Financial Inclusion and Women's Economic Empowerment in India

Nehal Jain

Pengpeng Xiao, Faculty Advisor

Michelle Connolly, Faculty Advisor

Honors Thesis submitted in partial fulfillment of the requirements for Graduation with Distinction in Economics in Trinity College of Duke University.

Duke University

Durham, North Carolina

2022

Acknowledgements

I would like to thank Professor Connolly and Xiao for their guidance on this paper. Professor Connolly spent countless hours working with me as I navigated through the intimidating process of writing my first economic research paper. Her advice and guidance was invaluable. Professor Xiao pushed me to truly understand the implications of my findings. This paper would not be possible without either of them.

I would also like to thank Kathy Calvin, Amanda Ellis, and the Girl Up campaign staff for sparking my interest in women's empowerment. From a young age, they have always believed in me and encouraged me to create a more equal world. Their dedication to gender equality taught me to look at problems through an intersectional, feminist lens. Without their mentorship, I would not have the inquisitive background or drive to write this paper. Finally, I would like to thank my friends and family for supporting me throughout the writing process by providing helpful insight, questions, or just listening to me ramble.

Abstract

On August 14th, 2014 India's Prime Minister Narendra Modi implemented the largest ever financial inclusion scheme to date known as Pradhan Mantri Jan Dhan Yojana (PMJDY). The program aimed to bank all of India's unbanked population. Prior to the program, India had one of the highest rates of unbanked citizens. The program also included measures that prioritized women's access to these financial institutions given the gender gap in financial inclusivity. This paper aims both to understand the effectiveness of PMJDY on granting women equal access as men to financial institutions and whether financial inclusion results in increased economic empowerment, I find that PMJDY was successful in increasing access to bank accounts and separately, that access to bank accounts economically empowers women.

JEL classification: J1; G28; I31

Keywords: Financial Inclusion; Women's Empowerment; Pradhan Mantri Jan Dhan Yojana

Contents

1 Introduction

This paper examines how financial inclusion policy in India affects women's actual economic empowerment. Financial inclusivity is the availability and accessibility of financial services to individuals who have historically not had access to these institutions. This paper specifically focuses on the Pradhan Mantri Jan Dhan Yojana (PMJDY) financial inclusion scheme implemented by the Indian government on August 15, 2014. The goal of PMJDY is to bank all of India's unbanked. To date, the program has given hundreds of millions of Indians their first access to bank accounts. I define financial inclusion (FI) as access to a bank account. Previous studies have shown that FI is key to poverty reduction and women's empowerment (Klapper, El-Zogbhi and Hess, 2016).

This paper focuses on India because it is home to one of the largest unbanked populations in the world and in recent years the Indian government has made FI a priority (World Bank, 2014). According to the World Bank Global Financial Inclusion Index, in 2011 only 35% of individuals in India older than fifteen were estimated to have a bank account, by 2017 this number had increased to 80%.[1] The increase in the banked population is a direct result of the PMJDY policy (Agarwal et. al, 2017). As of March 2022, 449 million PMJDY bank accounts have been created.[2] The government was able to roll out their efforts quickly using citizen identification numbers, biometric identification and simplified Know Your Customer protocol (Singh and Ghosh 2021).[3] In India, the most common biometric ID is an Aadhar card. The Aadhar program is the largest biometric ID system in the world.[4] As a result of the existing infrastructure and pre-launch preparation, approximately 80 million PMJDY accounts were opened within the first week of the announcement.

1.1 PMJDY Initiative

The goal of PMJDY is to give every household at least bank one account to provide them with basic banking services. The government announced that this goal was achieved on January 26th, 2015 (except in the region of Jammu and Kashmir which is currently disputed between India and Pakistan, and areas affected by "left wing extremism").[5] Note that Jammu and Kashmir are similarly not included in the

[1] http://www.worldbank.org/globalfindex
[2] pmjdy.gov.in
[3] Know Your Customer are international standards used by financial institutions to prevent fraudulent and/or illegal activity.
[4] https://www.daijiworld.com/news/newsDisplay.aspx?newsID=442948
[5] https://pib.gov.in/newsite/printrelease.aspx?relid=126439

survey data I use. As is evident by this impressive milestone, PMJDY was quickly and evenly rolled out across geographic regions starting in August 2014. The program targeted districts in which bank accounts were less common, to bring them to par with more financially advanced districts. By the beginning of 2015, all districts were relatively comparable in terms of household access to basic bank accounts as nationwide, every household reportedly had at least one bank account.

It is important to note that PMJDY is not the first FI effort undertaken by the Indian government. Still, it has been the most effective to date in terms of account creation and usage (Agarwal et. al, 2016). One can only speculate as to why PMJDY was more successful than former FI attempts. Potential reasons for success include the prioritization of sustainable measures for their program including mobile banking, low barriers to account creation, and financial literacy training. The accounts that were created under PMJDY were special "no-frill" bank accounts which required zero minimum balance, making the accounts accessible to low income individuals. These accounts have been classified separately, making it easy for the Indian government to keep track of them and aiding research efforts.

In addition to giving people access to banking, PMJDY accounts had certain measures aimed at increasing financial security. One of these components of is known as an "overdraft facility." This feature allows customers to withdraw money from their account even if it has zero balance with no collateral, essentially acting as a microfinance loan provided by the government. Under these accounts, customers can withdraw up to INR 5,000 (USD 66) after six months of good bank history (Agarwal et. al, 2017). The government stipulates that the women in the family are the preferred household member to withdraw this loan. However, men are still allowed to utilize the overdraft feature. The loan has to be approved by the bank, but the woman is not required to give her reason behind taking out the loan. The omission of reason is present to afford discretion to women; however, it also increases the likelihood that the loan might be misused. The overdraft facility mirrors the format of many informal microfinance programs that are already present in India, in which women are given control of microloans. These microfinance programs have shown to increase women's economic empowerment (Hulme 2008). Therefore, one can conclude the Indian government included this measure in an effort to increase women's economic empowerment. Unfortunately, the overdraft facility is not heavily used by account holders, giving researchers little insight into the feature's effectiveness.

It is important to further note that in 2016, the Indian government announced the demonetization of all bills over INR 500 (USD 7). The motivation behind this policy was to formalize the economy

and push people into formal financial institutions (e.g. banks), where black market activity is harder to conduct (Lahiri 2020). Since this policy occurred in the middle of the data set, I include a dummy variable in my regression for years after demonetization to control for the impact of demonetization; however, it is not the main focus of my paper.

1.2 Women's Empowerment

The motivation to include an analysis of women's empowerment alongside FI in this paper stems from studies that show FI has a positive impact on women's empowerment (Holloway, Niazi, Rouse, 2017). In this paper, I focus on economic empowerment, defining it as the ability and confidence to make one's own financial decisions. In heavily patriarchal societies such as India, access to money is often controlled by the male head of the household (Singh and Bhandari, 2012). The lack of independent access to money causes women to become financially reliant upon the male figure in her life. When women have control of their finances they are more likely to invest it in their community and families which leads to sustainable growth that helps end the vicious cycle of poverty (Demirguc-Kunt et al., 2017). Unfortunately, there is a gender gap in FI that causes less women than men to have access to financial institutions (World Bank, 2014). As a result, there has been a push for FI programs such as PMJDY to prioritize women's participation in financial inclusion.

According to the 2015 Indian National Family Health Survey (NFHS-4), women's empowerment measures have increased countrywide since the last time the same survey was conducted in 2011.[6] The NFHS-4 measures women's overall empowerment through variables such as: participating in household decisions, owning land, having a mobile phone, etc. This paper focuses on women's economic empowerment, specifically in relation to individual autonomy in financial decisions. I use survey data from the India Financial Inclusion Insight survey, which was conducted between 2013-2018, for data on women's empowerment.

This paper adds to existing discourse on the effectiveness of PMJDY and financial inclusion, particularly in relation to women. Previous papers on this matter that attempt a national analysis do not focus on women in particular and/or use bank data rather than survey data. Literature on PMJDY that incorporates a feminist analysis is sparse. Moreover, the literature that does exist often focuses on a single geographic area rather than attempting to explain country wide trends. This paper conducts a

[6] https://dhsprogram.com/publications/publication-fr339-dhs-final-reports.cfm

feminist analysis of PMJDY and financial inclusion on a country wide level. The remainder of the paper proceeds as follows. Section 2 offers a review of existing literature in the field. Section 3 describes the data. Section 4 assess the impact of PMJDY on bank account ownership. Section 5 assesses the impact of bank account ownership on economic empowerment. Section 6 is the conclusion.

2 Literature Review

This section presents literature relevant to financial inclusion (FI), the connection between FI and female empowerment, and an India specific analyses of FI driven by PMJDY. The World Bank reports that approximately 2 billion adults worldwide do not have access to a bank account, one-fifth of whom reside in India (Demirguc-Kunt et al., 2017). Past research provides evidence that increased FI can lead to decreased rates of poverty. There are many reasons that FI is directly linked to poverty reduction. In this paper I focus primarily on FI to the extent that an individual has access to a bank account.

From a welfare point of view, access to a bank account also allows the government to deposit money directly into the account rather than using middlemen to deliver cash. A study on India's 2014 effort to implement electronic payments through SmartCards that require biometric authentication (e.g. fingerprints) found that electronic payments significantly decreased the incidence rate of bribes, effectively making individuals who received government transfers more wealthy (Muralidharan et al., 2014). The Indian government has put a strong emphasis on direct deposits to PMJDY accounts as a part of the initiative.

Another way in which FI can promote poverty reduction is through access to loans. Credit has been positively correlated with economic empowerment (Demirguc-Kunt and Levine, 2009). Low income individuals often lack access to loans because they lack credit. As a result, it is difficult for them to engage in long term investments that lead to wealth accumulation, such as starting a business or making a capital investment (e.g. buying land) (Demirguc-Kunt and Levine, 2009). Research shows that the most common method of borrowing in middle and low-income OECD countries is borrowing from friends and family which limits one to the funds available in their community (Demirguc-Kunt et al., 2015). The dataset confirms that of people who have borrowed money, a good portion of them borrow from their community instead of a financial institution. Therefore access to formal financial institutions, especially through PMJDY's overdraft facility, would increase the money available to the average Indian, allowing them to accumulate wealth.

The implementation of PMJDY created a large natural experiment on FI. Papers written on the subject are divided into two general categories: papers that use proprietary bank data and those that use survey data. Both datasets have pros and cons. Bank papers have data that are free from individual bias,

but survey data can provide more color as to intentions and reasoning for transactions. This paper uses survey data as it is publically available.

The two most comprehensive studies that analyze PMJDY are written by Agarwal et. al (2017) and Chopra, Prahabla, and Tandri (2018). Both studies use bank data to understand the effectiveness of the policy on increasing actual financial activity, especially among poor individuals that the policy was most prominently aimed at. The studies corroborated each other's findings: PMJDY did increase financial activity amongst account holders. In particular, Agarwal et. al (2017) found that account usage by poor households increased overtime as the households became more financially literate, eventually converging with the activity levels of normal account holders. By providing easily accessible bank accounts, the government essentially increased supply in the financial sector. As a result, Chopra, Prahabla, and Tandri (2018) hypothesize that PMJDY tapped into a latent demand for bank accounts by low income Indians.

While FI has a positive effect on poverty reduction for everyone, the impact is augmented for women. The World Bank asserts that women benefit from access to their own bank account because it gives them discretion and control over their own money. When women are paid through direct deposit it is harder for other members of their household to take her money for themselves (Demirguc-Kunt et al., 2015). A study on bank accounts in rural Nigeria also documented that women experienced increased social empowerment as a result of having a bank account. The increase in empowerment resulted from an increase in household decision making power given that the women had access to their own finances (Aker et al., 2013). My paper studies the relationship between having a bank account and household decision making power, but does not have enough data to comment on women's social empowerment.

In general, a large field of research has established that giving women control over finances leads to general economic empowerment of the community because women are more likely than men to invest their money back into their family and community (Duflo, 2012). Similarly, much research has been conducted on the benefit of giving women access to microcredit loans. In the early 2000's, Grameen Bank made headlines for their revolutionary microfinance model that gave small loans to poor women and proved that it improved their financial autonomy (Hulme 2008). Since then, a myriad of literature has been written underscoring the positive impact of access to credit for women on economic and social empowerment (see Swapnapriya and Chinmoy 2020 for an example).

In India specifically, Singh and Bhatia (2017) aimed to understand how PMJDY and subsequent, smaller FI programs by the Indian government affected female empowerment. They studied the impact

of these policies on the social, economic, and political empowerment of women in slums in the Indian city of Ludhiana. The study found that women with higher access to financial services and increased use of these services saw increases in all forms of their empowerment. Similarly, Günther (2017) found that before PMJDY being a woman was negatively correlated with having a bank account, but after PMJDY women were more likely than men to have a bank account opened under PMJDY. My paper hopes to expand upon the findings in these two papers. I use the same dataset as Günther, which now has three more years of data available. I hope to use the additional years to capture the convergence in financial activity overtime that Agarwal et. al. (2017) discovered. Furthermore, the data set added financial autonomy questions in 2017 that allow me to analyze women's economic empowerment. My analysis loses the granularity on types of women's empowerment that Singh and Bhatia (2019) achieve because it focuses solely on economic empowerment. However, the expanded regionality provides more color to the discourse around FI and women's empowerment in India as a whole.

3 Data

This paper uses the Financial Insights Inclusion (FII) data set. The FII was conducted annually from 2013 to 2018 by FinMark, a South African non-profit funded by the Bill and Melinda Gates foundation. The survey is tailored specifically to India. Each year, approximately 45,000 different individuals from across India participate in an in-person interview. Samples were constructed using a "multistage, stratified, clustered and randomized sampling methodology...that included proportional distribution of the sample across all states of India and eight stratified urban and rural classes based on the 2011 Indian census."[7] The data set is cross-sectional, meaning that it does not track the same individuals over time, but rather provides a snapshot of the financial situation of the same locations over time. To account for location, I use geographic coordinates provided in the data set. Participants hail from over 500 districts in India. This data set was chosen because it was the largest and most diverse survey on financial inclusion conducted in the appropriate time range that was easily accessible. My analysis is conducted on an individual level, using geographic and time fixed effects to account for regional differences in behavior and attitude, as well as general trends over time.

3.1 Limitations of the Data

Survey data inherently is flawed due to its subjective nature and room for human error. This data set is further affected by changes in the key stakeholder's interest, the Bill and Melinda Gates Foundation, over the years. Fortunately, their focus on women's empowerment starting in 2017 allowed me to conduct my analysis on economic empowerment, furthering the research in the field. However, the dynamic nature of the survey questionnaire harms the internal validity of the data set because questions may change or disappear overtime.

To the extent it was possible, I avoided using questions that were different between years. Most of the questions represented in the tables and the regression stayed relatively consistent overtime. In instances when the answer choices change, I recoded the answer into categories that were synonymous. 2018 saw the biggest change in questions asked, therefore Table 3 excludes 2018 as the questions were irreconcilable.

[7] India 2015 Annual Report. https://www.kantarpublic.com/articles/previous-financial-inclusion-index-reports

Another limitation of the study is limited pre-PMJDY and post-demonetization data points, since the data set spans from 2013-2018, and PMJDY was implemented in 2014 and demonetization in 2016. The lack of additional years provides little variation in the data that I do have, making it harder to draw conclusions about the impacts of both policies. However, given prior literature proving that the effects of PMJDY compound overtime, I am still confident that this data provides meaningful insights on the impact of the policy. Additionally, whereas the 2014 survey was conducted after PMJDY was implemented, the 2016 survey was already underway when demonetization was announced. Unfortunately, the data set does not provide exact dates of interviews so it is not possible to ascertain who was interviewed before or after demonetization. Therefore, my regression only includes 2017 and 2018 as "after demonetization." The inability to provide a more detailed demonetization dummy variable in 2016 is a limitation of this study. The regression accounts for the introduction of PMJDY and for demonetization, as well as including a time fixed effect that should help account for the yearly differences.

3.2 Summary Statistics

Table 1 shows weighted summary statistics for individual demographics. Included are: gender, literacy, numeracy, marriage, urbanicity, ownership of an Aadhar card, poverty status, PPI score, and education level. PPI score is a measure of poverty. This is the only measure of income/wealth that the data set provides. The PPI (Poverty Probability Index) was developed by the Grameen Foundation to benchmark a family's financial status.[8] The score creates an index from 0-100 that is based on 10 questions: household size, female head/spouse education, and seven questions about ownership of household items (fridge, TV, car, etc.). The lower the score, the poorer the family. For India, the PPI score is based on a $2.50/day poverty rate. Individuals who are estimated to live on less than $2.50/day are considered below the poverty line, this corresponds to a PPI score of approximately 55. The $2.50/day threshold is higher than some organizations use, but since this data set collects PPI score, I use it as my threshold.

The demographic trends remain relatively consistent,[9] except for a noticeable increase in numeracy rates (from 71% to 95%).[10] It is likely that this increase in numeracy was a direct result of the Indian government's efforts during PMJDY to increase financial literacy. A similar trend is seen with ownership

[8] https://www.povertyindex.org/about-ppi

[9] Note that the dataset is weighted to align the dataset with the overall Indian population, so any changes in demographics reflects either a countrywide change or a methodological change.

[10] Numeracy is the ability to understand and work with numbers.

Table 1: Summary Statistics for Demographics (weighted)

Statistic	2013	2014	2015	2016	2017	2018
Female	48.94%	48.90%	48.90%	48.90%	48.02%	48.02%
Literate	61.83%	65.18%	66.17%	60.46%	64.39%	63.44%
Numerate	74.66%	87.12%	95.47%	96.79%	90.25%	94.09%
Married	70.25%	68.75%	69.66%	64.94%	72.91%	72.24%
Rural	67.48%	67.48%	67.47%	67.35%	68.38%	68.39%
Aadhar Card	45.43%	65.78%	82.34%	91.29%	95.57%	95.88%
Below the Poverty Line	77.50%	77.68%	77.51%	65.39%	60.71%	67.92%
Lowest PPI Quintile	12.74%	10.78%	10.00%	10.22%	8.96%	10.96%
Second PPI Quintile	40.47%	40.04%	41.86%	27.15%	22.22%	27.68%
Middle PPI Quintile	33.05%	34.46%	35.11%	31.56%	31.33%	32.67%
Fourth PPI Quintile	12.57%	13.80%	12.29%	23.11%	25.66%	22.17%
Highest PPI Quintile	1.17%	0.92%	0.74%	7.97%	11.83%	6.52%
No Formal Education	29.47%	28.56%	29.04%	26.98%	31.26%	31.55%
Some Education (0-8 years)	30.72%	30.87%	30.18%	32.14%	31.34%	32.83%
More Education (8-12 years)	29.18%	30.04%	30.33%	30.38%	28.09%	26.98%
Diploma (Non-Degree)	2.54%	2.55%	2.55%	1.94%	1.62%	2.10%
Graduate Degree	8.05%	7.94%	7.74 %	7.37%	7.48%	6.34%
Num. Respondents	45,024	45,087	45,036	45,540	47,132	48,027

Source: India Financial Insights Inclusion Survey (Intermedia) 2013-2018

of Aadhar ID cards, which can also be attributed to efforts by the Indian government.[11] Age is very consistent overtime and was therefore excluded from the demographics table.

Table 2 shows summary statistics for general measures of financial behavior. Some of these behaviors are not unique to banks, but might indicate increased usage of financial services. For example, people who earn income would be more likely to make regular use of a bank account compared to those who do not. Table 3 shows data for the overall sample and for women separately. Overall, the percentage of both men and women who hold bank accounts increases significantly over time. Women are drastically less likely to earn income as compared to the total sample, but that number steadily increases overtime. This is in line with the general trend in India of increased women's empowerment.

Table 3 shows summary statistics for financial behavior individuals conducted at a formal financial institution (i.e. banks). This table only displays answers for survey respondents who mentioned having a bank account and having ever gone to a bank. This sample differs from the other two tables which look at the full data sample. The most common financial activities that are performed by the individuals in this dataset are depositing and withdrawing from a bank account.[12] The welfare row tracks people who receive welfare directly into their bank account. Depositing welfare payments directly into bank accounts was prioritized by the Indian government during the implementation of PMJDY and demonetization. Note that the sample size is lower for the welfare row because the variable necessitates that someone receives welfare in order to receive it directly into their bank account.

Across all behaviors, there is not a large difference between the way that women use bank accounts compared to the overall survey sample of people who own bank accounts. Although, women constantly report performing all behaviors less than men do.

Furthermore, there appears to be a drop in all financial activity in 2016. I assume that this drop can be attributed to demonetization which occurred while the survey was in the field. Although demonetization aimed to increase use of bank accounts, the period directly following the policy resulted in decreased use of bank accounts because people struggled to get access to the new cash bills that the Indian government issued.[13] The 2016 year dummy in my regression accounts for the transitional chaos in financial behavior due to demonetization. The 2017 and 2018 dummy variables capture the effect of demonetization.

[11] An Aadhar Card is the most popular form of biometric identification in India, including one's name, address, gender, age, iris scans, and fingerprint scans. They are used as one's proof of residence, not citizenship.

[12] In 2017, deposit and withdraw were combined into one question.

[13] https://www.forbes.com/sites/patrickwwatson/2016/12/01/indias-demonetization-could-be-the-first-cash-domino-to-fall/?sh=17894e7963db

Table 2: Summary Statistics for Financial Access (weighted)

Statistic	2013	2014	2015	2016	2017	2018
Personal Bank Account						
(Total)	47.03%	55.23%	66.14%	62.18%	76.37%	77.39%
(Female)	38.73%	48.09%	60.99%	58.81%	73.96%	75.65%
PMJDY Account						
(Total)	N/A	5.34%	12.37%	13.07%	22.11%	19.92%
(Female)	N/A	4.79%	11.77%	12.18%	23.67%	20.84%
Earn Income						
(Total)	54.11%	48.44%	49.50%	49.56%	53.43%	51.56%
(Female)	29.42%	19.94%	22.32%	25.84%	27.92%	25.78%
Receive Welfare						
(Total)	7.19%	20.91%	26.45%	14.57%	11.00%	20.91%
(Female)	5.63%	21.40%	25.85%	15.29%	11.77%	21.16%
Any Investment						
(Total)	0.18%	5.81%	8.13%	10.69%	8.50%	10.95%
(Female)	0.05%	3.49%	5.69%	7.82%	6.00%	8.77%
Any Insurance						
(Total)	2.31%	6.14%	13.45%	11.37%	20.12%	10.91%
(Female)	1.24%	3.04%	8.97%	8.70%	16.89%	8.23%
Num. Respondents						
(Total)	45,024	45,087	45,036	45,540	47,132	48,027
(Female)	26,514	25,736	26,120	24,321	24,953	25,162

Source: India Financial Insights Inclusion Survey (Intermedia) 2013-2018

Table 3: Summary Statistics for Bank Behavior (weighted)

Statistic	2013	2014	2015	2016	2017
Deposit					
(Total)	89.13%	86.59%	92.01%	66.84%	83.06%
(Female)	86.79%	84.43%	90.73 %	62.65%	80.80%
Withdraw					
(Total)	84.19%	90.12%	93.75%	79.30%	83.06%
(Female)	80.23%	88.14%	91.95%	76.64%	80.80%
Pay Bills					
(Total)	6.00%	2.86%	2.39%	2.31%	2.70%
(Female)	4.35%	2.07%	1.56%	1.28%	2.14%
Num. Respondents					
(Total)	19,302	21,501	26,737	25,965	37,165
(Female)	9,429	10,586	14,110	12,739	19,154
Welfare Direct Deposit					
(Total)	21.59%	24.98%	19.83%	5.73%	20.25%
(Female)	21.34%	25.84%	21.26%	5.99%	22.02%
Num. Respondents					
(Total)	3,317	9,700	12,020	6,625	5,208
(Female)	1,461	5,493	6,814	3,647	2,928

Source: India Financial Insights Inclusion Survey (Intermedia) 2013-2017

Tables 4 and 5 show results from economic empowerment questions that were added into the survey for 2017 and 2018. These questions concern qualitative measures of economic empowerment including factors such as decision making power, ability to speak up in a household, and personal influence on household financial matters. These variables create the empowerment index I use. These variables were answered on a scale as opposed to financial behaviors which are binary variables. In the index, "Don't Know/Refused" is coded as 0. Any respondent that responded "Don't Know/Refused" to any question was dropped from the regression. The remaining answers were ranked from 1 (Very Uninvolved) to 5 (Very Involved) and added up into an index. General trends from Tables 4 and 5 show that women's economic empowerment in India increased over the two year period.

Table 4: 2017-18 Summary Statistics for Women's Economic Empowerment (Women only, weighted)

Statistic	2017	2018
Typical involvement in deciding how to ...spend your household's income?		
(Somewhat/Very Uninvolved)	22.75%	19.8%
(Neither Uninvolved or Involved)	12.05%	10.91%
(Somewhat/Very Involved)	59.48%	66.84%
(Don't know/Refused)	5.72%	2.44%
...spend on basic needs like food and clothing?		
(Somewhat/Very Uninvolved)	21.14%	18.33%
(Neither Uninvolved or Involved)	13.96%	11.89%
(Somewhat/Very Involved)	59.33%	67.39%
(Don't know/Refused)	5.56%	2.39%
...spend beyond basic needs?		
(Somewhat/Very Uninvolved)	18.89%	16.98%
(Neither Uninvolved or Involved)	13.99%	12.11%
(Somewhat/Very Involved)	61.27%	68.32%
(Don't know/Refused)	5.85%	2.60%
If you were to speak your mind on how to spend your household's income, how much influence would you have on the final decision?		
(None/A Little)	36.53%	28.7%
(A fair amount)	20.84%	20.76%
(Most/Almost all)	36.28%	47.58%
(Don't know/Refused)	6.35%	2.96%
Num. Respondents	**24,953**	**25,162**

Source: India Financial Insights Inclusion Survey (Intermedia) 2017-2018

Table 5: 2017-18 Summary Statistics for Women's Economic Empowerment (Women only, weighted) Cont.

Statistic	2017	2018
If you disagreed with a decision, how likely would you be to voice disagreement?		
(Somewhat/Very Unlikely)	20.07%	20.57%
(Neither unlikely nor likely)	16.22%	14.88%
(Somewhat/Very Likely)	55.40%	61.24%
(Don't know/Refused)	8.31%	3.31%
Agreement with: You make the final decision on how household income is spent		
(Somewhat/Strongly Disagree)	10.70%	16.56%
(Neither agree nor disagree)	13.02%	13.03%
(Somewhat/Strongly Agree)	66.65%	67.07%
(Don't know/Refused)	9.63%	3.41%
Agreement with: You make the final decision on how your own money is spent/saved		
(Somewhat/Strongly Disagree)	15.48%	1.59%
(Neither agree nor disagree)	16.82%	6.10%
(Somewhat/Strongly Agree)	58.41%	63.21%
(Don't know/Refused)	9.28%	2.99%
Agreement with: You trust financial service providers to keep your personal information private unless you allow it to be shared.		
(Somewhat/Strongly Disagree)	26.93%	20.32%
(Neither agree nor disagree)	16.95%	16.58%
(Somewhat/Strongly Agree)	38.18%	56.79%
(Don't know/Refused)	17.93%	6.31%
Num. Respondents	**24,953**	**25,162**

Source: India Financial Insights Inclusion Survey (Intermedia) 2017-2018

4 Impact of PMJDY on Bank Account Ownership

To understand the impact of the Indian government's PMJDY interventions on women's financial inclusion, I evaluate the probability that an individual has a bank account or has a PMJDY bank account based on various demographic factors using a probit regression. Figure 1 clearly shows that bank account ownership in India has increased substantially over time and that the gender gap has decreased. These first two regressions show what factors are the most important in predicting whether or not an individual respondent has a bank account, and how individual's chances of having a bank account changed post-PMJDY and post-demonetization. *I hypothesize that women will be more likely to have any type of bank account after PMJDY than before.*

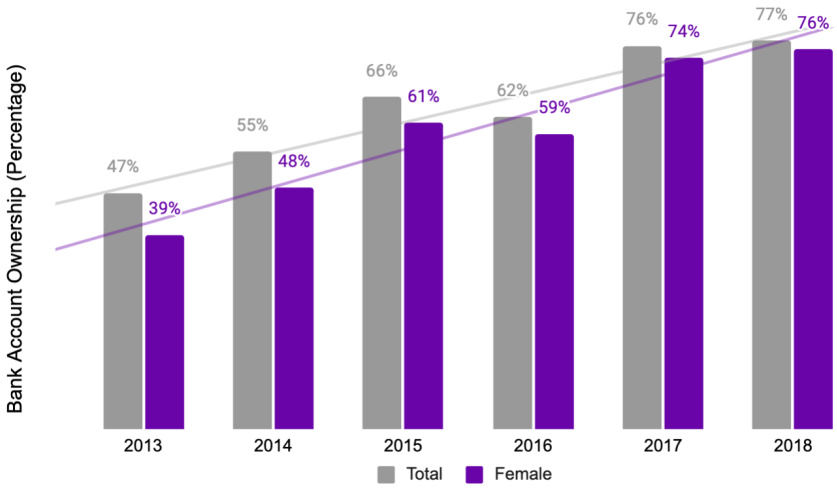

Figure 1: Bank Account Ownership Over Time (Total vs. Female)

4.1 Probit Model

Before I look at empowerment, Equations 1 and 2 are used to conduct a probit regression, separately, on the probability of having any bank account and on specifically having a PMJDY bank account based on the independent variables. The benchmark cases are: unmarried urban men, no formal education, no Aadhar ID, no income earning, and not receiving welfare. I drop 2015 as a year to avoid co-linearity in the regression because 2013 is the only pre-PMJDY year I have, 2014 captures the introduction of PMJDY, 2016 captures the introduction of demonetization, and 2017/18 capture the after effects of demonetization. I use age and age squared to account for the potential non-linear relationship between

account ownership and age. Equation 1 includes an interaction variable between the presence of PMJDY and female, and the presence of PMJDY and rural, to separately understand the impact of PMJDY on women and rural individuals. The following regression is conducted for every individual for every year. Note that Equation 2 excludes 2013 because PMJDY was not introduced until 2014, ergo excluding the interaction variables as well.

$$
\begin{aligned}
\Pr(AnyBankAcccount_{it}) = {} & \beta_0 + \beta_1 Age_{it} + \beta_2 Age_{it}^2 + \beta_3 PPIScore_{it} + \beta_4 Female_{it} \\
& + \beta_5 EducationLevel_{it} + \beta_6 Married_{it} + \beta_7 Rural_{it} \\
& + \beta_8 Female_{it} XPMJDY\,presence + \beta_9 Rural_{it} XPMJDY\,presence \\
& + \beta_{10} EarnIncome_{it} + \beta_{11} Aadhar_{it} + \beta_{12} Welfare_{it} \\
& + \beta_{13} DemonetizationPresence \\
& + \beta_{14} PMJDY\,presence + \eta + \tau + \varepsilon
\end{aligned} \tag{1}
$$

$$
\begin{aligned}
\Pr(PMJDYAcccount_{it}) = {} & \beta_0 + \beta_1 Age_{it} + \beta_2 Age_{it}^2 + \beta_3 PPIScore_{it} + \beta_4 Female_{it} \\
& + \beta_5 EducationLevel_{it} + \beta_6 Married_{it} + \beta_7 Rural_{it} \\
& + \beta_8 EarnIncome_{it} + \beta_9 Aadhar_{it} + \beta_{10} Welfare_{it} \\
& + \beta_{11} DemonetizationPresence + \eta + \tau + \varepsilon
\end{aligned} \tag{2}
$$

The independent demographic variables were chosen because a previous study found that account activity across both genders was higher for "richer, educated, older, married, formerly-married, and employed individuals" (Günther 2017). The same study also found that ownership of an Aadhar card and receiving government welfare has a positive impact on account ownership. Both equations include time dummies for the demonetization policy (post 2016) and PMJDY (post 2013). η represents geographic fixed effects, τ represents a time fixed effect, and ε represents random error.

4.2 Bank Account Probit Results

The results for Equations 1 and 2 are in the following tables. It is important to note that Equation 1 excludes 2013 and 2018 for co-linearity because multiple variables perfectly define their impact.

Equation 2 excludes 2018 for the same reason. This is unsurprising because I have policy time dummies to observe the effect of PMJDY and Demonetization. If I were to drop these variables, values for 2013 and 2018 are assigned in the regression. However, since I am more interested in the impact of these policies overtime I have chosen to keep those variables in over the year coefficients of 2013 and 2018.

Table 6 and 7 represent the probability that a respondent has any type of bank account based on previously defined independent variables. Note that I use a probit model, which means the reported coefficient's direction and significance are relevant, but the value is not indicative of the variable's contribution to the probability. For interpretability, look to the margins column next to the coefficients. The margins are reported at the mean for every variable. For example, the impact of being a woman instead of a man would decrease an individual's probability of having a bank account by 8.27% holding all other independent variables at the sample's mean.

Almost all the variables included in the probit regressions are significant at the 99% confidence interval. The regression shows that age, a higher PPI score, marriage, education, earning income, Aadhar card ownership, and receiving welfare are all demographic factors that increase the probability that an individual has a bank account. Note that age and PPI scores are continuous variables from 15-115 and 0-100, respectively. Therefore, while their coefficients are of a smaller magnitude compared to some the other binary variables, these two variable's margins are multiplied by the individual's age or score to determine it's influence on their probability of having a bank account.

Education is divided into 5 levels of education, "No Formal Education" is dropped from the regression to avoid co-linearity. The levels of education, starting with "Some Education" and ending with "Graduate Education" are listed in increasing order of years of education. The regression shows that increasing levels of education correspond to coefficients with larger magnitudes, implying that the more educated someone is, the more likely they are to have a bank account. According to this regression, education level is the most impactful demographic in predicting whether or not an individual has a bank account.

Additionally, both PMJDY and Demonetization time dummy variables have a positive coefficient; however, the PMJDY coefficient is not significant at any level–this is surprising. One explanation for why the post-PMJDY variable is not significant, is that the data set only provides one baseline year before PMJDY which does not provide a large enough sample to be compared significantly to the rest of the data set, which is post PMJDY. For demonetization, the coefficient implies that individuals were 15.5% more likely to have a bank account in the years after demonetization was implemented.

Table 6: Effects of Demographics and Time on Bank Account Ownership 2013-2018

Variable	Any Bank Account (1)	Margin	PMJDY Account (2)	Margin
Female	-0.228*** (0..0140)	-8.27%	0.0404*** (0.0085)	0.82%
Age	0.0588*** (0.001)	2.13%	0.0215*** (0.001)	0.44%
Age Sq.	-0.0005*** (0.000)	-0.01%	-0.0002*** (0.00002)	-0.00%
PPI Score	0.003*** (0.0002)	0.11%	0.0001 (0.0002))	0.00%
Marriage	0.0540*** (0.007)	1.96%	0.0824*** (0.0093)	1.68%
Rural	-0.0746*** (0.0159)	-2.71%	0.0462*** (0.0089)	0.94%
Some Education (Up to Primary School)	0.224*** (0.007)	8.13%	0.0140 (0.009)	0.29%
More Education (Up to Some High School)	0.613*** (0.0086)	22.28%	0.0564*** (0.0104)	1.15%
Diploma Holder	1.009*** (0.0238)	36.61%	0.1527*** (0.0276)	3.11%
Graduate Education	1.136*** (0.0148)	41.25%	0.130*** (0.0157)	2.70%
Earn Income	0.178*** (0.0068)	6.47%	0.0429*** (0.0086)	0.87%
Aadhar Card	0.396*** (0.0086)	14.37%	0.2953*** (0.0153)	6.0%
Received Govt Welfare	0.590*** (0.0085)	21.43%	.1776*** (0.0092)	3.61%

Table 7: Effects of Demographics and Time on Bank Account Ownership 2013-2018

Variable	Any Bank Account (1)	Margin	PMJDY Account (2)	Margin
Post Demonetization	0.427***	15.5%	0.7206***	14.67%
	(0.0101)		(0.0139)	
Post PMJDY	0.0054	0.20%	NA	.
	(0.0188)			
Female X PMJDY Year	0.1797***	6.52%	NA	.
	(0.0148)			
Rural X PMJDY Year	0.135***	4.91%	NA	.
	(0.0173)			
2013	0	.	NA	
	(.)			
2014	-0.2346***	-8.51%	Omitted	
	(0.0100)			
2015	Omitted		0.442***	8.99%
			(0.0141)	
2016	-0.1153	-4.19%	0.469***	9.54%
	(0.0100)		(0.0142)	
2017	-0.0142	-0.52%	0.0937***	1.91%
	(0.0105)		(0.0107)	
2018	0	.	0	.
	(.)		(.)	
Constant	-2.121***	.	-2.957***	
	(0.0693)		(0.129)	
N	275,801		229,783	
Wald chi2(552)	4,0984		14,368	
Years:	2013-2018		2014-2018	

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
District controls were included in this regression but are excluded from this table.

On the other hand, being a woman and living in a rural area decreases the probability that an individual has a bank account. However, the interaction between women and the PMJDY year dummy has a positive sign. The interaction term tells us that although women overall throughout 2013-2018 are 8.27% less likely to have a bank account than men, after PMJDY was implemented women were 6.52% more likely than before to get a bank account. This interaction term shows an increase in the probability that a woman would own a bank account after PMJDY in comparison to before PMJDY. The same can be said for individuals living in a rural district. In fact, for the rural variable, the interaction term shows that after PMJDY, living in a rural district was a positive indicator in one's probability of owning a bank account. **This regression supports my first hypothesis, that women are more likely after PMJDY than before PMJDY to have a bank account,** because the coefficient on the interaction term between female and PMJDY is positive, showing that women were more likely to get a bank account after PMJDY, albeit still less likely overall.

4.3 PMJDY Probit Results

In the same table in the next column, I regress the same demographic variables on the probability of having a PMJDY account. Note that in this regression, PPI score and "Some Education" are no longer statistically significant. The remaining variables are still significant at the 99% confidence interval. In this regression, the sign on female and rural flips from negative to positive, indicating that women and individuals living in rural districts are more likely than men and individuals living in urban districts to have a PMJDY bank account specifically. It is also interesting to see that the margins on education level decrease substantially from Regression 1. It is possible that because PMJDY bank accounts are less common in the overall sample that there is less variation in education levels for PMJDY bank account holders. Another explanation is that PMJDY was pushed onto individuals who otherwise might not have gotten a bank account, so traditional indicators of bank account adoption such as education level are less helpful in predicting PMJDY account ownership. The latter explanation likely applies to the comparable decrease in magnitude for the coefficient on receiving government welfare. **Once again, these results support my first hypothesis, that women are more likely to get a bank account after PMJDY, because women are more likely than men to get a PMJDY account.**

This tracks with the results from the interaction term in Regression 1. It also aligns with the goal of PMJDY which was to provide bank accounts specifically to people who lacked financial access, most

prominently women and rural individuals. The signs of the remaining variables are consistent with the previous regression. The interpretations of the coefficients should be adjusted to understand that Regression 2 predicts the probability that an individual has a PMJDY account specifically, as opposed to any type of bank account. PMJDY account owners were included in the Regression 1, making account holders in Regression 2 a subset of those in Regression 1.

5 The Impact of Bank Account Ownership on Economic Empowerment

Once I establish that PMJDY increased women's probability of having a bank account, I look at the impact of having a bank account on women's economic empowerment. These results are separate from my analysis on the effectiveness of PMJDY. This section builds off section 4, which shows that PMJDY increased women's probability of owning a bank account; however, this section does not make direct conclusions about the connection between PMJDY and economic empowerment. Instead, the results of this regression show how access to a bank account affects women's economic empowerment in their own household. In this regression, I define economic empowerment as the ability to make decisions regarding personal and household financial matters. *I hypothesize that bank account ownership increases empowerment scores.*

5.1 Two Stage Least Squares Regression Model

To understand the relationship between economic empowerment and bank account ownership, I use a Two-Stage Least Squares regression model. This model is necessary because a woman's economic empowerment is not exogenous from having a bank account. It is hard to discern whether the woman was already more empowered and therefore has a bank account or whether the bank account led her to be more empowered. Therefore, bank account ownership's relationship with women's empowerment contains a problematic error term, which relates to an individual's inherent, behavioral characteristics that might cause them to both get a bank account and to be more economically empowered (e.g. ambition). Figure 2, shows the distribution of empowerment scores for women by bank account ownership status. The mean for women without a bank account (Mean 1) is 25.73 whereas the mean for women with a bank account (Mean 2) is 28.08. These graphs suggest that bank account ownership might play a substantial role in economic empowerment. The following analysis assesses the causal relationship between the two. I use two variables to instrument bank account ownership because both variables have limitations and combined they offer increased precision in the instrumentation process. The two instruments are: Aadhar card ownership and a predicted, lagged 2015 bank account ownership variable. First, I discuss the merits of Aadhar card ownership.

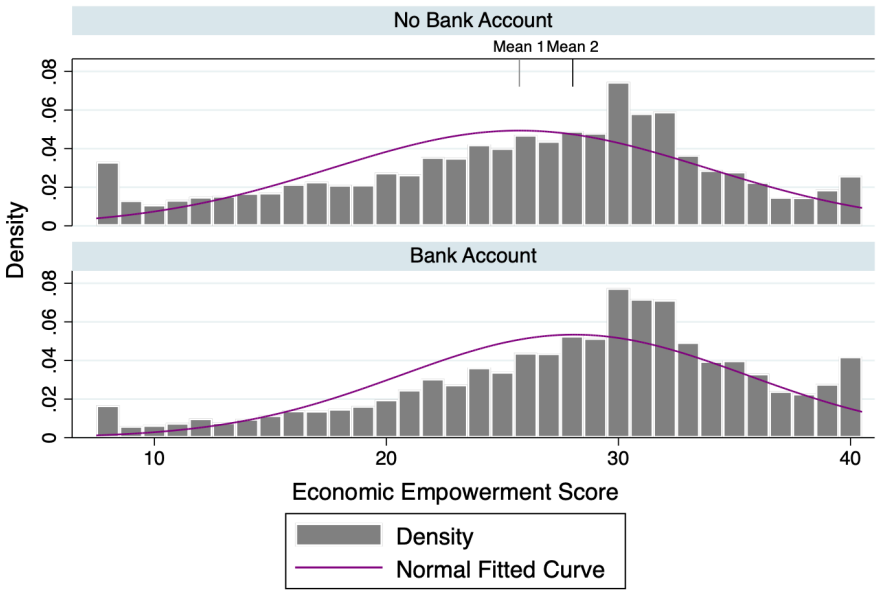

Figure 2: Women's Economic Empowerment Score by Bank Account Ownership

5.2 Aadhar Card Ownership Instrument

An Aadhar card is the Indian government's centralized, biometric (e.g. fingerprints and iris scan) form of identification. Aadhar cards are part of a government initiative to quickly and easily identify Indian residents in order to expedite administrative processes, including financial inclusion. Before Aadhar, India had no central identification system. During the time period in my regression, Aadhar was growing in prevalence. At the time of this paper, approximately 99.7% of Indians now have an Aadhar identification card.[14] Expanding Aadhar to all Indian citizens has been a priority of the Modi administration since the system's creation in 2010. The rollout of the cards in 2010 was initially limited to 51 districts and later expanded to all of India.[15] Given that my empowerment regression only looks at 2017 and 2018, the location selectivity does not bias the instrument as Aadhar was widely accessible and advocated for in all geographic locations by 2017. Literature on the rollout of Aadhar has emphasized its indiscriminate nature.[16] People of all walks of life and across all regions of India were able to easily and voluntarily enroll in the program.

[14] https://www.hindustantimes.com/india-news/over-100-crore-aadhaar-cards-issued-in-india-so-far-says-uidai-ceo-101639645906181.html

[15] https://www.ndtv.com/india-news/pm-launches-aadhar-based-direct-cash-transfers-in-51-districts-of-india-505663

[16] https://insights.som.yale.edu/insights/what-happens-when-billion-identities-are-digitized

Aadhar card ownership becomes a useful metric because it was an initiative that promoted financial inclusion pushed on to the Indian population by the government, exogenous of demographics. As illustrated in Figure 3, Aadhar card ownership and bank account ownership were at similar levels in 2013. Aadhar grows quickly starting in 2015, reaching almost 95% by 2018. Whereas bank account ownership grows much more steadily, reaching only 77% by 2018. Therefore, Aadhar provides us with a variable that is associated with financial inclusion but is more widespread and not exclusively related to bank accounts. Accordingly, Aadhar ownership is absent of the bias present in bank account ownership. For those who chose not to enroll in the Aadhar program, it is possible that they chose not to enroll for privacy concerns about their biometric data or simply that they saw no benefit at the time to having the identification card.

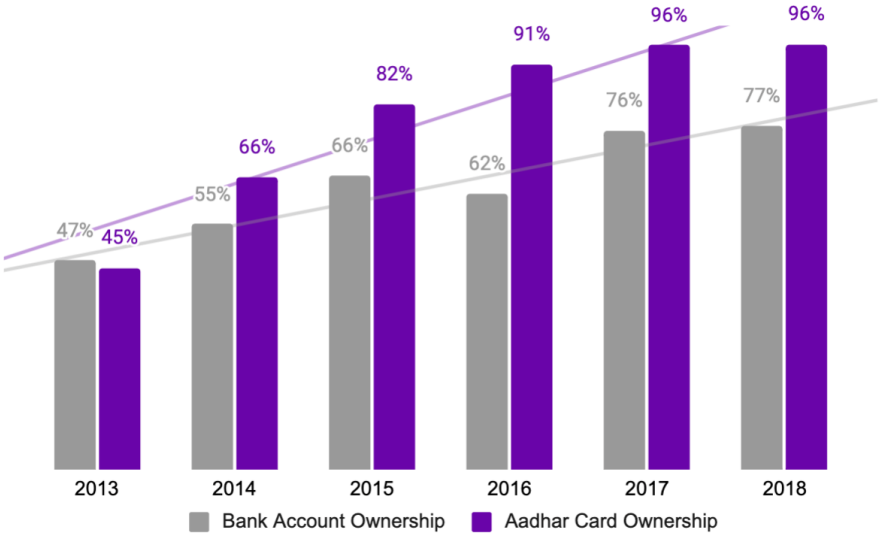

Figure 3: Aadhar Card Ownership vs. Bank Account Ownership

A valid instrument must satisfy the following two requirements: (1) Validity, the instrument should be strongly correlated with the endogeneous independent variable (2) Exclusion, the instrument cannot be correlated with the error term (i.e. it should be exogenous from the independent variable). Aadhar card ownership is positively and significantly correlated with bank account ownership, providing validity. This is shown in Table 8. Financial institutions prefer that account holders have an Aadhar card to open a bank account because it satisfies the international Know Your Customer requirements.[17] A 2018 Indian Supreme Court ruling clarified that an Aadhar card can not be mandatory for opening a bank

[17] International standards used by financial institutions to prevent fraudulent and/or illegal activity.

account. Therefore bank account ownership is not an absolute subset of Aadhar card ownership. Table 8 shows the first stage regression for bank account ownership on Aadhar card ownership and finds that the relationship between the two is significant at the 99% confidence level.

Aadhar card ownership also satisfies the exclusion restriction. Economic empowerment score is an index created from questions that concern one's decision making abilities in regards to financial decisions, presented in Tables 4 and 5. This index asks questions such as: *"If you disagreed with a decision, how likely would you be to voice a disagreement?"* I make the argument that Aadhar cards are not correlated with one's decision making abilities on their household finances. The Indian government advocated so heavily for the adoption of Aadhar cards, that obtaining one required little decision making, hence the nearly 96% adoption rate by 2017. One's reasons for not having a card likely focus more on privacy concerns or personal indifference, than they do financial autonomy. Aadhar has no influence on the independent variable because it is a voluntary, identification program that the vast majority of Indians have adopted, regardless of empowerment status. Little to no academic research exists on a link specifically between Aadhar and women's empowerment. This paper assumes that Aadhar card ownership's only influence on women's empowerment is through increasing women's access to bank accounts.

However, Aadhar card ownership has some limitations as an instrument. The card was so widely adopted by 2017 that there exists little variation between 2017 and 2018, which detracts from the strength of the instrument. Additionally, banks serve as Aadhar enrollment centers, creating a possible endogeneity issue between the dependent variable and its instrument, if bank account ownership and Aadhar card ownership also have bi-directional causality.[18] Since Aadhar ownership grows at a much faster pace than bank account ownership, I assume that scenario is not common. Yet, to accommodate for these limitations, I include a second instrument to increase precision. The discussion of the second instrument follows.

5.3 Predicted Value Instrument

The second instrument I utilize is an individual's lagged, predicted bank account ownership in 2015. A lagged value is valuable to addressing endogeneity concerns because it is less likely that two non

[18] https://uidai.gov.in/1019-faqs/enrolment-update/aadhaar-seva-kendra/12234-is-the-aadhaar-centre-at-my-nearby-bank-post-office-also-an-aadhaar-seva-kendra.html

contemporaneous variables might have a bi-directional causal relationship. In other words, it is not likely that economic empowerment in 2017/18 would cause bank account ownership in 2015, unless an individual is already more likely to be empowered. In the case that one might already exist at a higher level of empowerment based on their region, family, or behavioral characteristics, I include region controls and demographic independent variables in the 2SLS to capture the likelihood that someone is predisposed to be more empowered.

This equation uses 2015 as the benchmark year for predicting probability instead 2016 (the year directly before the survey begins to collect empowerment information) because the introduction of demonetization in the middle of the 2016 survey interfered with the 2016 data collection. As a reminder, in January 2015 the Indian government announced that it had reached it's goal of every household having at least one bank account. Therefore, 2015 demonstrates a year in which households are assumed to have access to financial institutions, but women still face a gap in financial inclusion. It is not relevant that 2015 was the omitted benchmark year in Section 4 because the year is specified when I run the prediction regression.

Since the data set is cross sectional instead of panel, I do not have the true lagged values for an individual. The absence of true lagged values also prevents me from performing a Granger-Sims causality test on the individual level, which would further strengthen my assertion that bank account ownership does not have a bi-directional causal relationship with economic empowerment. As a result, I use a predicted value that individual j in the 2017 or 2018 cohorts would have had a bank account in 2015 based on the 2015 cohort. I run the Bank Account probit I specified in section 4, fixed at t = 2015. For example, if individual j in 2017 is a married 34-year-old woman that graduated from high school and lives in Delhi, the regression uses what it knows about married 34-year-old women that graduated from high school and lived in Delhi in 2015 to predict individual j's probability of having a bank account in 2015. I do this using the predict command in Stata. The equation used to estimate the predicted value is below, from here on out I refer to this as the "predicted variable."

$$PredictedProb_{jt} = Pr(AnyBankAccount)_{j\ t=2015} \tag{3}$$

By using a predicted variable, the regression utilizes the variation in bank account ownership in 2017/18 that is correlated with an individual's probability of having a bank account in 2015 to explain their empowerment in 2017/18. Therefore, the instrument helps isolate only the effect of bank account ownership on empowerment, without other biases to the variable.

The predicted variable satisfies validity because it is correlated with the independent, endogenous variable, bank account ownership. The predicted variable inherently tells us about bank account ownership. The results of the probit regression in Table 7 provided a large Wald-Chi Squared score which was statistically different from zero, proving that the probit regression is useful in estimating the probability that one has a bank account based on the independent variables included in the regression. Therefore, a variable that uses said regression to predict would be positively and significantly correlated with bank account ownership. The first stage of the 2SLS, shown in Table 8, confirms that the relationship between the endogenous variable and its instrument is significant at the 99% confidence level.

The predicted variable satisfies the exclusion restriction because it is non contemporaneous with the empowerment score. As previously stated, is more likely that bank account ownership in 2015 influenced 2017/18 empowerment than it is that 2017/18 empowerment influenced 2015 bank account ownership. In other words, future behavior is unlikely to predict past behavior. Furthermore, the predicted variable cannot include the unobserved, problematic biases that are present in the 2017 true bank account ownership value because the prediction is based only on the independent variable that the survey collects. However, in the case that some of the independent variables (income earning status, education level, marriage, etc.) have problematic biases in themselves and are then being used in prediction, the prediction variable would include the problematic biases present in these other variables. The possibility of bias in other independent variables is a limitation of the predicted variable as an instrument.

I have now discussed the merits and limitations of two instruments. Due to the cross-sectional nature of the data set, these two instruments are the best solutions I could find to the endogeneity issue presented between bank account ownership and economic empowerment. I present the following 2SLS regression with both instruments together, and each instrument alone.

In Equation 4, female is dropped as a variable because this regression only looks at female respondents. The policy dummy variables have also been dropped from this regression because 2017 and 2018 were after both PMJDY and demonetization. The time and geographic fixed effects and the benchmark

cases remain the same as equations 1 and 2. I run Equation 4 thrice. First, I run it with with both Aadhar card ownership and the predicted variable as instruments. Then, I run both instruments independently. The results of the regressions follow.

$$
\begin{aligned}
EmpowermentScore_{ijt} = {} & \beta_0 + \beta_1 Age_{it} + \beta_2 Age_{it}^2 + \beta_3 PPI_S core_{it} \\
& + \beta_4 EducationLevel_{it} + \beta_5 Married_{it} + \beta_6 Rural_{it} \\
& + \beta_7 EarnIncome_{it} + \beta_8 BankAccount_{it} \\
& + \beta_9 Welfare_{it} + \eta + \tau + \varepsilon
\end{aligned} \tag{4}
$$

5.4 Two Stage Least Squares Regression Results

Tables 8 and 9 estimate how economically empowered a woman is based on the same independent demographic variables as the previous two regressions. This regression is performed only for female respondents. Empowerment score is a scale from 8-40, with 8 being the least empowered and 40 being the most empowered. Column 3 uses both the predicted variable and Aadhar ownership as instruments to bank account ownership. Column 4 uses only the Aadhar ownership variable as an instrument to bank account ownership. Column 5 uses only the predicted variable as an instrument to bank account ownership. Column 6 displays the OLS regression with the problematic 2017/18 bank account ownership variable for a side by side comparison. The results of the first stage are regressed on the binary variable of bank account ownership, including all the controls I have used throughout this paper. Only the coefficients on the instruments are shown for the first stage. In the second stage, the dependent continuous variable is economic empowerment score. The coefficients indicate each variable's estimated impact on a woman's empowerment score.

When looking at the instrumented 2SLS regression (columns 3-5), all three versions are quite similar. The biggest difference occurs in the magnitude of bank account ownership. The following variables are positively and significantly correlated with empowerment: bank account ownership, age, PPI score, marriage, earning income, having some education, and the 2018 time dummy variable. These variables can be interpreted as having a positive impact on women's empowerment to the magnitude of the coefficient (e.g. being married is estimated to add approximately 1 point to one's empowerment score). Bank account ownership is the variable, aside from the constant, with the largest impact on

Table 8: Female Economic Empowerment Regression Results (2SLS)

Variable	Aadhar & Pred. (3)	Aadhar Only (4)	Pred. Only (5)	OLS (6)
Aadhar 1st Stage	0.309***	0.3597***	NA	NA
	(0.0138)	(0.0122)		
Predicted Variable 1st Stage	1.049***	NA	2.441***	NA
	(0.134)		(0.119)	
Bank Account Ownership	3.588***	3.760***	2.762***	1.470***
	(0.570)	(0.589)	(0.840)	(.0790)
Age	0.453***	0.449***	0.469***	0.4896***
	(0.0166)	(0.0169)	(0.020)	(0.0125)
Age Squared	-0.005***	-0.005***	-0.005***	-0.0051***
	(0.0001)	(0.0001)	(0.0002)	(0.0001)
PPI Score	0.0180***	0.0180***	0.0183***	0.0186***
	(0.0018)	(0.0018)	(0.0018)	(0.0017)
Marriage	1.000***	0.998***	1.015***	1.041***
	(0.0863)	(0.0864)	(0.0867)	(0.0854)
Rural	-0.1089	-0.111	-0.0891	-0.060
	(0.0865)	(0.0863)	(0.0873)	(0.0850)
Earn Income	1.194***	1.191***	1.204 ***	1.218***
	(0.0780)	(0.0780)	(0.078)	(0.0774)
Some Education (Up to Primary School)	0.334***	0.322***	0.369***	0.4094***
	(0.0886)	(0.0889)	(.092)	(0.0851)
More Education (Up to Some High School)	0.134	0.114	0.224	0.3444***
	(0.120)	(0.121)	(0.137)	(0.103)
Diploma Holder	0.387	0.337	0.539	0.727**
	(0.341)	(0.342)	(0.358)	(0.3236)
Graduate Education	0.196	0.167	0.353	0.576***
	(0.197)	(0.199)	(0.229)	(0.165)

Table 9: Female Economic Empowerment Regression Results (2SLS)

Variable	Aadhar & Pred. (3)	Aadhar Only (4)	Pred. Only (5)	OLS (6)
Received Govt Welfare	-0.012	-0.034	0.110	0.2964***
	(0.126)	(0.128)	(0.155)	(0.0934)
Aadhar	NA	NA	NA	0.824***
	.	.	.	(0.213)
2018	1.769***	1.748***	1.769***	1.745***
	(0.0820)	(0.082)	(0.0817)	(0.0817)
Constant	10.974***	10.981***	11.093***	10.575***
	(0.893)	(0.895)	(0.894)	(0.907)
R-Squared	0.158	0.156	0.1659	0.1508
N	48,137	48,137	48,137	48,137

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

District controls were included in this regression but are excluded from this table.

economic empowerment. The results show that having a bank account, on average, causes women to add approximately 3 points to their economic empowerment score. This result is in line with previous literature which suggests that when women have access to their own bank account they have increased decision making power in their household's finances.

Note that similar to the previous results, the coefficients on age and PPI score in this regression represent a one year/point increase. Therefore, one must multiply an individual's age/score to get the total added value to one's empowerment score. Still, it is surprising that PPI Score has such a small coefficient. It is possible that a true income measure would provide more insight as to the effect of income on economic empowerment. Unfortunately, PPI score is the only measure of income the data set provides.

Age squared is negatively and significantly correlated with empowerment. The negative coefficient on age squared shows that there exists a non-linear relationship between empowerment and age. For the most part, being older increases empowerment, but after a certain point old age has a slightly negative effect on empowerment. The following variables do not have a statistically significant impact on women's economic empowerment: education past primary school and receiving government welfare.

The insignificance of education levels is unexpected at face value. However, the lack of significance should not be interpreted as education having an insignificant impact on economic empowerment, but rather that education past primary school is relatively co-linear with bank account ownership because educated people are more likely to have a bank account as Table 6 indicates. In fact, the education categorical variables have the largest marginal impact on one's probability to have a bank account. Therefore, all significance from the education levels are assigned to the bank account variable instead, explaining why education levels are assigned an insignificant coefficient. Despite its co-linearity, I do not exclude education levels from this regression to maintain consistency in demographic control variables used throughout this paper.

When looking at different instrumented versions of Equation 4, the biggest change in magnitude concerns bank account ownership. The coefficient on the bank account ownership variable decreases in magnitude by approximately 25% when Aadhar card ownership is not included in the instrumentation process, but it is still positive and statistically significant no matter which instrument is used. This does not indicate that Aadhar card ownership is a better or worse instrument than the predicted variable. It is impossible to ascertain which instrument is the most "correct," as instrument strength is determined theoretically. Multiple instruments increase precision, so Column 3 is theoretically the most precise. The significant independent variables are robust across versions, keeping the same sign and relative magnitude. The variables which were not significant vary slightly more in magnitude, but their non-significance remain the same. The OLS regression is presented in column 6. The OLS regression does not address the endogeneity issue present between bank account ownership and economic empowerment. Column 6 presents significant test results for almost all the independent variables. However, the model lacks internal validity and is only provided for comparison purposes. It should not be interpreted in the same way as columns 3, 4, and 5. **All three versions of the 2SLS regression support the my second hypothesis: that access to bank accounts increases economic empowerment.**

6 Conclusion

This study looks at the impact of the Indian government's financial inclusion program PMJDY on the lives on Indian women. It differentiates itself from previous studies which often stop examining the effects of PMJDY after the introduction of demonetization. This study also covers a broader geographic range than previous literature that examines women's empowerment specifically in relation to the Indian government's financial inclusion efforts. The study answers two questions: (1) Did PMJDY increase women's access to bank accounts? (2) Does access to bank account increase women's economic empowerment?

Using a Probit model and Two-Stage Least Squares Regression model, I find that India's financial inclusion efforts were successful in giving women increased access to bank accounts. In turn, banks accounts have a positive impact on women's empowerment. Similar benefits were found for rural individuals, another group of individuals that traditionally have less access to financial institutions in India. It remains unclear what effect PMJDY accounts specifically have on women's economic empowerment from my analysis, as PMJDY accounts are grouped in with all types of bank accounts. In terms of economic empowerment, this study finds that women with a bank account were significantly likely to be more economically empowered than women without a bank account.

These results are encouraging for other countries that are looking towards financial inclusion efforts or women's empowerment initiatives. While much more work needs to be done to close the gender gap in India and around the world, it is encouraging to know that access to a bank account is a first step in ameliorating the gender gap in financial autonomy. Moreover, the Indian government certainly has other government initiatives aimed at increasing women's economic empowerment specifically (e.g. government subsidies). This study does not look at those efforts. Future research may want to look at the combined impact of various government programs focused on empowering women.

A further limitation of this study is that economic empowerment questions were only available for two of the six years that this study examines. Future studies may want to look at the changes in empowerment over more years. This study defines economic empowerment as one's decision making influence in managing their finances given the questions that were included in the data set. Future studies may also want to expand their definition of economic empowerment and/or include other types of empowerment (social, political, etc) in their analysis.

References

Agarwal, S., Alok, S., Ghosh, P., Ghosh, S., Piskorski, T., &; Seru, A. (2017). Banking the unbanked: What do 255 million new bank accounts reveal about financial access? SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2906523 Aker, J., Welch, K., amp; Rowe, C. (2016). Payment mechanisms and anti-poverty programs: Evidence from a mobile money cash transfer experiment in Niger. AEA Randomized Controlled Trials. https://doi.org/10.1257/rct.1586 Bhatia, S., amp; Singh, S. (2019). Empowering women through Financial Inclusion: A Study of Urban Slum. Vikalpa: The Journal for Decision Makers, 44(4), 182–197. https://doi.org/10.1177/0256090919897809

Chopra, Y., amp; Tantri, P. L. (2017). Bank accounts for the unbanked: Evidence from a big bang experiment. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2919091

Demirguc-Kunt, A., amp; Levine, R. (2009). Finance and inequality: Theory and evidence. https://doi.org/10.3386/w15275

Demirguc-Kunt, A., Klapper, L., Singer, D., amp; Van Oudheusden, P. (2015). The global findex database 2014: Measuring Financial Inclusion around the world. Policy Research Working Papers. https://doi.org/10.1596/1813-9450-7255

Duflo, E. (2012). Women empowerment and economic development. Journal of Economic Literature, 50(4), 1051–1079. https://doi.org/10.1257/jel.50.4.1051

Gunther, M. K. (2017). The progress of financial inclusion in India: Insights from multiple waves of survey data. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2946954

Hulme, D. (2008). The story of the Grameen Bank: From subsidised microcredit to market-based microfinance. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.1300930

Holloway, K., Niazi, Z., & Rouse, R. (2017). IPA women's economic empowerment through financial inclusion: A review of existing evidence and remaining knowledge gaps. New Haven, CT: Innovations for Poverty Action.

Klapper, L., M. El-Zoghbi, and J. Hess. (2016). "Achieving the Sustainable Development Goals: The Role of Financial Inclusion." CGAP.

Lahiri, A. (2020). The great indian demonetization. Journal of Economic Perspectives, 34(1), 55–74. https://doi.org/10.1257/jep.34.1.55

Muralidharan, K., Niehaus, P., amp; Sukhtankar, S. (2014). Building State Capacity: Evidence from biometric smartcards in India. https://doi.org/10.3386/w19999

Singh, S., &; Bhandari, M. (2012). Money Management and control in the Indian joint family across generations. The Sociological Review, 60(1), 46–67. https://doi.org/10.1111/j.1467-954x.2011.02047.x

Singh, V. K., &; Ghosh, S. (2021). Financial Inclusion and economic growth in India amid demonetization: A case study based on panel cointegration and causality. Economic Analysis and Policy, 71, 674–693. https://doi.org/10.1016/j.eap.2021.07.005

Swapnapriya, S., &; Chinmoy, J. (2020). Role of microfinance towards personal empowerment of women: An empirical study. Indian Journal of Economics and Development, 301–306. https://doi.org/10.35716/ijed/20012

World Bank, 2014. Global Financial Development Report 2014: Financial Inclusion. Washington, DC.