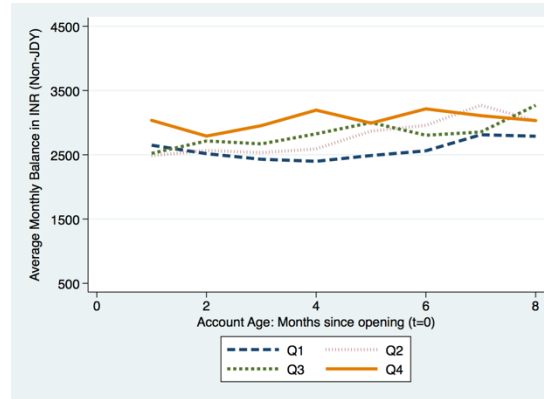
(f)

**Figure 12: Heterogeneity by GDP of region**

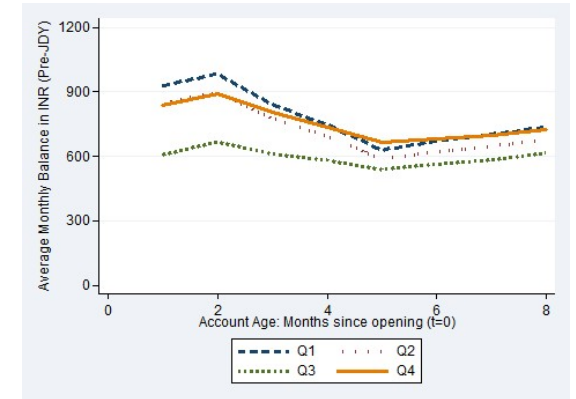
The figure shows time series of aggregate statistics related to JDY program: Average monthly balance (JDY in Panel a, Non-JDY in Panel b and Pre-JDY in Panel c) and Fraction of accounts with positive overall usage (JDY in Panel d, Non-JDY in Panel e and Pre-JDY in Panel f).



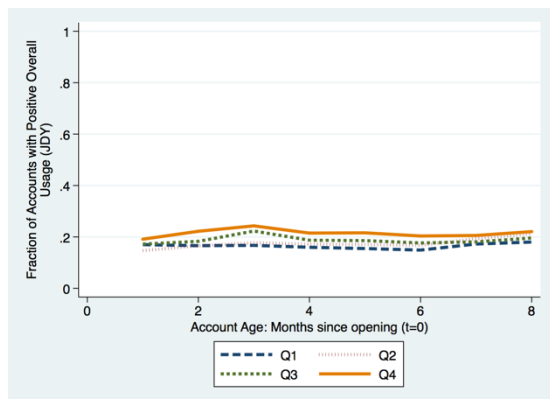
(a)



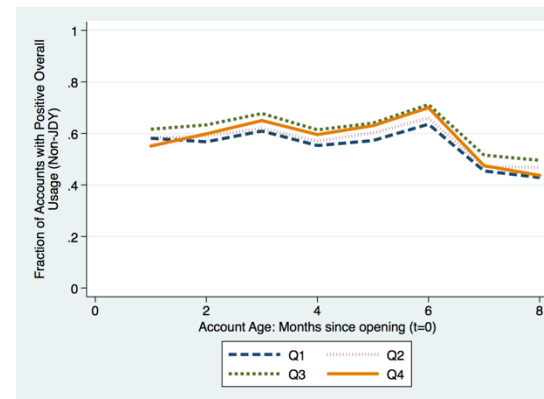
(b)



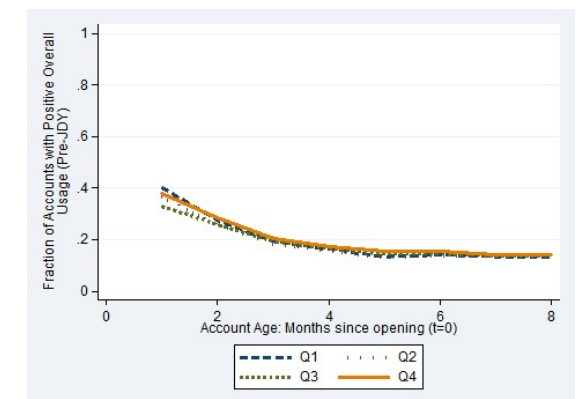
(c)



(d)



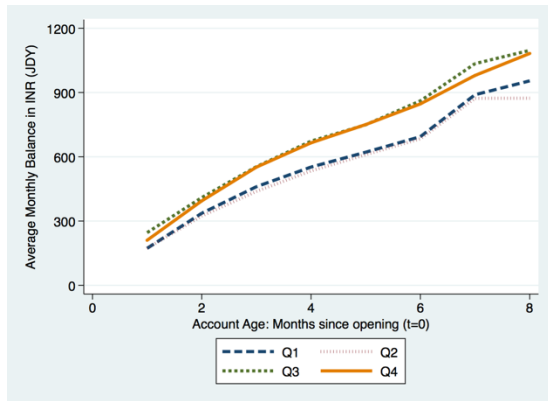
(e)



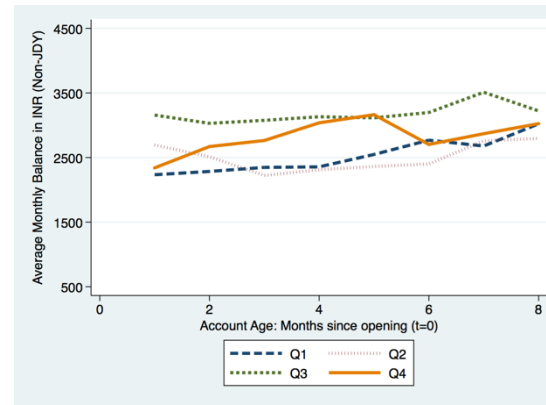
(f)

**Figure 13: Heterogeneity by Literacy of the Region**

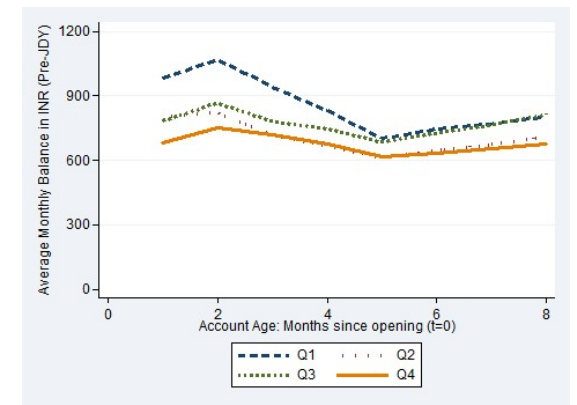
The figure shows time series of aggregate statistics related to JDY program: Average monthly balance (JDY in Panel a, Non-JDY in Panel b and Pre-JDY in Panel c) and Fraction of accounts with positive overall usage (JDY in Panel d, Non-JDY in Panel e and Pre-JDY in Panel f).



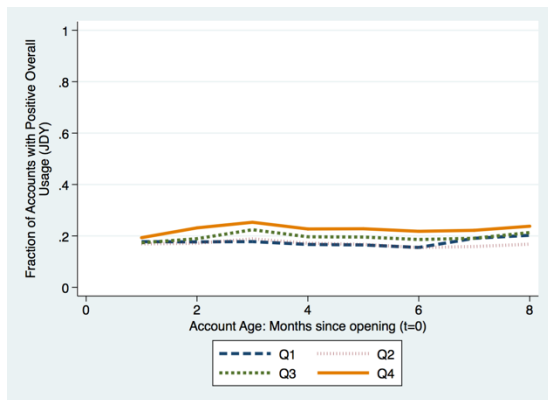
(a)



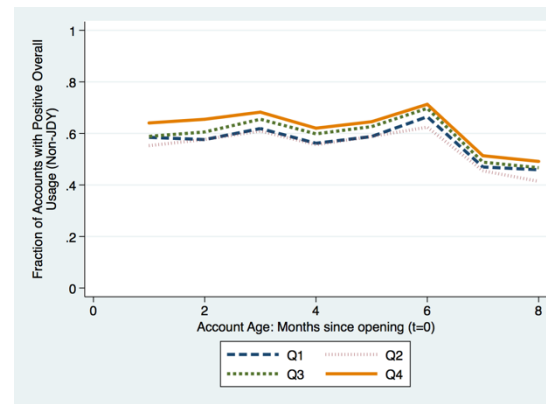
(b)



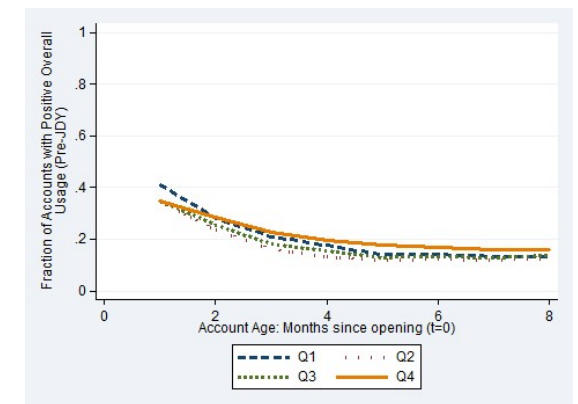
(c)



(d)



(e)



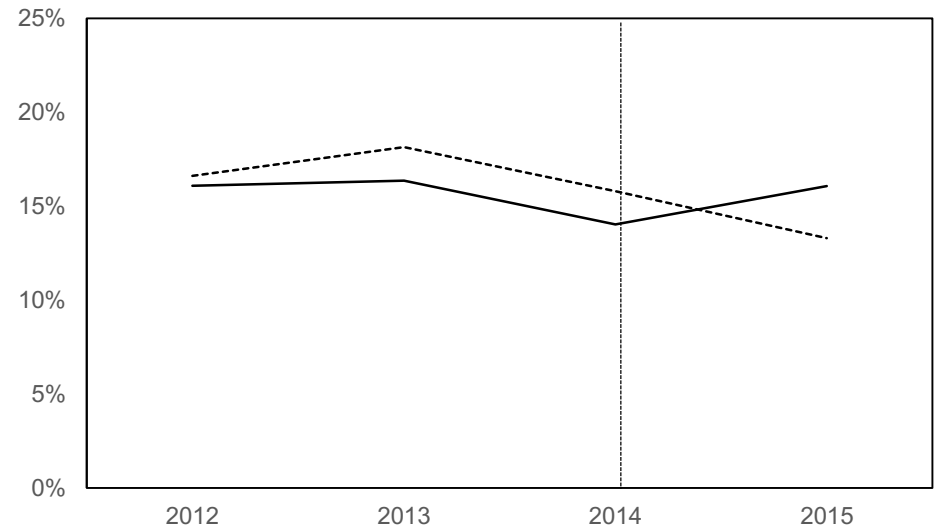
(f)

**Figure 14: JDY Exposure and Deposit and Bank Lending Growth Rate**

The figure shows the bank deposit percentage growth rates (Panels (a)) and bank lending growth rates (Panel (b)) in the more and less JDY exposed regions (based on the % of Households without Bank Accounts). The more exposed group is represented by the solid line, and the less exposed group is represented by the dashed line.



(a) Deposit Growth Rate



(b) Lending Growth Rate

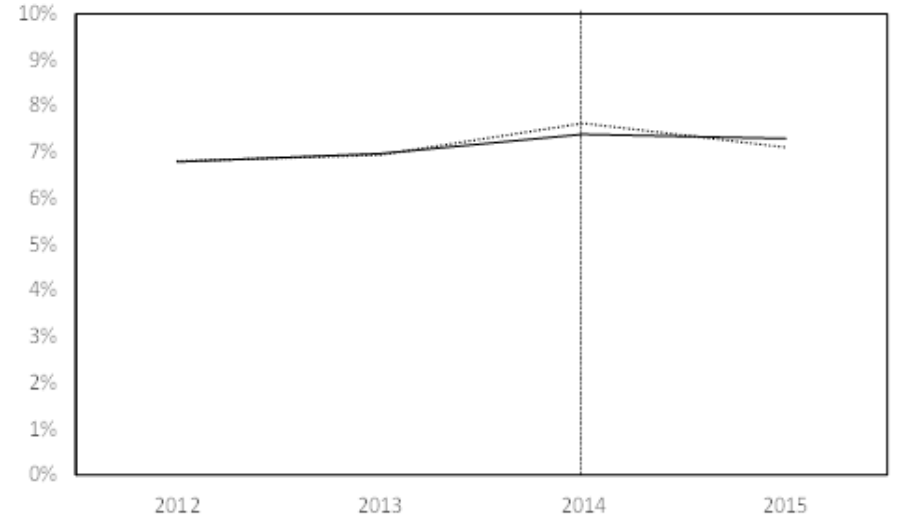


**Figure 15: Synthetic Control: JDY Exposure and Bank Lending and Region GDP Growth Rates**

The figure shows the bank lending growth rate (Panels (a)) and GDP growth rates (Panel (b)) in the more and less JDY exposed states (based on the % of Households without Bank Accounts). The more exposed group is represented by the solid line, and the less exposed synthetic control group is represented by the dashed line.



(a): Bank Lending Growth Rate



(b): GDP Growth Rate

## Online Appendix A: Variable Definition and Statistics

The Appendix describes and reports summary statistics for some of the key variables used in our analysis.

- *Accounts Per Capita*: the ratio of total number of JDY accounts opened in each state during the period August, 2014 to December 2015, to the total number of adults in that state.
- *Deposits Per Capita*: the ratio of total amount Deposited in JDY accounts in each state during the period August, 2014 to December 2015, to the total number of adults in that state.
- *Adults Per Unit Bank Branch*: the ratio of the total adult population to the total number of bank branches in a state (district) in Table 5 (Table 6).
- *%age State-Owned Bank Branches*: the ratio of total number of bank branches that are owned by state-owned banks to the total number of bank branches in each state (district) in Table 5 (Table 6).
- *%age Households Without Bank Accounts*: the ratio of total number of households without any bank account to the total number of households in each state (district) in Table 5 (Table 6).
- *Financial Inclusion Index*: a comprehensive district level measure of financial inclusion re- leased by CRISIL which combines three critical parameters of basic financial services: branch penetration, deposit penetration, and credit penetration into one single metric in the form of an index. It is a relative index that has a scale of 0 to 100 with higher number indicating lower levels of financial inclusion. For state level analysis (Table 5) we use the average value of the index across all districts.

## **Online Appendix B: Additional Tests**

The Appendix reports results of additional tests that are briefly described in the text. Additional details are available from the authors upon request.

**TABLE B1: Panel A – JDY Account Level Analysis of Average Balance and Usage Relative to Pre-JDY Accounts**

This table reports the coefficient estimates from the following regression model:

$$Balance_{it} = \beta_0 + \beta_1 JDY_{it} + \beta_2 Age_{it} + \beta_3 JDY \times Age + X_{i,t} + Account\ Opening\ Date_t + \varepsilon_{it}$$

where *i* refers to unique bank account, and *t* refers to year-month. *Balance* is *Average monthly balance* in column (1), a dummy variable that takes the value 1 for accounts-months with positive balance in columns (2) and a dummy variable that takes the value 1 for accounts-months if at least one transaction was performed by the account holder in column (3). *Age* is the number of months since account opening. *JDY* is a dummy variable that identifies accounts opened under the JDY program. In these baseline tests, we focus on the periods up to 10 months after the commencement of Jan Dhan Yojna (JDY) (August (2014) to May (2015)). The excluded category is pre-JDY accounts as defined in Section III. All variables are defined in detail in appendix A. Proprietary data was obtained from one of the largest banks in India. Account-clustered robust standard errors are reported in parentheses. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels respectively.

	Average Monthly	Positive Balance	Positive Usage
	(1)	(2)	(3)
JDY	-605.458*** (7.034)	-0.191*** (0.001)	-0.049*** (0.001)
Age of Account	2.637*** (0.438)	0.010*** (0.000)	-0.007*** (0.000)
Age of Account X JDY	109.205*** (1.657)	0.036*** (0.000)	0.008*** (0.000)
N	19024045	19024045	19024045
R <sup>2</sup>	0.002	0.026	0.013

**TABLE B1: Panel B – JDY Account Level Analysis of Cash Deposits and Withdrawals Relative to Pre-JDY Accounts**

This table reports the coefficient estimates from the following regression model:

$$Transaction_{it} = \beta_0 + \beta_1 JDY_{it} + \beta_2 Age_{it} + \beta_3 JDY \times Age + X_{i,t} + Account\ Opening\ Date_t + \varepsilon_{it}$$

where *i* refers to unique bank account, and *t* refers to year-month. *Transaction* in panel B is one of the 12 variables defined in appendix A based on deposit and withdrawal transactions. *Age* is the number of months since account opening. *JDY* is a dummy variable that identifies accounts opened under the JDY program. In these baseline tests, we focus on the periods up to 10 months after the commencement of Jan Dhan Yojna (JDY) (August (2014) to May (2015)). The excluded category is pre-JDY accounts as defined in Section III. Proprietary data was obtained from one of the largest banks in India. Account-clustered robust standard errors are reported in parentheses. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels respectively.

	Cash Deposit Amount	# Cash Deposit Transactions	Cash Deposit Dummy	Cash Withdrawal Amount	# Cash Withdrawal Transactions	Cash Withdrawal Dummy
	(1)	(2)	(3)	(4)	(5)	(6)
JDY	-144.723*** (3.034)	0.004*** (0.000)	0.013*** (0.000)	-291.462*** (3.689)	-0.147*** (0.001)	-0.050*** (0.000)
Age of Account	-8.641*** (0.201)	-0.002*** (0.000)	-0.002*** (0.000)	-8.118*** (0.270)	-0.005*** (0.000)	-0.002*** (0.000)
Age of Account X JDY	23.231*** (0.635)	0.001*** (0.000)	-0.001*** (0.000)	47.036*** (0.726)	0.024*** (0.000)	0.010*** (0.000)
N	19024045	19024045	19024045	19024045	19024045	19024045
R <sup>2</sup>	0.001	0.003	0.006	0.002	0.009	0.014

**TABLE B1: Panel C - JDY Account Level Analysis of Inward and Outward Remittances Relative to Pre-JDY Accounts**

This table reports the coefficient estimates from the following regression model:

$$Transaction_{it} = \beta_0 + \beta_1 JDY_{it} + \beta_2 Age_{it} + \beta_3 JDY \times Age + X_{i,t} + Account\ Opening\ Date_t + \varepsilon_{it}$$

where *i* refers to unique bank account, and *t* refers to year-month. *Transaction* in Panel C is one of the 12 variables defined in appendix A based on remittance transactions. *Age* is the number of months since account opening. *JDY* is a dummy variable that identifies accounts opened under the JDY program. In these baseline tests, we focus on the periods up to 10 months after the commencement of Jan Dhan Yojna (JDY) (August (2014) to May (2015)). The excluded category is pre-JDY accounts as defined in Section III. Proprietary data was obtained from one of the largest banks in India. Account-clustered robust standard errors are reported in parentheses. \*, \*\*, and \*\*\* indicate significance at 10%, 5%, and 1% levels respectively.

	Inward Remittance	# Inward Remittance	Inward Remittance	Outward Remittance	# Outward Remittance	Outward Remittance
	(1)	(2)	(3)	(4)	(5)	(6)
JDY	-449.872*** (6.043)	-0.068*** (0.001)	-0.028*** (0.000)	-331.536*** (5.594)	-0.123*** (0.001)	-0.060*** (0.000)
Age of Account	-27.364*** (0.396)	-0.008*** (0.000)	-0.005*** (0.000)	-14.832*** (0.331)	-0.006*** (0.000)	-0.002*** (0.000)
Age of Account X JDY	35.593*** (1.065)	0.005*** (0.000)	0.003*** (0.000)	22.165*** (1.051)	0.008*** (0.000)	0.004*** (0.000)
N	19024045	19024045	19024045	19024045	19024045	19024045
R <sup>2</sup>	0.001	0.004	0.014	0.001	0.002	0.009