

Saving Tax Incentives and Consumption: Evidence from a Policy Experiment*

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Abstract

Using high-frequency administrative transaction data, we study the consumption response to a fiscal policy in India that resulted in an increase in tax incentives for voluntary private savings. Difference-in-differences estimation shows a significant negative consumption response to the policy. 66% of additional voluntary savings through home equity accumulation are funded by a reduction in consumption. Heterogeneity analyses reveal that the amount of claimable tax benefits and liquidity buffers are significant drivers of the negative spending response. These results imply that saving tax incentives increase net private savings.

JEL Classification: D12, D14, D91, E21, E51, E62, G21, H27, H31

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1 Introduction

Understanding households' saving decisions is central to economics and has important policy implications. At the micro level, low savings can lead to financial vulnerability in post-retirement ages. At the macro level, the saving rate determines the sustainability of economic growth. To encourage savings, many countries develop special savings accounts and provide tax incentives to these accounts.¹

A critical debate is whether the tax incentives for saving (henceforth, saving tax incentives) effectively increase savings. If households respond to these incentives by substituting tax-favored savings for other forms of savings, the net effect on household savings is zero. Empirical evidence remains mixed. While Venti and Wise (1986, 1990), Poterba, Venti, and Wise (1995), Engelhardt (1996), Benjamin (2003), and Gelber (2011) document a positive net saving effect with zero or small crowding out of other savings; Gale and Scholz (1994), Engen, Gale, and Scholz (1996), and Chetty, Friedman, Leth-Petersen, Nielsen, and Olsen (2014) present analyses that point to a zero net effect on savings. One key difficulty in assessing the net effect on savings is data limitations. In most cases, researchers simply do not observe the entire portfolio of savings accounts.

To overcome this empirical challenge, we estimate the net effect on savings through the lens of the consumption response. Saving tax incentives raise personal savings when households finance tax-favored savings with reductions in consumption. We study a unique policy experiment on saving tax incentives in India and analyze the associated consumption and saving response. Specifically, the Indian government, in an effort to boost personal savings, announced in July 2014 that the annual deduction limit of eligible savings accounts was increased by 50,000 Indian rupees (INR). This increase was implemented in the same fiscal year.² The affected savings accounts include fixed deposits of

¹These accounts typically feature preferential tax treatment of contributions and investment earnings, tax-deductible contribution limits, and/or penalties for early withdrawals. Just to name a few examples, there are Individual Retirement Accounts (IRAs), 401 (k) plans, and Keogh plans in the United States; Tax Exempt Special Savings Accounts (TESSAs) and Individual Savings Accounts (ISAs) in the UK.

²India's fiscal year starts in April and ends in March. For example, FY 2014–15 refers to the period from

more than five years, health insurance, tuition fees, the public provident fund (PPF), as well as the principal portion of monthly mortgage payment.

We use a unique panel dataset from a leading commercial bank in India that enjoys the highest market share in consumer banking. For this analysis, we use the debit card spending transactions of a random sample of the bank's customers as well as the monthly mortgage performance for the mortgage borrowers in the sample. Compared to prior studies on saving tax incentives that use annual survey data, we perform a more powerful test based on monthly transaction-based spending and savings by individuals from an administrative dataset that has little measurement error.

We implement a difference-in-differences identification strategy to study the impact of the increase in saving tax incentives on savings and consumption. Because our data do not cover all eligible savings accounts or accurate information on total income before deductions, we cannot precisely identify the total effect of the change in saving tax incentives. Instead, we adopt a slightly different empirical strategy that focuses on one eligible savings instrument: mortgage payment, which corresponds to savings in the form of home equity. We first compare the mortgage payment by existing mortgage borrowers before and after the policy announcement, July 2014, controlling for individual fixed effects that absorb unobserved cross-sectional heterogeneity such as individual savings preferences. As we do not capture other eligible savings accounts that these individuals might have, this impact we estimate may under-estimate the true effect of the policy on eligible savings. Furthermore, we examine how the policy change in saving tax incentives affects consumption. This consumption analysis alleviates the concern that an increase in mortgage payment may be driven by a mere shift of savings from other savings accounts, which implies there is no actual increase in net savings. The saving tax incentives raise net savings when households finance contributions with reductions in consumption. We adopt a difference-in-differences approach by comparing the consumption response to

April 2014 to March 2015.

the policy between mortgage borrowers and non-mortgage borrowers. This gives us a fuzzy identification: any impact of the change in saving tax incentives on consumption we find is likely the lower bound of the true estimate, because we are potentially including treated individuals in our control group (i.e., some non-mortgage borrowers are owners of other eligible savings accounts) who might also respond to the saving tax incentives shock. To validate our research design, we explicitly test for parallel trends in spending behavior before the policy announcement in our analysis.

We find that mortgage borrowers increase monthly mortgage payment by 24.1%, or approximately 9,615 INR per month, following the increase in saving tax incentives. This estimate is obtained using panel regressions where we control for static loan-level characteristics, time-invariant individual characteristics, and the concurrent interest rate. Next, using a difference-in-differences design, we estimate that mortgage borrowers reduce spending by 21.3%, or approximately 6,416 INR per month on average, relative to non-mortgage borrowers after the tax policy change. In other words, 66 cents out of every rupee in additional savings through home equity accumulation are funded by a reduction in consumption.

We verify the validity of the identifying assumption, that is, the control group serves as a good counterfactual for the treatment group, using multiple approaches. We first show that the difference in spending between the treatment group and the control group before the policy announcement is economically negligible and statistically insignificant, which confirms the parallel-trends assumption. Next, we match the treatment and the control groups using observable characteristics including age, gender, marital status, and district-level characteristics. The results based on the matched sample resemble those from the main analysis. Moreover, to address the concern that renters are not a valid control group for mortgage borrowers, we use only older non-mortgage borrowers as the control group to proxy for outright home-owners and obtain similar estimates.

We find substantial heterogeneity in the consumption response to the increase in sav-

ing tax incentives across individuals. In particular, while the low-loan-balance mortgage borrowers experience little consumption change economically or statistically relative to non-mortgage borrowers, high-loan-balance mortgage borrowers experience a statistically and economically significant reduction in their spending. The differential response between low- and high-loan-balance mortgage borrowers is consistent with the fact that the maximum amount of tax benefits that a mortgage borrower can obtain by increasing mortgage payment is limited by the remaining balance of the mortgage. Moreover, higher-liquidity (as measured by the pre-period bank balance) individuals experience a larger reduction in their spending relative to lower-liquidity individuals.

In addition to mortgage payment (home equity), there are other long-term savings instruments that can benefit from the higher tax deduction limit. To complete our analysis, we also investigate the effect of the change in saving tax incentives on a different eligible savings instrument - the public provident fund (PPF). Although the PPF has a lock-in period of 15 years and is less liquid, it offers attractive returns that can be compounded annually and are guaranteed by the government. This attractive feature suggests that the PPF is arguably another popular venue for the saving response to occur, besides mortgage payment. We find that PPF users make additional PPF contribution of 18,170 INR annually, which accounts for 36.3% of the increase in deduction limit. In addition, relative to individuals without a PPF account, PPF users reduce their monthly spending by 3.0%, or approximately 468 INR per month, following the tax policy change. The comparison of the increase in savings and the a reduction in consumption implies that 31 cents out of every rupee in additional PPF savings are funded by a reduction in consumption.

We perform additional tests to examine the robustness of our results. First, we control for regional variation in tax evasion by augmenting our panel regression specification to include district-specific year-month fixed effects and obtain similar estimates. Second, we rule out the possibility that the estimated relative decline in mortgage borrowers' spending is due to some unknown seasonal trend by conducting a falsification test using

the prior year (FY 2013–14). Third, we control for the potentially differential sensitivity to interest rate shocks and house price fluctuations between mortgage borrowers and non-mortgage borrowers and obtain similar estimates of the spending response. Fourth, we test and reject a hypothesis that a spurious correlation between mortgage status and income shocks can explain our findings. Fifth, we find that the economic magnitude of the spending response remains stable when we re-estimate the equation using an alternative measure of spending as the outcome variable. Last but not the least, we find that the higher tax incentives do not trigger any visible response in the extensive margin.

Our paper contributes to the literature on households' saving decisions and tax-based saving incentives. According to the classical life-cycle model, households should exhaust saving tax incentives and increase private savings today in order to maximize lifetime utility (Ando and Modigliani, 1963). However, actual saving behaviors deviate from the predictions of the life-cycle model (Thaler, 1994). Bounded rationality, hyperbolic discounting, and self-control problems can all lower household saving (Laibson, Repetto, Tobacman, Hall, Gale, and Akerlof, 1998; Angeletos, Laibson, Repetto, Tobacman, and Weinberg, 2001). Empirical evidence remains mixed due to the presence of unobserved household-specific preferences for savings and the potential endogeneity of eligibility in panel studies. In view of these empirical challenges, this paper uses an alternative approach and highlights that the consumption response is informative to assess the impact on net savings. If the saving incentives lead to an increase in total savings, then current consumption would have to fall. This paper also refines the precision of consumption measurement relative to the existing literature. We are able to perform a more powerful test using monthly transaction-based measures of consumption and savings by individuals from an administrative dataset that has little measurement error. We document that 66% of additional voluntary savings through home equity accumulation are funded by a reduction in consumption. Furthermore, the amount of claimable tax benefits is a significant driver of the negative spending response. Our results imply that saving tax

incentives increase net private saving.

We also relate to the literature on the consumption response to tax changes. Shapiro and Slemrod (2003a), Johnson, Parker, and Souleles (2006), and Agarwal, Liu, and Souleles (2007) use micro-level data to examine the effect of the 2001 U.S. tax rebates. Others have looked at the effect of the 2008 tax rebates on payday loans payments (Bertrand and Morse, 2009) and the 2001 and 2008 tax rebates on bankruptcy filing (Gross, Notowidigdo, and Wang, 2012). As the tax rebates represent positive income shocks, the insights from the broader literature on the consumption response to income shocks (Browning and Colado, 2001; Jappelli and Pistaferri, 2010) are also relevant. Existing studies find a large consumption response to expected and unexpected income shocks, especially for liquidity-constrained consumers.³ Our setting of tax incentives differs from the typical stimulus policies in that there is no change in income. We find that households respond strongly to higher tax deductibility by reducing their consumption to increase saving. Our results demonstrate the salience of tax incentives for household decision-making.

We also relate to the literature on mortgage and homeownership. Coulibaly and Li (2006) find that homeowners increase their active savings as well as consumption of durable goods, but not consumption of nondurable goods, after they pay off their mortgages. Gan (2010) finds that housing wealth has an effect on consumption such that for the majority of the households who do not refinance, consumption sensitivity appears to be due to a reduction in precautionary savings. Using micro-level mortgage data, Gerardi, Rosen, and Willen (2007) find that mortgage securitization, creating a less imperfect mortgage market since the early 1980s, has played an important role in smoothing consumption. One important aspect of the tax subsidies for mortgages available in many countries is the mortgage interest deduction. Using different methodologies, both Hilber

³Examples include Zeldes (1989a,b); Carroll, Hall, and Zeldes (1992); Shapiro and Slemrod (2003a,b); Souleles (1999, 2000, 2002); Parker (1999); Hsieh (2003); Stephens (2003, 2006, 2008); Stephens and Unayama (2011); Aguiar and Hurst (2005, 2013); Agarwal and Qian (2014, 2017); Gelman, Kariv, Shapiro, Silverman, and Tadelis (2014); Di Maggio, Kermani, Keys, Piskorski, Ramcharan, Seru, and Yao (2017); Olafsson and Pagel (2018); Baker (2018).

and Turner (2014) and Sommer and Sullivan (2018) find that the mortgage interest deduction does not promote homeownership. Gruber, Jensen, and Kleven (2021) also confirm this lack of extensive margin effect; along the intensive margin, they find that the mortgage interest deduction encourages households to buy larger or more valuable homes. Consistent with these existing studies, we also document faster accumulation of home equity among existing borrowers along the intensive margin and no change in homeownership along the extensive margin. Our analyses reinforce and enrich this finding by tracing out the magnitude and characteristics of the a reduction in consumption that underlies the home equity accumulation.

2 Institutional Setting

2.1 India's Personal Income Tax Policy Change

The basic structure of India's personal income tax regime can be described as a progressive tax schedule that varies by age groups. In FY 2013–14, income up to (a) 200,000 Indian Rupee (INR) for individuals below 60 years old; (b) 250,000 INR for individuals between 60 and 80 years old; or (c) 500,000 INR for individuals above 80 years old has a tax rate of 0%. The marginal tax rate ranges from 10% to 30% for higher income brackets. Individuals can claim deductions from their total income to calculate taxable income. One source of deductible items that we focus on in this paper is long-term savings and investment instruments specified by Section 80C of the Income Tax Act, including the public provident fund (PPF), long-term fixed deposits, health insurance, tuition fees, as well as the principal portion of the monthly payment on a mortgage on an owner-occupied primary residence.⁴

In the Union Budget speech on July 10, 2014⁵, the Finance Minister Arun Jaitley announced an increase in the income tax exemption limit of 50,000 INR for both individuals

⁴Further details on marginal tax rates and the full list of 80C long-term savings instruments are provided in Appendix A.

⁵Since 1999, the annual Union Budget is usually announced in February. But in FY 2014–15, the union

below 60 years old and senior citizens between 60 and 80 years old in order to “provide relief to small and marginal taxpayers and senior citizens”. At a marginal tax rate of 30%, this tax relief is valued up to INR 15,000. Moreover, in order to “encourage domestic investment in long term savings”, the deduction limit of long-term investments was increased by 50,000 INR from 100,000 INR to 150,000 INR.⁶ Assuming a mortgage borrower has a loan balance at the median level of 750,000 INR with an annual interest rate of 10.15% and a remaining maturity of 20 years, based on an amortization schedule, the total annual principal payment is about 12,700K INR and the total annual interest payment is about 76,600 INR.⁷ If the individual has other eligible long-term investment(s) of 86,300 INR, the individual has reached old exemption limit. Under the new deduction limit, if the individual pays 50,000 more back to the mortgage loan, she will be able pay 15,000 INR less on income tax given a marginal tax rate of 30%. Therefore, we argue that policy change creates an increase in saving tax incentives. For the remainder of the paper, we refer to the increase in deduction limit as an increase in saving tax incentives.

2.2 India’s Mortgage Market

Residential mortgage loans are the primary form of household credit in India. As of December 2014, India’s outstanding residential mortgage reached 6.0 trillion INR, accounting for 55.7% of total household debt.⁸ Housing finance penetration stood at 35.8% in

budget was delayed from February to July due to the general election. As the 2014 union budget is the policy enacted by the new party in power, the policy change is most likely unanticipated by the general population.

⁶In India, the income tax deduction limit of the eligible savings instruments increases over time. Since July 2014, the deduction limit of long term saving accounts has remained at 150,000 INR. The general expectation of the public is that the increase in the deduction limit was a non-reversible policy change and the trend would be continuing to expand over time.

⁷The policy change also includes an increase in the deduction limit of the interest payment of a mortgage loan of 50,000 INR from 150,000 INR to 200,000 INR. For this example, the individual had total annual interest payment being 76,600 INR which was below the old limit and the policy change had no impact on her from interest payment tax subsidy. The amount of interest payment is a not a choice variable of the mortgage borrower but is determined by the remaining balance and the interest rate of the mortgage loan. Borrowers with annual interest payment exceeding the old cap will get more tax deduction from interest payment and more disposable income for consumption. The increase in permanent income is against us finding the mortgage borrowers reducing consumption to finance the extra principal payment.

⁸Source: The Reserve Bank of India (RBI)’s *Quarterly BSR-1: Outstanding Credit of Scheduled Commercial*

urban India and 7.8% in rural India as of 2012.⁹

Floating rate products are the most widely used structure for mortgages, accounting for 75% of all outstanding mortgages in 2012.¹⁰ Commercial banks are the major providers of mortgages: In 2013, 61.1% of the outstanding residential mortgages were provided by commercial banks, with the rest provided by housing finance companies or HFCs.¹¹

In terms of the tax treatment of mortgages, India is one of the few countries that grant tax deductibility for both the principal payment as well as the interest payment on a home mortgage. In addition, there is no penalty on prepaying a mortgage. The Reserve Bank of India (RBI) asked banks to remove prepayment penalty on floating rate mortgages in early 2012.¹² Before the RBI ruling, the bank that provided us with the data used in this paper waived the mortgage prepayment penalty in November 2011. Therefore, mortgage borrowers could increase mortgage payment without incurring extra costs. Higher mortgage payments accelerate the accumulation of home equity. Individuals can access their illiquid home equity through home equity loans. Home equity loans enable the accumulated home equity to serve as a self-insurance device for intertemporal consumption smoothing (Lustig and Van Nieuwerburgh, 2005, 2010).

Banks, available at <https://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications#!12>.

⁹Source: The RBI's *Report of the Committee on the Development of Housing Finance Securitisation Market*, available at <https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/HOUSINGFINANCESECURITISATION42BEC7A160F34B56A6893ECB71223D65.PDF>.

¹⁰Source: The RBI's *Report of the Committee to Assess the Feasibility of Introducing More Long-Term Fixed Interest Rate Loan Products by Banks*, available at <https://m.rbi.org.in/Scripts/PublicationDraftReports.aspx?ID=680>. During our sample period, the floating interest rate was fairly stable with a small increase. The mortgage borrowers in our sample did not refinance their mortgage loans during the sample period. Therefore, our results are not driven by any refinanced mortgage loans.

¹¹Source: The RBI's *Report of the Committee on the Development of Housing Finance Securitisation Market*, available at <https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/HOUSINGFINANCESECURITISATION42BEC7A160F34B56A6893ECB71223D65.PDF>.

¹²See <https://www.businesstoday.in/money/banking/home-loan-prepayment-penalty-rbi/story/185146.html>.

3 Data

We use a unique proprietary dataset obtained from a leading commercial bank in India that enjoys the highest market share in consumer banking. The dataset covers a random sample of the bank's customers over a 24-month period from April 2013 to March 2015 (i.e., two full fiscal years, FY 2013–14 and FY 2014–15). The first set of comprehensive records in the dataset is the detailed transaction-level information about the debit cards that individuals in the sample have with the bank. For each transaction, we observe the amount, date, direction (inflow or outflow), and the transaction code that the bank assigns according to its transaction classification system. In addition, the data include individual demographic characteristics, including age, gender, marriage status, and residential location at the state-district level.

The sample of individuals include individuals that have a mortgage with the bank during the sample period (who we refer to as “mortgage borrowers”) as well as individuals that do not have an outstanding mortgage with the bank during the sample period (who we refer to as “non-mortgage borrowers”). For the mortgage borrowers in the sample, we also observe information on their mortgages with the bank. We observe the mortgage sanction information, including the sanction time, total approved credit limit, loan terms, payment starting date, and the underlying property's location at the state-district level. We also observe the loan performance at the monthly frequency, including payment amount, outstanding balance, interest rate, and delinquency status.

This dataset offers several advantages. Relative to survey-based datasets on household consumption and savings such as the Surveys of Consumer Finances (SCF) or the Consumer Expenditure Surveys (CEX) that most existing studies rely on, our sample is larger with little measurement error, and it allows high frequency analysis. Although we do not have information about accounts individuals have with other banks in India,

¹³This calculation is based on debit card ownership data from the World Bank, debit card issuance statistics from the RBI, and population statistics from the Indian Census. The full details are included in Appendix B.

we suspect the measurement error is negligible given the bank's market share. For example, an average Indian debit card holder has 1.1 debit cards used for transactions¹³, which is also the number of debit cards an average individual has in our transaction dataset. Although our data do not cover credit card transactions, we suspect the resulting mis-measurement is negligible due to the very limited use of credit cards in the Indian economy during our sample period.¹⁴ In other words, we are picking up the majority of card spending of these households through their spending transactions using debit cards with this bank.

Following Agarwal and Qian (2014, 2017), we aggregate the data to the individual-month level. Total monthly spending consists of two components: Cash spending is computed by adding all cash withdrawals from automated teller machines (ATMs) and teller counters over all debit cards for each individual. Point-of-sale (POS) spending is computed by adding all POS transactions over all debit cards for each individual. We code observations of flow variables as zero if the individual did not have any corresponding transactions in the given month.¹⁵

To ensure that the household-level changes in consumption following the July 2014 tax policy change are well-defined, we restrict the sample to individuals whose debit cards were open before July 2014 and remain open afterwards. In addition, we restrict the sample of mortgage borrowers to those who started mortgage payment before July 2014. We further exclude inactive users—individuals with no bank account transaction for six months as well as individuals with no valid demographic information.

¹⁴Between debit cards and credit cards, the former is the dominant spending instrument across multiple dimensions, such as overall issuance, usage share, and ownership rate. The full details are included in Appendix B.

¹⁵Admittedly, zero-valued observations would drop out in log-linear regression specifications and may affect the consistency of the estimate. We show that we obtain estimates of similar economic magnitude in both the level and the log specifications in Section 6.5.

4 Identification and Empirical Strategy

The main analysis in this paper studies the consumption and saving responses to the change in saving tax incentives that was announced on July 10, 2014 and implemented in the same fiscal year. The tax policy change increases the investment limit of eligible savings accounts that can be deducted from total income to calculate taxable income. Ideally, one would like to track the investment flows into all eligible savings accounts to analyze the extent to which individuals utilize the higher deduction limit. Additionally, given the tax benefit of deductible investments varies for individuals with different levels of total income before deductions due to the progressive marginal tax rates, we could also assess the elasticity of investment to the tax benefit if total income before the deductions is observed.

Because our data do not cover all eligible savings accounts or accurate information on total income, we cannot precisely identify the total effect of the change in saving tax incentives. Instead, we adopt a slightly different empirical strategy that focuses on one eligible savings instrument: mortgage payment, which reflects savings in the form of home equity. Home mortgage loan is the only negative saving instrument among all eligible long-term savings instruments.¹⁶ Households in debt are arguably more liquidity constrained compared with the households with positive savings. This unique feature suggests that home equity accumulation is arguably the most popular venue for the saving response to occur through a reduction in consumption. The substantial increase in the tax subsidy for mortgage repayment in July 2014 creates significant financial incentives for mortgage borrowers to respond to the policy change. Mortgage borrowers could reduce consumption and increase their mortgage payment to take advantage of the tax subsidy.¹⁷

¹⁶Moreover, other long-term savings instruments eligible for the tax subsidy have requirements on lock-in periods and minimum balances. As a result, we expect to see a more muted response of additional saving in other instruments. In Section 7, we examine a different instrument and confirm our conjecture.

¹⁷The simultaneous increase in the income tax exemption limit does not negatively affect our empirical

We first compare the mortgage payment by mortgage borrowers before and after July 2014. The impact of the income tax policy on mortgage payment we find may underestimate the true effect of the policy on eligible savings. This is because we do not capture other eligible savings accounts that these individuals might have, and the individuals might also respond to the shock by increasing their contributions into these missing accounts.

One might be concerned that an increase in mortgage payment may be driven by a mere shift of savings from non-tax-advantaged savings accounts. In view of this, the consumption response is informative to assess the impact on *net* savings. If the policy leads to an increase in total savings, then current consumption would have to fall. We adopt a difference-in-differences approach by comparing the consumption response to the policy between mortgage borrowers and non-mortgage borrowers.

This gives us a fuzzy identification: any impact of the income tax change on consumption we find is likely the lower bound of the true estimate. This is because we are potentially including treated individuals in our control group (i.e., some non-mortgage borrowers are owners of other eligible savings accounts) who might also respond to the saving tax incentives shock. As a result, the fuzzy identification strategy raises the hurdle of identification and produces conservative estimates of the consumption response to the income tax policy.

Admittedly, the treatment (mortgage borrowers) and the control (non-mortgage borrowers) may not be a well-balanced sample due to observable and unobservable differences between the two groups, which could affect their consumption patterns. In our analysis, we explicitly test for any difference in consumption between the two groups during the pre-policy period. If our research design is valid, we expect to observe an

identification. Such an effective income tax decrease means more disposable income so that individuals increase consumption. The additional consumption typically occurs in the following year when the income tax is accessed and tax rebates (if applicable) are disbursed (see, e.g., Johnson et al. (2006), Agarwal et al. (2007), among others). To the extent that individuals adjust their consumption in the current year in anticipation of the future tax rebates, the adjustment is in the upward direction and increases the hurdle of identification for us to find a reduction of consumption to increase savings.

economically and statistically insignificant difference in consumption between the two groups during the pre-treatment period (i.e., parallel trends in the pre-treatment period).

One might be concerned that renters are not a valid control group for mortgage borrowers as they do not have home equity. Since we do not directly observe home ownership status and therefore cannot precisely isolate home-owners without mortgage obligation as the control group, we proxy for home-owners without mortgage obligation using older non-mortgage borrowers.¹⁸ We thus use non-mortgage borrowers older than 35 years old as our control group and find similar results. In addition, we perform a matched-sample analysis, as well as various diagnostic checks and falsification tests on the validity of the difference-in-differences strategy.

Table 1 provides summary statistics of demographics and spending information for mortgage borrowers and non-mortgage borrowers. Panel (a) covers demographic characteristics. Panel (b) covers district-level characteristics based on the Socioeconomic High-resolution Rural-Urban Geographic Platform for India (SHRUG)¹⁹ data. Panel (c) covers total spending and its components. For the spending variables, we first calculate the within-individual average of each variable in the fifteen months prior to policy announcement (2013:04–2014:06) and then report the summary statistics in the cross-section of individuals.

Compared to non-mortgage borrowers, mortgage borrowers are younger, less likely to be female, and more likely to be married. In terms of district-level characteristics, HMBs are from districts of slightly lower manufacturing employment share, less urban, less literate, lower per capita consumption, and larger average household size.

Although mortgage status is likely orthogonal to the tax policy shock, it may be endogenously related to wealth and other demographic variables. Individuals in the treat-

¹⁸In general, home-ownership increases with age. According to the 2015-16 India National Family Health Survey (NFHS-4), ownership of a housing property increases from 44% for men aged 15–19 years old to 86% for men aged 40–49 years old and from 26% for women aged 15–19 years old to 47% for women aged 40–49 years old.

¹⁹Source: <http://www.devdatalab.org/shrug>

ment group also have higher levels of monthly spending than the control group. To the extent that the identifying assumption lies in the “parallel trends” assumption, the difference in the level of spending between the treatment group and the control group is of lesser concern, and we will test explicitly for the parallel trends between the two groups before the policy shock.

To analyze the impact of the change in saving tax incentives on mortgage payment, we estimate the following regression in the sample of mortgage borrowers:

$$y_{i,t} = \mu_i + \beta \cdot Post_t + \varepsilon_{i,t} \quad (1)$$

$y_{i,t}$ is the monthly mortgage payment by mortgage borrower i in month t . The key variable of interest is $Post_t$, an indicator for post-July 2014 months. We include individual fixed effects μ_i to absorb unobserved cross-sectional heterogeneity such as individual preferences for savings. β in equation (1) captures the average change in monthly mortgage payment after the July 2014 policy change relative to the months before the policy change (the benchmark period).

We study the average spending response to the saving tax incentives policy change using the following specification:

$$y_{i,t} = \mu_i + \pi_t + \beta \cdot (Treated_i \times Post_t) + \varepsilon_{i,t} \quad (2)$$

$y_{i,t}$ is spending of individual i in month t . The key variable of interest is the interaction term between $Treated_i$, an indicator for eligible individuals, and $Post_t$, an indicator for post-July 2014 months. Its coefficient β measures the spending response to the tax policy change. We include a host of fixed effects to control for unobserved characteristics that are invariant in dimensions that one might think as confounding factors. Individual fixed effects μ_i are included to absorb unobserved cross-sectional heterogeneity such as individual consumption preference. Year-month fixed effects π_t are included to ab-

sorb seasonal variations in aggregate consumption expenditures and the average impact of all other concurrent aggregate factors. β in equation (2) captures the average change in monthly spending of the treated group after the July 2014 policy change compared to the months before the policy change (the benchmark period), relative to the change in spending of the control group. In other words, β is the estimated treatment effect.

Unless indicated otherwise, all regression equations are estimated using ordinary least squares (OLS), and the standard errors are doubly clustered at the individual level and at the month level.

5 Analysis on Mortgage Borrowers

In this section, we focus on one eligible savings instrument: mortgage payment, which reflects savings in the form of home equity accumulation. Home mortgage loan is the only negative saving instrument among all eligible long-term savings instruments. Households in debt are arguably more liquidity constrained compared with the households with positive savings. This unique feature suggests that home equity accumulation is arguably the most popular venue for the saving response to occur through a reduction in consumption. The substantial increase in the tax subsidy for mortgage repayment in July 2014 creates significant financial incentives for mortgage borrowers to respond to the policy change. Mortgage borrowers could reduce consumption and increase their mortgage payment to take advantage of the tax subsidy.

We begin by estimating the average response of payment to the tax policy change. Next, we proceed to estimate the average spending response to the tax policy by comparing mortgage borrowers to non-mortgage borrowers before and after the tax policy changes. To sharpen the results, we later study response heterogeneity across different types of individuals.

In the main analysis, we focus on the sample of mortgage borrowers and non-mortgage borrowers in the period from fifteen months before to nine months after the July 2014 tax

policy change (April 2013 to March 2015). To further address the possibility that individuals spend via accounts with other banks, we report the estimates obtained in the sample of active users, defined as individuals having at least 6 months of non-zero debit card transactions. Our results are robust to other ways in filtering active users or no filtering at all.

5.1 Average Mortgage Payment and Spending Responses

We first analyze the extent to which mortgage borrowers increase mortgage payment. We estimate equation (1) to examine how mortgage payment changes following the tax policy change conditional on the inclusion of individual fixed effects. In the context of mortgage payment, the inclusion of individual fixed effects neutralizes the impact of static loan-level characteristics such as approved credit limit and maturity of the loan, as well as time-invariant individual characteristics such as unobserved saving preferences.

Column 1 of Table 2 shows that on average, mortgage borrowers increase payment by 27.3% following the tax policy.²⁰ As floating rate mortgages are prevalent in our sample, consistent with the national prevalence, one may be concerned by the mechanical impact of interest rate fluctuations on mortgage payment. To test this, we estimate equation (1) with the interest rate as the outcome variable and report the results in Column 2. We find that there is a small increase in interest rate after July 2014. In view of this, we additionally control for the interest rate in estimating the payment response in Column 3. In this improved specification, we find that mortgage borrowers increase payment by 24.1% following the tax policy. Given an average monthly mortgage payment of 39,881 INR in the pre-period, the coefficient estimate implies that the monetary value of the mortgage payment increase amounts to 9,615 INR for an average mortgage borrower in the post-period.

²⁰In interpreting this and subsequent results where the natural logarithm of payment (or spending) is used as the outcome variable, we compute the proportional change in payment (or spending) associated with coefficient X by the exact formula $\exp(X) - 1$. For example, the coefficient of 0.241 in Column 1 of Table 2 implies a percentage change of $\exp(0.241) - 1 = 27.3\%$.

We then proceed to study the spending response to the tax policy change using a difference-in-differences design. We first compare the unconditional means of log total spending of mortgage borrowers (the treatment group) and non-mortgage borrowers (the control group) in Figure 1. While there are differences in spending between the treatment and control groups, they exhibit parallel trends before the July 2014 tax policy change. In addition, unconditionally, mortgage borrowers reduce spending relative to non-mortgage borrowers immediately after the enactment of the higher saving tax incentives. This comparison of unconditional patterns also shows the general seasonality in consumer spending and lends support for the inclusion of year-month fixed effects as in our panel regression specification.

Next, we estimate equation (2) to compare spending of mortgage borrowers (the treatment group) to non-mortgage borrowers (the control group) before and after the policy change conditional on the inclusion of individual fixed effects and time fixed effects.

Table 3 reports the estimates. As can be seen here, mortgage borrowers reduce spending by 21.3% relative to non-mortgage borrowers after the tax policy change. Given an average monthly spending of 30,071 INR for the treatment group in the pre-period, the coefficient estimate implies that the monetary value of the spending decrease amounts to 6,416 INR per month for an average mortgage borrower in the post-period. Furthermore, the average decrease in monthly consumption of 6,416 INR accounts for approximately 66% of the average increase in monthly mortgage payment of 9,615 INR. In other words, 66 cents out of every rupee in additional savings through home equity accumulation are funded by a reduction in consumption.

In our sample, cash spending accounts for more than 90% of total spending, consistent with the overall dominance of cash in the Indian economy during our sample period. According to the RBI, POS purchase transactions accounted for only around 9% of total volume and 5% of total value of debit card transactions in 2013.²¹ Furthermore, POS trans-

²¹Source: RBI's Concept Paper on Card Acceptance Infrastructure published on March 8th 2016, available at <https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=840>

actions require POS machines to be available at the merchants. The RBI notes in its card acceptance infrastructure analysis that POS machines might pose a constraint on POS usage during 2013–15.²² The availability of POS machines for an individual affects his/her POS transactions. However, we do not have this information. As we analyze debit card spending, which is consumption using individuals' own liquid wealth regardless of the payment method, we focus on the total spending and do not separately examine the two components in the subsequent analyses.

5.2 Testing the Identifying Assumptions

Before turning to additional results on the heterogeneity and characteristics of the spending response, in this subsection, we address several key concerns with our empirical approach.

The parallel-trends assumption. To explicitly examine the parallel-trends assumption, in Column 1 of Table 4, we additionally control for $\mathbb{1}(Mortgage) \times \mathbb{1}(Pre)$ with *Pre* equal to 1 for the four months immediately before the July 2014 tax change (i.e., March to June 2014). The coefficient estimate of $\mathbb{1}(Mortgage) \times \mathbb{1}(Pre)$ captures the difference between the treatment group and the control group before the policy change. For the parallel-trends assumption to hold, the coefficient of $\mathbb{1}(Mortgage) \times \mathbb{1}(Pre)$ should be statistically insignificant and economically small, which is what we find. This evidence confirms the validity of the parallel-trends assumption.

Controlling for the observable differences between mortgage borrowers and non-mortgage borrowers. One challenge with the current identification is that mortgage borrowers and non-mortgage borrowers differ significantly along observable dimensions. The pre-event parallel trends between the two groups have already mitigated the concern regarding our empirical strategy. We further conduct propensity-score matching to control for the differences in observables between the two groups. Specifically, we calculate propensity scores

²²Source: *ibid.*

based on the following covariates: the natural logarithm of age, gender, marital status, the manufacturing share in district-level employment, the district-level urban share, the district-level literacy share, the natural logarithm of district-level per capita consumption, and the district-level average household size. We perform the nearest-neighbor matching without replacement based on the computed propensity scores. Table C1 in the Appendix shows that after matching, the difference in these observable covariates between the two groups reduces substantially from the pre-matching level. For many covariates, the difference becomes statistically and economically indistinguishable from zero. In Column 2 of Table 4, we repeat the analysis above for the matched sample. The results based on the matched sample are very similar to the ones based on the unmatched full sample. The coefficient of $\mathbb{1}(Mortgage) \times \mathbb{1}(Pre)$ is statistically insignificant and economically small, confirming the validity of the parallel-trends assumption in the matched sample. After the policy announcement, there is a significant spending response in the matched sample: Individuals in the matched treatment group decreased their monthly spending by 22.3% relative to the individuals in the matched control group after the tax policy change. These results corroborate the robustness of our main findings.

Investigating the unobservable differences between mortgage borrowers and non-mortgage borrowers. Individuals without any mortgage may be renters or home-owners without mortgage obligation. One might be concerned that renters are not a valid control group for mortgage borrowers. Ideally, one would use the sample of home-owners without mortgage obligation as the control group. Unfortunately, we do not observe accurate home ownership status and therefore cannot filter out renters in the sample of non-mortgage borrowers. In general, home-ownership increases with age. According to the 2015-16 India National Family Health Survey (NFHS-4), ownership of a housing property increases from 44% for men aged 15–19 years old to 86% for men aged 40–49 years old and from 26% for women aged 15–19 years old to 47% for women aged 40–49 years old. When we use only older non-mortgage borrowers as the control group to proxy for outright

home-owners (Table 5), we find that the estimates change little. These results show that our main findings are unlikely to be driven by unobserved differences between mortgage borrowers and non-mortgage borrowers.

5.3 Heterogeneity in the Spending Response

We further study whether the spending response varies across groups of mortgage borrowers. To allow for heterogeneity in the spending response to the tax policy change, we add interaction terms to equation (2):

$$y_{i,t} = \mu_i + \pi_t + Treated_i \times Post_t + \sum_{g=1}^{N-1} \beta_g \cdot (Treated_i \times \mathbb{1}_{i,g} \times Post_t) + \varepsilon_{i,t} \quad (3)$$

In this model, N is the number of mutually exclusive groups that we decompose treated individuals into and g denotes group identity. The N th group is the absorbed treatment group and thus not shown in equation (3).

Column 1 of Table 6 compares the treatment effect by the remaining balance of the mortgage. We divide the mortgage borrowers into high-loan-balance and low-loan-balance groups based on whether the loan balance at the end of FY 2013–14 is above (below) 100,000 INR. The estimate shows that the spending response is driven by the high-loan-balance mortgage borrowers within the treatment group. The low-loan-balance mortgage borrowers in the treatment group experience little consumption change economically or statistically relative to the individuals in the control group. Specifically, low-loan-balance mortgage borrowers in the treatment group reduce their debit card spending by 2.7% per month after the policy announcement, relative to the change in the control group. The effect is statistically insignificant. However, the high-loan-balance mortgage borrowers experience a much greater reduction in their spending: they reduce their spending by 17.3% more than the low-loan-balance mortgage borrowers in the treatment group (and the difference between the low- and high-loan-balance mortgage borrowers in the spend-

ing response is statistically significant at 1%). The differential response between low- and high-loan-balance mortgage borrowers is consistent with the fact that the maximum amount of tax benefits that a mortgage borrower can obtain by increasing mortgage payment is limited by the remaining balance of the mortgage.

Column 2 compares the treatment effect by liquidity. We divide the mortgage borrowers into high-liquidity and low-liquidity groups based on whether the bank balance is above (below) the sample median. The estimate shows that the high-liquidity mortgage borrowers within the treatment group exhibit a more pronounced spending response. The low-liquidity mortgage borrowers in the treatment group reduce their debit card spending by 19.7% per month after the policy announcement, relative to the change in the control group. The effect is statistically significant. Moreover, the high-liquidity mortgage borrowers experience a larger reduction in their spending: they reduce their spending by 4.8% more than the low-liquidity mortgage borrowers in the treatment group (and the difference between the low- and high-liquidity mortgage borrowers in the spending response is statistically significant at 1%). This differential spending response by liquidity suggests that liquidity constraints affect the effectiveness of saving tax incentives in increasing savings. Only relatively liquidity-unconstrained individuals can afford to cut their consumption to finance the tax-favored savings.

Table C2 in the Appendix compares the the spending response by age cohorts, gender, and marital status respectively. The statistically insignificant and economically small coefficient of the triple interaction term shows that mortgage borrowers split in these dimensions reduce spending by similar levels.

6 Additional Robustness Tests

We perform additional tests to examine the robustness of our results.

²³The Indian government demonetized paper notes on three occasions — once in 1946, once in 1978, and once in 2016 — in all three cases, the stated goal was to combat tax evasion and black money.

6.1 Controlling for Regional Variation in Tax Evasion

Tax evasion is perceived to be widespread in India.²³ The ability to evade taxes would mean that individuals are less responsive to saving tax incentives. Therefore, our estimate of the saving financed by consumption reduction likely understates the saving response that would occur in an environment with a lower degree of tax evasion. Furthermore, there can be regional variation in tax evasion within India. To control for this, we re-estimate equation (2) with tighter fixed effects. Specifically, we include a separate set of year-month fixed effects for each district. These district-specific year-month fixed effects neutralize the time-varying local tax enforcement intensity and also control for other time-varying local economic conditions that are common to mortgage borrowers and non-mortgage borrowers in the same district. Table 7 presents the estimates obtained under this alternative fixed effects panel specification. In all cases, the spending responses are statistically significant and quantitatively similar to the estimates in the main analysis.

6.2 Falsification Test

We examine the spending response of mortgage borrowers during April 2013 to March 2014, a period that covers the fiscal year prior to the policy change and does not involve any changes in income tax deduction. We define $\mathbb{1}(Post\ July\ 2013)$ as an indicator that equals 1 for July 2013 to March 2014, one year before the true post-policy period. As shown in Table 8, the spending response of mortgage borrowers to the falsified policy change is economically small and actually runs in the opposite direction. This implies that the differential seasonality within the fiscal year between mortgage borrowers and non-mortgage borrowers, if anything, is against us finding a reduction of consumption to fund tax-incentivized savings, raising the hurdle for our identification.

6.3 Controlling for Potentially Differential Exposures to the Economic Environment

One concern regarding our estimated spending responses is that mortgage borrowers and non-mortgage borrowers may have differential exposure to the changes in the economic environment other than the change in saving tax incentives, which may confound our estimate of the saving financed by consumption reduction. For instance, mortgage borrowers and non-mortgage borrowers may differ in their saving preferences and therefore would be differentially sensitive to the interest rate fluctuations in the economy. To mitigate this concern, we additionally control for the RBI benchmark repo rate²⁴ interacted with mortgage status. As shown in Column 1 of Table 9, the spending response is statistically significant and quantitatively similar to the estimate obtained in our baseline specification.

Another possibility is that mortgagors and non-mortgagors are differentially exposed to fluctuations in the house price. For instance, increases in the house price may force renters, who are included in our control group, to cut back consumption. To mitigate this concern, we additionally control for the growth rate of India's house price index²⁵ interacted with mortgage status. As shown in Column 2 of Table 9, the spending response is statistically significant and quantitatively similar to the estimate obtained in our baseline specification.

6.4 Addressing the Identifying Concern of Income Shocks

One might be concerned about an income shock channel whereby mortgage borrowers experience negative income shocks following the tax policy change and therefore reduce their spending relative to non-mortgage borrowers. We explicitly test this alternative

²⁴The benchmark repo rate is the key interest rate that the RBI's Monetary Policy Committee sets in the conduct of monetary policy. We obtain the daily data on the benchmark repo rate from CEIC and use the monthly average benchmark repo rate in this analysis.

²⁵The quarterly house price index (HPI) is constructed by the RBI based on transaction-level data received from housing registration authorities. We obtain the HPI data from the RBI's Database of Indian Economy (DBIE) portal, available at <https://dbie.rbi.org.in/DBIE/dbie.rbi?site=statistics>, and calculate the quarter-over-quarter growth for this analysis.

hypothesis by comparing the changes in account inflow between the two groups of individuals following the policy change in the same DiD framework. As shown in Column 3 of Table 9, there is no statistically significant difference in inflow between the treatment group and the control group after the policy change. Our main results are not driven by the potential confounder of income shocks. Furthermore, as our measure of income is based on bank administrative records, this test also rules out the change in the cost of banking services as an alternative explanation.

6.5 Alternative Measure of Spending

One may be concerned that the log-linear regression specification forces zero-valued observations to drop out, which might bias the estimate. To mitigate this concern, we also estimate the spending response using the level of total spending as the outcome variable and compare the economic magnitude from the two specifications. Despite using different measurements, the economic magnitude of the estimated spending response remains stable: An average mortgage borrower increases spending by 7,028 INR (6,904 INR) per month according to the level specification as shown in Column 4 of Table 9 (the baseline log specification as shown in Column 1 of Table 3). The similarity in the economic magnitudes of alternative estimates underscores the stability of the underlying economic relationship.

6.6 Extensive Margin Response

Figure 2 plots the number of loan originations for the 36-month period from 2012:04 to 2015:03. This period covers FY 2014–15 when the policy change took place mid-year in July, as well as the previous two fiscal years. We denote July using a vertical line in the figure. We can see that new loan originations exhibit seasonality within a fiscal year: for all three fiscal years, the number of new loan originations increased in the last few months. Compared to previous two fiscal years, however, the number of new loans does

not exhibit any visible response to the increase in saving tax incentives in July 2014. The lack of an extensive margin response is broadly consistent with the empirical findings in the literature on mortgage tax subsidies (Hilber and Turner (2014), Sommer and Sullivan (2018), Gruber et al. (2021), among others).

7 Analysis on an Alternative Long-term Saving Instrument

In addition to mortgage payment (home equity), there are other long-term savings instruments that can benefit from the higher tax deduction limit. In this section, we repeat our analysis for an alternative long-term savings instrument, the public provident fund (PPF). Although the PPF has a lock-in period of 15 years and is hence less liquid, it offers attractive returns that can be compounded annually and that are guaranteed by the government. This attractive feature suggests that the PPF is arguably another popular venue for the saving response to occur, besides mortgage payment.

To conduct the analysis, we obtain the data on debit card spending transactions for a sample of PPF users and non-PPF users from the same bank. For the PPF users in the data, we also obtain information on their PPF contributions. Due to the fact that data extraction occurs in different times and the anonymized individual identifier in the data is regenerated each time, this sample of individuals cannot be merged with the sample of mortgage borrowers and non-mortgage borrowers that we use in the main analysis of this paper. Therefore, we conduct the analysis on PPF separately from our main analysis on mortgage. We filter the sample of individuals in the PPF analysis following the same procedure as in our main analysis on mortgages.

Table 10 provides summary statistics of demographics and spending information for PPF users and non-PPF users. Panel (a) covers demographic characteristics. Panel (b) covers total spending and its components. For the spending variables, we first calculate the within-individual average of each variable in the three months prior to policy announcement (2013:04–2014:06) and then report the summary statistics in the cross-section

of individuals.

We first analyze the extent to which PPF users increase their PPF contribution in response to the increase in saving tax incentives. We estimate equation (1) to examine how PPF contributions change following the tax policy change conditional on the inclusion of individual fixed effects in Columns 1–3 of Table 11. As PPF contributions are voluntary, we examine the extensive margin and the intensive margin separately. Column 1 reports the estimates for the extensive margin – an indicator for making positive contribution in a given month. Column 2 reports the estimates for the intensive margin – the log contribution amount given positive contribution. We find that a positive response along the two margins of PPF contribution following the increase in saving tax incentives. In Column 3, we use the filled contribution amount, which we calculate by imputing zero for the month with no contribution, as the outcome variable. The coefficient estimate implies that an average PPF holder makes an additional PPF contribution of 18,170 INR annually, which accounts for 36.3% of the increase in deduction limit.

Next, we study the spending response to the tax policy change by comparing PPF users (the treatment group) to non-PPF users (the control group) before and after the tax policy change. We estimate equation (2) to compare spending of PPF users (the treatment group) to non-PPF users (the control group) before and after the policy change conditional on the inclusion of individual fixed effects and time fixed effects. Column 4 of Table 11 shows the spending response. As can be seen here, PPF individuals reduce spending by 3% after July 2014 relative to non-PPF individuals. Given an average monthly spending of 15,845 INR for the PPF users in the pre-period, the coefficient estimate implies that the monetary value of the decrease in spending amounts to 468 INR per month for an average PPF user in the post-period. Furthermore, the average decrease in consumption of 468 INR accounts for approximately 31% of the average increase in monthly PPF contribution of 1,514 INR. In other words, 31 cents out of every rupee in additional PPF savings are funded by a reduction in consumption.

8 Conclusion

Low saving levels can trigger concerns for financial vulnerability in post-retirement ages at the micro level and the sustainability of economic growth at the aggregate level. To encourage saving, many countries provide tax incentives to special savings accounts. A critical debate is whether these saving tax incentives effectively increase personal saving. On the one hand, saving incentives raise household saving when households finance contributions into the tax-favored savings accounts with reductions in consumption or increases in labor supply. On the other hand, saving incentives do not raise household saving when households finance contributions into the tax-favored savings accounts with reductions in other, non-tax-favored savings accounts, with saving that would have been done even in the absence of the incentive, or with increases in debt. Empirical evidence remains mixed due to limitations in the scope of consumption and savings data.

Our paper contributes to the literature by directly estimating household consumption response to saving tax incentives using a plausibly exogenous policy change in India. In July 2014, the Indian government increased the income tax deduction limit by 50,000 INR for long-term savings instruments. We analyze this exogeneous policy change and test the extent to which Indian households reduce consumption in order to fund their tax-favored savings accounts. We focus on mortgage payment, which enjoys the highest tax subsidy among all eligible long-term savings instruments and corresponds to the accumulation of home equity. Using administrative data on consumer spending transactions, we find that following the increase in saving tax incentives, mortgage borrowers increase monthly mortgage payment by 24.1%, or approximately 9,615 INR per month. Using a difference-in-differences design that compares mortgage borrowers with non-mortgage borrowers, we estimate that mortgage borrowers reduce spending by 21.3%, or approximately 6,416 INR per month on average. In other words, 66 cents out of every rupee in additional saving through home equity accumulation are funded by a reduction in

consumption. We find substantial heterogeneity in the consumption response to the increase in saving tax incentives across individuals. The spending response appears to be driven by mortgage borrowers with higher remaining balance prior to the policy shock, consistent with the fact that the maximum amount of tax benefits that a mortgage borrower can obtain by increasing mortgage payment is limited by the remaining balance of the mortgage. Moreover, higher-liquidity (as measured by the pre-period bank balance) individuals experience a larger reduction in their spending relative to lower-liquidity individuals.

We shed light on the design of policies that encourage household savings. Our results imply that saving tax incentives can increase net private savings by inducing individuals to cut consumption to finance the tax-subsidized savings. Despite not altering current incomes, tax concessions in the form of higher saving tax incentives substantially affect current consumptions. The amount of claimable tax benefits appears to be salient to individuals for their saving decisions. Our findings point to that individuals are active savers who respond to the tax incentives.

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Figure 1: **Unconditional mean of spending around the tax policy change**

This figure plots the unconditional means of log total spending of the treatment group (mortgage borrowers) and the control group (non-mortgage borrowers) during the period from April 2013 to March 2015. The vertical line indicates the month that the tax policy change becomes effective (July 2014).

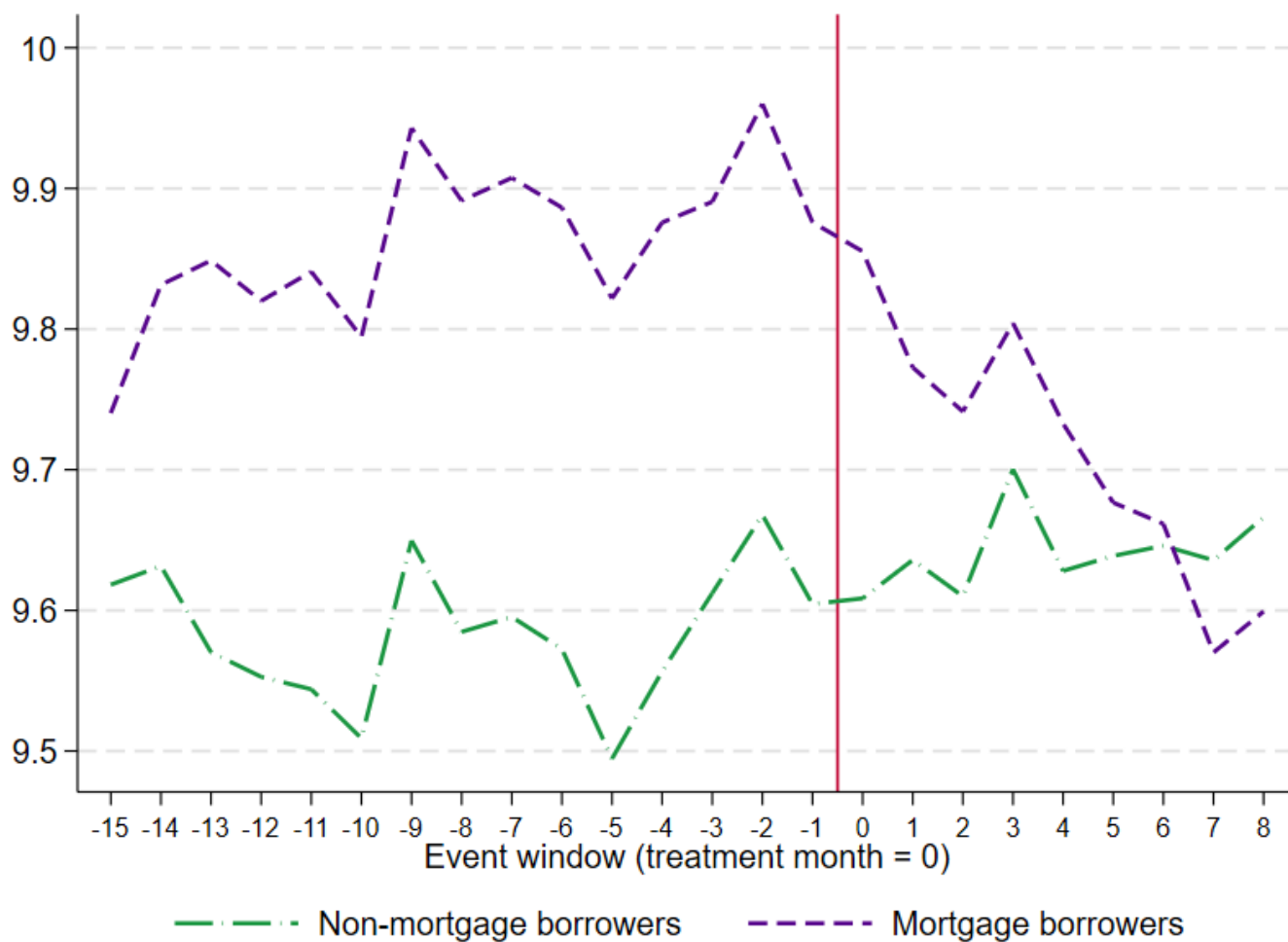


Figure 2: Number of loan originations from 2012:04 to 2015:03

This figure plots the number of loan originations by month in the mortgage snapshot dataset for the 36-month period from April 2013 to March 2015. This period covers FY 2014–15 when the tax policy change took place mid-year in July, as well as the previous two fiscal years. The vertical bar indicates the calendar month July.

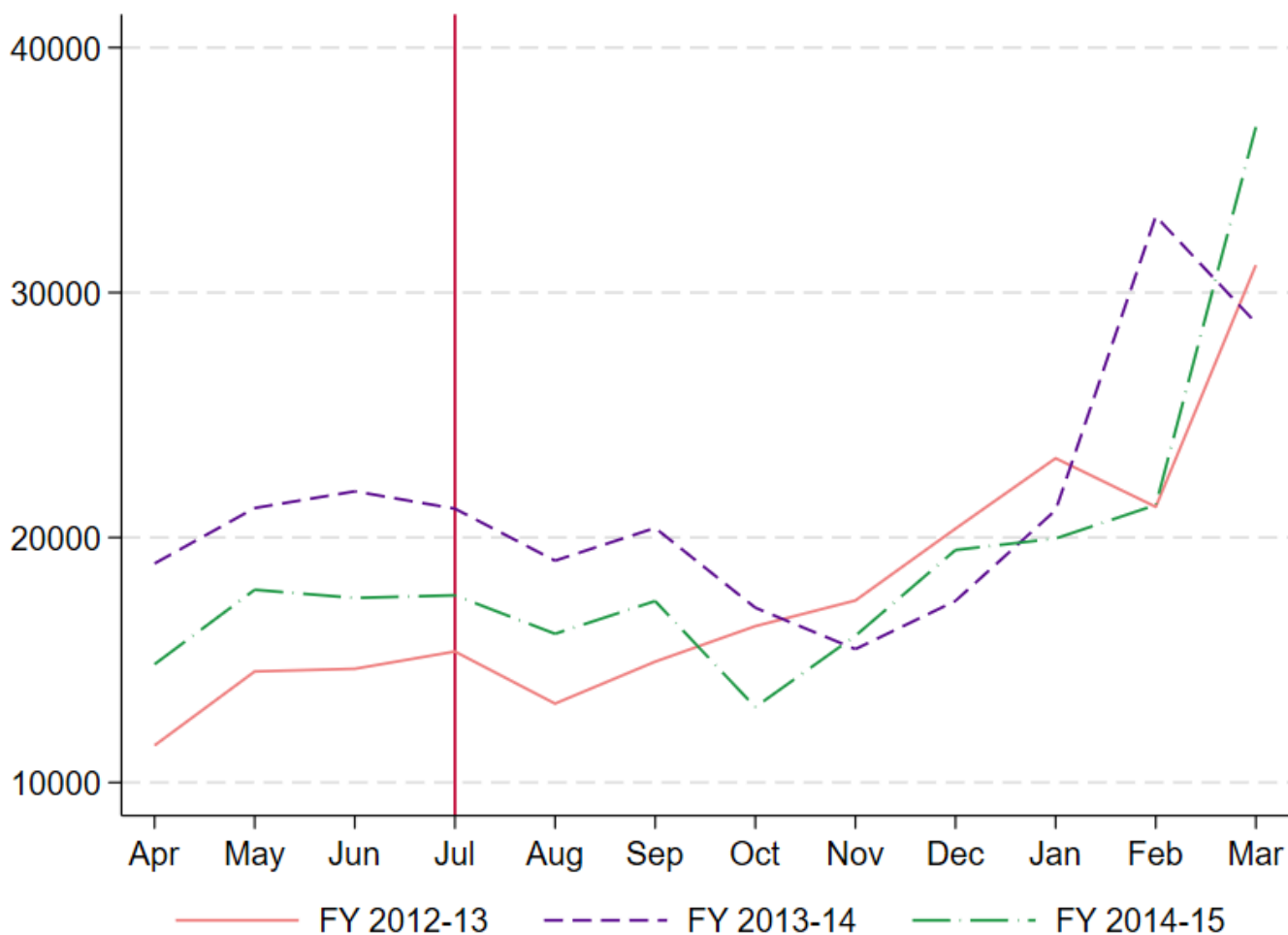


Table 1: **Summary statistics**

This table reports the summary statistics of our treatment group (mortgage borrowers) and the control group (non-mortgage borrowers). Panel (a) covers demographic characteristics. Panel (b) covers district-level characteristics where data are obtained from the Socioeconomic High-resolution Rural-Urban Geographic Platform for India (SHRUG), available at <http://www.devdata.org/shrug>. Panel (c) covers total spending and its components. For the spending variables, we first calculate the within-individual average of each variable in the fifteen months prior to policy announcement (2013:04–2014:06) and then report the summary statistics in the cross-section of individuals. The monetary amount is the local currency Indian rupee (INR) and 1 USD = 60 INR as of July 2014.

	Treatment		Control		Difference
	Mean	SD	Mean	SD	
<i>Panel (a) demographic characteristics:</i>					
Age (as of July 2014)	41.38	8.84	54.58	21.57	13.20***
Is female	0.18	0.38	0.25	0.43	0.07***
Is married	0.77	0.42	0.60	0.49	-0.16***
<i>Panel (b) district-level characteristics:</i>					
Manufacturing share	0.24	0.09	0.27	0.08	0.02***
Urban share	0.48	0.27	0.82	0.28	0.34***
Literacy share	0.70	0.09	0.77	0.05	0.06***
Per capita consumption	25,380.99	6,914.87	33,607.72	7,164.04	8,226.73***
Avg household size	5.24	0.84	4.49	1.45	-0.75***
<i>Panel (c) spending level and composition:</i>					
Monthly spending amount (INR)	30,070.81	25,043.36	18,032.59	16,862.93	-12,038.22***
Cash spending amount (INR)	28,879.31	24,341.18	16,019.25	15,645.91	-12,860.06***
Cash spending count	4.65	3.66	2.69	2.79	-1.96***
POS spending amount (INR)	855.11	2,214.28	1,811.53	3,094.94	956.41***
POS spending count	0.41	1.22	0.76	1.54	0.35***
Number of households	39,398	39,398	212,764	212,764	252,162

Table 2: **Mortgage payment response**

This table shows the average response of mortgage payment to the increase in saving tax incentives, announced on July 10, 2014 in the Union Budget speech and implemented in the same fiscal year (FY 2014–15). The data are at the individual-month level (2013:04–2015:03). $\mathbb{1}(Post)$ is an indicator for the months after the tax policy change (i.e., July 2014 and later months). Individual fixed effects (FEs) are included and denoted at the bottom. Standard errors are doubly clustered at the individual level and at the month level; the corresponding t-statistics are reported in brackets. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	(1) Log(monthly mortgage payment)	(2) Interest rate	(3) Log(monthly mortgage payment)
$\mathbb{1}(Post)$	0.241*** [7.78]	0.047** [2.38]	0.216*** [7.71]
Interest rate			0.593*** [5.40]
Individual FEs	Yes	Yes	Yes
R^2	0.640	0.989	0.642
No. of observations	651,432	681,815	650,817

Table 3: Average spending response

This table shows the average spending response to the increase in saving tax incentives, announced on July 10, 2014 in the Union Budget speech and implemented in the same fiscal year (FY 2014–15). The data are at the individual-month level (2013:04–2015:03). $\mathbb{1}(Mortgage)$ is an indicator variable that equals 1 for mortgage borrowers, and 0 for non-mortgage borrowers. $\mathbb{1}(Post)$ is an indicator for the months after the tax policy change (i.e., July 2014 and later months). Individual and year-month fixed effects (FEs) are included and denoted at the bottom. Standard errors are doubly clustered at the individual level and at the month level; the corresponding t-statistics are reported in brackets. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	(1) Log(monthly total spending)	(2) Log(monthly cash spending)	(3) Log(monthly POS spending)
$\mathbb{1}(Mortgage) \times \mathbb{1}(Post)$	-0.240*** [-6.99]	-0.231*** [-6.53]	-0.073*** [-5.84]
Individual FEs	Yes	Yes	Yes
Year-Month FEs	Yes	Yes	Yes
R^2	0.423	0.422	0.414
No. of observations	4,361,791	4,055,273	1,635,128

Table 4: Testing the parallel-trends assumption and the matched-sample evidence

This table shows the average spending response to the increase in saving tax incentives, announced on July 10, 2014 in the Union Budget speech and implemented in the same fiscal year (FY 2014–15). The results in Columns 1 and 2 are based on the unmatched full sample and the matched sample, respectively. The data are at the individual-month level (2013:04–2015:03). $\mathbb{1}(Mortgage)$ is an indicator variable that equals 1 for mortgage borrowers, and 0 for non-mortgage borrowers. $\mathbb{1}(Pre)$ is an indicator for the four months immediately before the announcement of the tax policy (i.e., March to June 2014). $\mathbb{1}(Post)$ is an indicator for the months after the tax policy change (i.e., July 2014 and later months). Individual and year-month fixed effects (FEs) are included and denoted at the bottom. Standard errors are doubly clustered at the individual level and at the month level; the corresponding t-statistics are reported in brackets. We use ^{***}, ^{**} and ^{*} to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	Full sample	Matched sample
	(1)	(2)
	Log(monthly total spending)	Log(monthly total spending)
$\mathbb{1}(Mortgage) \times \mathbb{1}(Pre)$	-0.010 [-0.42]	-0.021 [-1.02]
$\mathbb{1}(Mortgage) \times \mathbb{1}(Post)$	-0.242 ^{***} [-6.69]	-0.252 ^{***} [-6.36]
Individual FEs	Yes	Yes
Year-Month FEs	Yes	Yes
R^2	0.423	0.407
No. of observations	4,361,791	1,164,265

Table 5: Using older non-mortgage borrowers to proxy for outright home-owners

This table shows the average spending response to the increase in saving tax incentives, announced on July 10, 2014 in the Union Budget speech and implemented in the same fiscal year (FY 2014–15), estimated using only older non-mortgage borrowers as the control group to proxy for outright home-owners. The data are at the individual-month level (2013:04–2015:03). $\mathbb{1}(Mortgage)$ is an indicator variable that equals 1 for mortgage borrowers, and 0 for non-mortgage borrowers. $\mathbb{1}(Post)$ is an indicator for the months after the tax policy change (i.e., July 2014 and later months). Individual and year-month fixed effects (FEs) are included and denoted at the bottom. Standard errors are doubly clustered at the individual level and at the month level; the corresponding t-statistics are reported in brackets. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	Require control individuals aged ≥ 30	Require control individuals aged ≥ 35	Require control individuals aged ≥ 40	Require control individuals aged ≥ 45
	(1)	(2)	(3)	(4)
	Log(monthly total spending)	Log(monthly total spending)	Log(monthly total spending)	Log(monthly total spending)
$\mathbb{1}(Mortgage) \times \mathbb{1}(Post)$	-0.236*** [-6.93]	-0.235*** [-6.99]	-0.234*** [-7.09]	-0.234*** [-7.25]
Individual FEs	Yes	Yes	Yes	Yes
Year-Month FEs	Yes	Yes	Yes	Yes
R^2	0.419	0.419	0.419	0.419
No. of observations	4,184,514	3,887,386	3,504,969	3,083,860

Table 6: **Heterogeneous spending response**

This table shows the heterogeneous spending response to the increase in saving tax incentives, announced on July 10, 2014 in the Union Budget speech and implemented in the same fiscal year (FY 2014–15). The data are at the individual-month level (2013:04–2015:03). $\mathbb{1}(Mortgage)$ is an indicator variable that equals 1 for mortgage borrowers, and 0 for non-mortgage borrowers. $\mathbb{1}(Post)$ is an indicator for the months after the tax policy change (i.e., July 2014 and later months). Individual and year-month fixed effects (FEs) are included and denoted at the bottom. Standard errors are doubly clustered at the individual level and at the month level; the corresponding t-statistics are reported in brackets. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	(1) Log(monthly total spending)	(2) Log(monthly total spending)
$\mathbb{1}(Mortgage) \times \mathbb{1}(Post)$	-0.027 [-0.24]	-0.222*** [-6.50]
$\mathbb{1}(Mortgage) \times \mathbb{1}(Loan\ Bal \geq 100,000) \times \mathbb{1}(Post)$	-0.190** [-2.49]	
$\mathbb{1}(Mortgage) \times \mathbb{1}(Bank\ Bal \geq Median) \times \mathbb{1}(Post)$		-0.049*** [-3.04]
Individual FEs	Yes	Yes
Year-Month FEs	Yes	Yes
R^2	0.426	0.424
No. of observations	3,876,062	4,212,786

Table 7: The spending response estimated using alternative fixed effects panel specification

This table shows the spending response to the increase in saving tax incentives, announced on July 10, 2014 in the Union Budget speech and implemented in the same fiscal year (FY 2014–15), estimated using an alternative fixed effects specification. The data are at the individual-month level (2013:04–2015:03). $\mathbb{1}(Mortgage)$ is an indicator variable that equals 1 for mortgage borrowers, and 0 for non-mortgage borrowers. $\mathbb{1}(Post)$ is an indicator for the months after the tax policy change (i.e., July 2014 and later months). Individual and district \times year-month fixed effects (FEs) are included and denoted at the bottom. Standard errors are doubly clustered at the individual level and at the month level; the corresponding t-statistics are reported in brackets. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	(1)	(2)	(3)
	Log(monthly total spending)	Log(monthly discretionary spending)	Log(monthly non-discretionary spending)
$\mathbb{1}(Mortgage) \times \mathbb{1}(Post)$	-0.226*** [-6.65]	-0.051*** [-5.07]	-0.211*** [-7.14]
Individual FEs	Yes	Yes	Yes
District \times Year-Month FEs	Yes	Yes	Yes
R^2	0.427	0.412	0.364
No. of observations	4,361,791	2,863,429	3,715,744

Table 8: Falsification test in the period from April 2013 to March 2014

This table shows the average spending response of mortgage borrowers during April 2013 to March 2014, a period that covers the fiscal year prior to the policy change and does not involve any changes in income tax deduction. The data are at the individual-month level (2013:04–2014:03). $\mathbb{1}(\text{Mortgage})$ is an indicator variable that equals 1 for mortgage borrowers, and 0 for non-mortgage borrowers. $\mathbb{1}(\text{PostJuly2013})$ is an indicator for the months after the announcement of the falsified tax policy (i.e., July 2013 and later months). Individual and year-month fixed effects (FEs) are included and denoted at the bottom. Standard errors are doubly clustered at the individual level and at the month level; the corresponding t-statistics are reported in brackets. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	(1)	(2)	(3)
	Log(monthly total spending)	Log(monthly discretionary spending)	Log(monthly non-discretionary spending)
$\mathbb{1}(\text{Mortgage}) \times \mathbb{1}(\text{Post July 2013})$	0.095** [2.50]	-0.032*** [-3.52]	0.115*** [3.36]
Individual FEs	Yes	Yes	Yes
Year-Month FEs	Yes	Yes	Yes
R^2	0.492	0.475	0.427
No. of observations	2,098,103	1,380,011	1,782,378

Table 9: **Additional robustness analyses**

This table shows additional robustness analyses. The data are at the individual-month level (2013:04–2015:03). $\mathbb{1}(Mortgage)$ is an indicator variable that equals 1 for mortgage borrowers, and 0 for non-mortgage borrowers. $\mathbb{1}(Post)$ is an indicator for the months after the tax policy change (i.e., July 2014 and later months). The RBI benchmark repo rate is from CEIC. The house price growth is the quarter-over-quarter growth of India’s house price index, which is obtained from the RBI’s Database of Indian Economy (DBIE) portal. Individual and year-month fixed effects (FEs) are included and denoted at the bottom. Standard errors are doubly clustered at the individual level and at the month level; the corresponding t-statistics are reported in brackets. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	(1)	(2)	(3)	(4)
	Log(monthly total spending)	Log(monthly total spending)	Log(monthly total inflow)	Monthly total spending
$\mathbb{1}(Mortgage) \times \mathbb{1}(Post)$	-0.266*** [-7.73]	-0.233*** [-7.08]	-0.060 [-0.92]	-7027.954*** [-7.78]
$\mathbb{1}(Mortgage) \times \text{RBI Benchmark Repo Rate}$	0.109** [2.22]			
$\mathbb{1}(Mortgage) \times \text{House Price Growth}$		-0.779 [-0.55]		
Individual FEs	Yes	Yes	Yes	Yes
Year-Month FEs	Yes	Yes	Yes	Yes
R^2	0.424	0.423	0.432	0.378
No. of observations	4,361,791	4,361,791	4,170,986	5,870,954

Table 10: **Summary statistics**

This table reports the summary statistics of our treatment group (PPF users) and the control group (non-PPF users). Panel (a) covers demographic characteristics. Panel (b) covers total spending and its components. For the spending variables, we first calculate the within-individual average of each variable in the three months prior to policy announcement (2013:04–2014:06) and then report the summary statistics in the cross-section of individuals. The monetary amount is the local currency Indian rupee (INR) and 1 USD = 60 INR as of July 2014.

	Treatment		Control		Difference
	Mean	SD	Mean	SD	
<i>Panel (a) demographic characteristics:</i>					
Age (as of July 2014)	40.79	45.11	54.40	83.65	13.61***
Is female	0.31	0.46	0.24	0.43	-0.08***
Is married	0.55	0.50	0.56	0.50	0.01**
<i>Panel (b) spending level and composition:</i>					
Monthly spending amount (INR)	15,845.48	19,151.84	18,124.46	23,192.21	2,278.98***
Cash spending amount (INR)	13,553.74	17,500.87	16,362.30	21,902.42	2,808.56***
Cash spending count	2.79	3.05	3.33	3.60	0.54***
POS spending amount (INR)	2,291.74	5,256.47	1,762.16	4,897.75	-529.58***
POS spending count	1.03	1.99	0.80	1.96	-0.23***
Number of households	25,042	25,042	466,059	466,059	491,101

Table 11: Average saving and consumption responses in the PPF sample

This table shows the average spending response to the increase in saving tax incentives, announced on July 10, 2014 in the Union Budget speech and implemented in the same fiscal year (FY 2014–15). The data are at the individual-month level. For Columns 1–3, the sample period is 2013:04–2015:03; for Column 4, the sample period is 2014:02–2015:02. PPF is an indicator variable that equals 1 for PPF users, and 0 for non-PPF users. $\mathbb{1}(Post)$ is an indicator for the months after the tax policy change (i.e., July 2014 and later months). For Columns 1–3, individual fixed effects (FEs) are included; for Column 4, individual and year-month fixed effects (FEs) are included. The inclusion of FEs for all columns is denoted at the bottom. Standard errors are doubly clustered at the individual level and at the month level; the corresponding t-statistics are reported in brackets. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	Saving			Consumption
	(1) $\mathbb{1}(\text{monthly PPF contribution} > 0)$	(2) $\text{Log}(\text{monthly PPF contribution})$	(3) $\text{Filled monthly PPF contribution}$	(4) $\text{Log}(\text{monthly total spending})$
$\mathbb{1}(Post)$	0.069*** [4.12]	0.217*** [8.16]	1514.147*** [2.84]	
$\mathbb{1}(PPF) \times \mathbb{1}(Post)$				-0.030* [-2.21]
Individual FEs	Yes	Yes	Yes	Yes
Year-Month FEs	No	No	No	Yes
R^2	0.311	0.805	0.0617	0.470
No. of observations	601,008	145,216	601,008	4,020,138

Appendix

This appendix contains supplementary material, tables, and figures.

A India's Income Tax Policy (FY 2013 to FY 2015)

Table A1 summarizes the marginal tax rates in India's progressive personal income tax schedule.

Section 80C of India's Income Tax Act stipulates the list of eligible savings accounts that feature tax-deductible contributions up to a combined annual limit. The July 2014 policy increased the combined deductible limit from 100,000 INR to 150,000 INR. Eligible savings accounts include:

1. Public Provident Fund (PPF): a government-sponsored pension plan that features tax-deductible contributions up to an annual limit, tax-free accrual of interest, and substantial penalties for withdrawal before the the end of the lock-in period of 15 years. An account holder can contribute anywhere from 500 INR to 150,000 INR in a fiscal year. The Indian government decides the interest rate for the PPF account. Furthermore, the interest rate can be compounded annually. During our sample period (Year 2013–14 and 2014–15), the annual interest rate was constant at 8.70%.
2. Life Insurance Premiums: Any Life Insurance premiums (for one or more insurance policies) paid by the assessee as well as the spouse and children of the assessee.
3. Equity Linked Saving Schemes (ELSS): a type of mutual funds that qualifies for Section 80C deduction.
4. Unit Linked Insurance Plans (ULIP): Investments made in certain ULIPs of Unit Trust of India and LIC of India are eligible for Section 80C deduction.
5. Bank fixed deposits or term deposits with maturity more than 5 years are eligible for Section 80C deduction.
6. Tuition Fees: Tuition fees for up to two children paid by the assessee are eligible for

Section 80C deduction.

7. The principal part of the mortgage payment for an owner-occupied primary residence is eligible for Section 80C deduction. The other part in the mortgage payment, the interest part, is eligible for a different deduction category—Section 24B.
8. Other Section 80C deductions include National Saving Certificate (NSC), Infrastructure Bonds or Infra Bonds, amount paid as stamp duty and registration charges while buying a new home.

Table A1: India's personal income tax schedule

This table summarizes India's personal income tax schedule for two fiscal years, FY 2013–14 and FY 2014–15. India's fiscal year starts in April and ends in March. For example, FY 2014–15 refers to the period from April 2014 to March 2015. The progressive tax schedule varies by age groups. In the Union Budget speech on July 10, 2014, the Finance Minister Arun Jaitley announced an increase in the exemption limit of 50,000 INR for both individuals below 60 years old and senior citizens between 60 and 80 years old. For individuals above 80, there is no change in the exemption limit.

FY 2013 (April 2013 - March 2014)		FY 2014 (April 2014 - March 2015)	
Age below 60		Age below 60	
Income range	Tax rate	Income range	Tax rate
Up to 200,000 INR	0%	Up to 250,000 INR	0%
Between 200,000 and 500,000 INR	10%	Between 250,000 and 500,000 INR	10%
Between 500,000 and 1,000,000 INR	20%	Between 500,000 and 1,000,000 INR	20%
Above 1,000,000 INR	30%	Above 1,000,000 INR	30%
Age between 60 and 80		Age between 60 and 80	
Income range	Tax rate	Income range	Tax rate
Up to 250,000 INR	0%	Up to 300,000 INR	0%
Between 250,000 and 500,000 INR	10%	Between 300,000 and 500,000 INR	10%
Between 500,000 and 1,000,000 INR	20%	Between 500,000 and 1,000,000 INR	20%
Above 1,000,000 INR	30%	Above 1,000,000 INR	30%
Age above 80		Age above 80	
Income range	Tax rate	Income range	Tax rate
Up to 500,000 INR	0%	Up to 500,000 INR	0%
Between 500,000 and 1,000,000 INR	20%	Between 500,000 and 1,000,000 INR	20%
Above 1,000,000 INR	30%	Above 1,000,000 INR	30%

B Coverage of the Consumption Measure

According to the World Bank's Global Financial Inclusion databank²⁶, debit card ownership rate among people aged 15 or more in India stood at 22.1% in 2014. According to the RBI, the total number of debit cards in India amounted to 441.6 million in 2014.²⁷ The statistics from the India Census²⁸ show that 72.4% of the entire Indian population—representing 917.3 million people—are aged 15 or more in 2014. Combining the statistics from all three sources, we can see that the average number of debit cards an individual among the 202.45 million adult debit card holders had in 2014 was 2.2 debit cards. This is substantially higher than the average of 1.1 debit cards an individual has in our dataset due to the prevalence of dormant cards. While there was an almost threefold increase in the debit card ownership rate from 2011 to 2014, many of the newly issued debit cards were not used in any actual transaction and therefore can be considered a dormant debit card account. By construction, a dormant debit card account is not included in our dataset on transaction records. Therefore, the average number of debit cards based on micro-level transactions reflects the average of non-dormant debit cards, which is not directly comparable to the average number of debit cards based on aggregate issuance data unless we adjust for dormant accounts in the latter. The World Bank database reports that the dormancy rate among debit cards in India was as high as 51.7% in 2014. Applying this dormancy rate to the overall debit card ownership means that an average Indian debit card holder has 1.1 non-dormant debit cards, which is also the number of debit cards an average individual has in our dataset.

Admittedly, our data do not cover credit card transactions. This is less of a concern due to the limited use of credit cards in the Indian economy. In 2014, credit cards only accounted for 4.3% of total number of debit cards and credit cards issued; credit card usage only consisted 7.4% of total volume and 7.6% of total value of debit card and credit card transactions.²⁹ The World Bank database reports that credit card ownership rate among people aged 15 or more in India stood at 4.2%, less than one fifth of debit card ownership rate, in 2014.

In other words, we are picking up the majority of card spending of these households

²⁶Source: <http://databank.worldbank.org/data/reports.aspx?source=global-financial-inclusion>.

²⁷Source: The RBI's *Concept Paper on Card Acceptance Infrastructure* published on March 8, 2016, available at <https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=840>.

²⁸Source: Chapter 2 of India's Sample Registration System Statistical Report 2014, available at https://censusindia.gov.in/vital_statistics/SRS_Report_2014/6.%20Chap%202-Population%20Composition-2014.pdf.

²⁹Source: The RBI's *Concept Paper on Card Acceptance Infrastructure* published on March 8, 2016, available at <https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=840>.

through their spending transactions using debit cards with this bank.

C Additional Results for Analysis on Mortgage Borrowers

In addition to the full sample analysis, we conduct propensity-score matching to control for the observable differences between mortgage borrowers and non-mortgage borrowers. Specifically, we calculate propensity scores based on the following covariates: the natural logarithm of age, gender, marital status, the manufacturing share in district-level employment, the district-level urban share, the district-level literacy share, the natural logarithm of district-level per capita consumption, and the district-level average household size. We perform the nearest-neighbor matching without replacement based on the computed propensity scores. Table C1 shows that after matching, the difference in these observable covariates between the two groups reduces substantially from the pre-matching level. For many covariates, the difference becomes statistically and economically indistinguishable from zero.

Table C2 presents additional heterogeneity results. Column 1 compares the spending response by age cohorts. We divide the mortgage borrowers into older-age and younger-age groups based on whether the age is above (below) the sample median. The statistically insignificant and economically small coefficient of the triple interaction term shows that younger and older mortgage borrowers reduce spending by similar levels. Column 2 compares the spending response by gender. The statistically insignificant and economically small coefficient of the triple interaction term shows that female and male mortgage borrowers reduce spending by similar levels. Column 3 compares the spending response by marital status. The statistically insignificant and economically small coefficient of the triple interaction term shows that married and single mortgage borrowers reduce spending by similar levels.

Table C1: **Summary statistics (matched sample)**

This table reports the summary statistics of our treatment group (mortgage borrowers) and the control group (non-mortgage borrowers) in the matched sample. Panel (a) covers demographic characteristics. Panel (b) covers district-level characteristics based on the Socioeconomic High-resolution Rural-Urban Geographic Platform for India (SHRUG) data, available at <http://www.devdatalab.org/shrug>. Panel (c) covers total spending and its components. For the spending variables, we first calculate the within-individual average of each variable in the fifteen months prior to policy announcement (2013:04–2014:06) and then report the summary statistics in the cross-section of individuals. The monetary amount is the local currency Indian rupee (INR) and 1 USD = 60 INR as of July 2014.

	Matched Treatment		Matched Control		Difference
	Mean	SD	Mean	SD	
<i>Panel (a) demographic characteristics:</i>					
Age (as of July 2014)	41.55	8.87	41.62	11.31	0.07
Is female	0.18	0.38	0.19	0.39	0.01**
Is married	0.76	0.43	0.72	0.45	-0.04***
<i>Panel (b) district-level characteristics:</i>					
Manufacturing share	0.25	0.09	0.25	0.08	0.00***
Urban share	0.49	0.26	0.45	0.29	-0.03***
Literacy share	0.71	0.08	0.71	0.07	0.00***
Per capita consumption	25,975.23	6,780.99	25,870.91	7,435.92	-104.33
Avg household size	5.28	0.59	5.19	0.54	-0.10***
<i>Panel (c) spending level and composition:</i>					
Monthly spending amount (INR)	30,372.20	26,915.37	19,194.26	17,673.82	-11,177.95***
Cash spending amount (INR)	29,371.53	26,609.30	17,641.10	16,877.68	-11,730.43***
Cash spending count	4.59	3.66	3.09	2.89	-1.50***
POS spending amount (INR)	825.35	2,036.32	1,321.33	2,362.04	495.98***
POS spending count	0.43	1.25	0.67	1.48	0.25***
Number of households	32,643	32,643	32,643	32,643	65,286

Table C2: **Additional heterogeneous spending response**

This table shows the heterogeneous spending response to the increase in saving tax incentives, announced on July 10, 2014 in the Union Budget speech and implemented in the same fiscal year (FY 2014–15). The data are at the individual-month level (2013:04–2015:03). $\mathbb{1}(Mortgage)$ is an indicator variable that equals 1 for mortgage borrowers, and 0 for non-mortgage borrowers. $\mathbb{1}(Post)$ is an indicator for the months after the tax policy change (i.e., July 2014 and later months). Individual and year-month fixed effects (FEs) are included and denoted at the bottom. Standard errors are doubly clustered at the individual level and at the month level; the corresponding t-statistics are reported in brackets. We use ***, ** and * to denote significance at 1%, 5% and 10% level (two-sided), respectively.

	(1) Log(monthly total spending)	(2) Log(monthly total spending)	(3) Log(monthly total spending)
$\mathbb{1}(Mortgage) \times \mathbb{1}(Post)$	-0.233*** [-7.36]	-0.240*** [-6.87]	-0.236*** [-7.60]
$\mathbb{1}(Mortgage) \times \mathbb{1}(Age \geq Median) \times \mathbb{1}(Post)$	-0.012 [-0.97]		
$\mathbb{1}(Mortgage) \times \mathbb{1}(Female) \times \mathbb{1}(Post)$		0.003 [0.23]	
$\mathbb{1}(Mortgage) \times \mathbb{1}(Married) \times \mathbb{1}(Post)$			-0.004 [-0.36]
Individual FEs	Yes	Yes	Yes
Year-Month FEs	Yes	Yes	Yes
R^2	0.423	0.423	0.423
No. of observations	4,361,791	4,361,791	4,361,791