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Evaluating the economic impacts of rural banking

Experimental evidence from southern India

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Summary

Three decades of sustained growth have contributed to a halving of Indian poverty rates. Yet one in every four Indians is still classified as being extremely poor and lives on less than US\$1.90 a day (Narayan and Murgai 2016).¹ Further, income inequality in India is fast rising with limited changes in the well-being of many poor rural households. How can public policy in India best respond to the economic needs of its poor rural citizens?

Improved access to formal financial sources has long been considered a critical element of policy responses directed at the rural poor. A large theoretical economics literature suggests that increasing financial access has the potential to enable individuals to exit poverty by altering their production and employment choices, and by helping them to retain productive assets when hit by income shocks. Quasi-experimental evidence from India's social banking experiment suggests that such policies can reduce aggregate poverty (Burgess and Pande 2005). However, less is known about the channels of influence and whether these channels remain operative in today's vastly richer India. One may, for instance, argue that the remaining poor populations have demographic and economic characteristics that imply that they are less able to benefit from formal institutions and instead need specific grant programmes (such as the ultra-poor programme). Equally, it is unclear whether the general equilibrium effects associated with increased banking – which could include changing social networks and the extent of reliance on informal lenders – help or harm the poorest households.

There are to date no experimental evaluations of financial access (henceforth referred to as microfinance) in relatively unbanked settings, where liquidity constraints are likely to be the most binding for a wide range of investment choices. Over the last few decades, the emergence of microcredit has also revamped the financial landscape for poor people. The relatively high cost of enabling brick-and-mortar banking access has led many to question the value of continued investment in rural banking, and indeed the last few decades have seen the private sector focus more on using Grameen Bank-style microcredit to reach underserved individuals, who mostly rely on informal (and more expensive) lenders.

Reflecting this, experimental evaluations of financial access for the poor have focused on evaluating Grameen Bank-style microcredit, largely in urban populations that already have relatively good access to credit. Results from this recent body of work suggest that microcredit has positive – but not transformative – effects on the lives of the urban poor. In addition to the urban focus, it is also important to note that these studies focus on the impacts of offering specific financial products on specific household outcomes, and have yet to demonstrate the effect of financial access as a *whole* on household poverty. Hence, there are still gaps in our understanding of the effect of expanding financial access more broadly on the multiple dimensions of poverty, income, self-employment and overall well-being.

In collaboration with Dvara Trust,² a randomised controlled trial was designed and set up to study the effects of the expansion of a rural branch banking model in Tamil Nadu,

¹ Expressed in 2011 purchasing power parity.

² The Dvara Trust was formerly called the IFMR Trust, till it was [rebranded](#) in 2018.

India. The partner, as a non-banking financial company and business correspondent, uses the financial services delivery model called Kshetriya Gramin Financial Services (KGFS) to provide a range of financial services. It also provides tailored financial advice through local brick-and-mortar village branches, thus representing an alternative to the standard microfinance movement in India, which has focused primarily on microcredit. The type of financial products offered by KGFS, along with the large data collection effort carried out by the research team, allows our study to be the first to evaluate the impact of increased access to financial services as a whole. In addition, our focus on rural areas allows us to provide valuable insights into this model of expanding financial access to remote rural communities.

Starting in 2009, we identified 101 service areas over three districts – Ariyalur, Pudukkottai and Thanjavur – from which we formed 50 service area pairs.³ We then randomly assigned service areas to treatment and control groups within each pair. Each service area was also assigned a branch location, and KGFS opened branches in treatment group service areas at the time of assignment, while expansion into control group areas occurred no sooner than 24 months later. The average service area of a bank branch spanned a radius of 3–5 kilometres from its assigned branch location and covered approximately 10,000 people, or 10 villages. More than 4,000 households were then randomly selected across all service areas to be included in the main component of the study. A separate survey was conducted on about 19,000 households in order to create detailed village social network maps.

KGFS began opening branches in treatment service areas in 2010. We surveyed a sample of households in each new service area, as the pair entered the study. Our baseline surveys (paralleling branch opening) occurred between 2010 and 2014, and endline surveys were administered between 2013 and 2016, that is 18 to 24 months after branch opening. We obtained information on financial access (borrowing and saving), economic activity, shocks and well-being. This report presents the core comparisons across treatment and control groups for our main outcomes of interest. Living in an area where KGFS expanded increases the likelihood of households participating in formal banking. Compared with the control group, at endline, treated households are more likely to have formal outstanding loans, have a larger number of formal loans, and borrow more from formal lenders. They also report higher levels of savings. Households in the treatment group are also less likely to borrow from informal sources such as moneylenders and financiers. Importantly, these household-level changes are mirrored by changes in their networks: households in the treatment group report lower borrowing capacity, both from moneylenders and from individuals living both inside and outside their village, compared to households in the control group.

Greater access to formal finance enables households to benefit from greater economic opportunities: our intervention increases households' likelihood of being self-employed and raises business income. Treated households are also more likely to use formal loans for business purposes. Consistent with a large body of theoretical research, we find that formal financial access promotes entrepreneurship and encourages households to take

³ One service area 'pair' is a triplet, containing one treatment area and two control areas. Our 49 pairs and 1 triplet 'pair' give a total of 101 service areas, with 50 treatment areas and 51 control areas.

on riskier – but more profitable – activities. This, in turn, has a significant, positive effect on business income and on overall household income.

All in all, our initial results suggest that expanding access to formal financial products and services to rural households not only crowds out informal borrowing, but also has a positive impact on saving, on people’s business activities, and on their ability to cope financially with health shocks. We also find a positive treatment effect on wages. This result is consistent with the hypothesis that the poor shift from farming to self-employment, or that the poor diversify their activities by starting a business. The main lesson from this report is that, in our study, increasing access to formal financial services seems to have a positive impact on poor households through income stabilisation and increased financial security.

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Abbreviations and acronyms

KGFS	Kshetriya Gramin Financial Services
DRCS	Dvara Rural Channels and Services Pvt Ltd

1. Introduction

Sustained economic growth has played a critical role in lowering poverty in India, but the benefits of this growth remain unevenly distributed. According to the World Bank (Narayan and Murgai 2016), almost one quarter of the world's poor lived in India (2012), living below US\$1.90 a day.⁴ Can better access to finance help India's rural poor to benefit from economic growth and widen the transformation of the rural economy?

A large body of theoretical work in economics suggests that the provision of financial products (also referred to as microfinance) to underserved individuals can play a critical role in helping poor households alter their production and employment choices. This, in turn, can enable a virtuous cycle where they lift themselves out of economic marginalisation by increasing the security of their assets, helping them to absorb economic shocks, and allowing them to borrow their way to a higher socioeconomic status (Aghion and Bolton 1997; Banerjee and Newman 1993; Banerjee 2004).

Early policy enthusiasm for this theory of change was reflected in India's large social banking experiment, and Burgess and Pande (2005) provide quasi-experimental evidence on its poverty impact. They also show that an increased density of rural banks increased rural credit and savings. Alongside, they find some reduced form of evidence of structural transformation, but the use of aggregated data limits their ability to examine mechanisms. After liberalisation (from 1991), Indian banks were given much more freedom in terms of branch placement, and Indian banks responded by increasing branch density, largely in urban India. In our baseline data from rural India, we see that the average rural household has limited access to formal banking: indeed, 40 per cent of our sample reported not having any formal loan at the beginning of the study, and almost 20 per cent did not save in a formal savings account.

Instead, for two and a half decades after economic liberalisation, Indian policymakers and the private banking sector alike focused on using Grameen Bank-style microcredit expansion to provide financial access to the poor. This was a common trend in much of the developing world and was also reflected in academic research. An increasing number of experimental studies conducted since the early 2000s focused on estimating the impact of providing microcredit to poor households. Karlan and Zinman (2010), Banerjee and others (2015) and Crépon and others (2015), in addition to others, study the effect of facilitating access to microloans in South Africa, India and Morocco, respectively. Although these studies suggest that microcredit has a positive impact on business expansion and employment, they find only small effects on other outcomes. This can also partly be explained by the modest take-up rates of microloans (Banerjee et al. 2015; Karlan and Zinman 2010).

Randomised evaluations of micro-insurance (weather-indexed) products also find very low take-up rates (Cole, Stein and Tobacman 2014). However, the use of innovative contract features (Casaburi and Willis, forthcoming)⁵ seems to increase the individual's demand for index insurance.

⁴ Expressed in 2011 purchasing power parity.

⁵ In this case the cost of insurance was paid ex-post – i.e. it was deducted from the final payments due to farmers from a sugar mill.

Perhaps unsurprisingly, given that simpler design of financial products could explain higher take-up rates, recent evaluations of savings products show more promising results. Providing savings accounts to poor households has beneficial effects on business investment and income (Dupas and Robinson 2013) and on households' ability to cope with adverse shocks (Prina 2015), but the positive effect of access to savings technologies can be heavily undermined by intra-household pressures (Schaner 2015). However, as shown by Dupas and others (2017), even with simple savings products, take-up is key.

The advantage of experimental studies that directly examine impacts on household outcomes is that they are able to take a closer look at channels of influence. However, a key limitation of studies focusing on the provision of stand-alone financial products is that they fail to demonstrate the effects of broad financial access *as a whole* on households' poverty. A closer look at the related theoretical literature suggests that the relevant policy question is unlikely to be whether to introduce a single savings product or approve a particular type of loan, but rather relates to the provision of and easy access to a suite of financial products. Put differently, financial services taken as a whole – whether they are savings accounts, insurance products, collateral-based loans or joint liability group loans – provide a formal mechanism for shifting income from one state of the world to another. Non-experimental studies of more 'holistic' programmes of financial inclusion have found large effects on households' welfare (Burgess and Pande 2005; Kaboski and Townsend 2005; Bruhn and Love 2014). However, these studies are often unable to examine specific pathways in detail and also, the banking or microfinance programmes being studied often occur contemporaneously with other policy changes.

Against this background, our India-focused study was designed to provide experimental evidence on the key development question of interest: *What is the impact of increased access to financial services as a whole?* To the best of our knowledge, there are no other examples of randomised bank branch placement at scale. Our study encompassed 50 local bank branches, covering 850 villages and a population of more than 25,000 surveyed households.

The two other papers closest in nature to the focus of our study are the non-experimental evaluation of the Indian Social Banking Experiment, undertaken by Burgess and Pande (2005), and the experimental evaluation of Spandana in India run by Banerjee and others (2015). Context-wise, although Burgess and Pande (2005) do focus on rural banks, the government rural banks analysed in their study were built two decades ago and differ greatly from the current financial landscape and options in India. We complement the focus of that study by providing granular evidence on the channels of influence, and by examining outcomes at the household level. Our approach of randomising the area of operation of a financial provider is similar to the experimental methodology adopted by Banerjee and others (2015). However, we differ in the nature of our intervention, as we focus on rural areas where alternative sources of credit are less common. Thus, the evidence from this evaluation provides valuable and innovative inputs for evaluating banking models specifically aimed at expanding financial access to remote rural communities.

Our paper can also be seen as complementary to the evaluation of BRAC carried out by Bandiera and others (2017), who find that providing women with livestock assets and

skills training increases labour supply and earnings. An important consideration is that we are able to consider a financially more sustainable model (loans versus grants, especially since KGFS reports having good repayment rates). Finally, our experimental set-up meant that we could study general equilibrium effects, by looking at the impact of expanding credit supply (and, more broadly, financial access) on social networks, in the presence of informal lenders and by wages (Burgess and Pande 2005; Breza and Kinnan 2018).

Our research was designed in collaboration with Dvara Trust and built on the expansion of a large rural financial institutional model in Tamil Nadu, southern India, starting in March 2010. The partner, as a non-banking financial company and business correspondent, uses the financial services delivery model called Kshetriya Gramin Financial Services (KGFS) to provide a range of financial products spanning loans, savings and insurance. It also provides tailored financial advice through local village branches, in order to effectively reach individuals in financially marginalised rural communities. Overall, KGFS represents an alternative to the standard microfinance movement in India, which has focused primarily on microcredit.

We see the key innovation of our study being the ‘at scale’ nature of our experimental intervention. This is fundamental for studying the impact of financial access taken as a whole, thus capturing general equilibrium effects. One related innovation is that during our data collection, we not only gathered information on households’ characteristics and behaviour, but also mapped financial and social networks in the villages under study. Our final data represent one of the largest complete social network mappings in India.

This report uses data collected from 2010 to 2016 on a sample of 4,160 households to assess the impact of expanding financial access on households’ poverty. We also evaluate the impact of expanding financial inclusion on village-level outcomes, such as the presence of informal lending sources (moneylenders and financiers), as well as on social and financial networks. For this last dimension, we also collected social network information for 19,183 households in the study, representing the entire population in 204 villages.

2. Study context

In 1991, India launched a large programme of economic liberalisation. The period until the early 2000s largely saw a reduction in financial sector regulation vis-à-vis servicing the rural economy. However, since the early 2000s, there has been a heightened regulatory focus on providing financial services to the poor, with the belief that formal financial services allow the poor to develop income-generating activities and improve their ability to cope with shocks.

Specifically, during the period between 2010 and 2016, the Reserve Bank of India took several steps to accelerate financial inclusion and increase access to banking services. Under the two phases of the Financial Inclusion Plan implemented during 2010–2013 and 2013–2016, the government ordered banks to adopt a structured and planned approach to financial inclusion. This consisted of extending branch networks into rural areas in order to bring banking within the reach of the masses, as well as various forms of ICT-based models, including banking through business correspondents.

The two phases of the Financial Inclusion Plan were then integrated with the Pradhan Mantri Jan Dhan Yojana scheme, one of the biggest government-sponsored financial inclusion programmes, which aimed to provide access to basic financial services to every household in India.

The expansion of KGFS in rural areas of Tamil Nadu, which started in 2010, and the impact of which is our object of investigation, can be seen as part of this attempt by formal financial institutions to promote financial access among the poorest. As previously mentioned, KGFS is a group of strategic business units under an Indian non-banking financial company called Pudhuaru Financial Services Private Limited. The stated mission of KGFS is to 'maximise the financial well-being of every individual and every enterprise in remote rural India by providing complete financial services'. In line with this goal, during its expansion, KGFS explicitly targeted villages with low access to banking services. Indeed, a key requirement in branch site selection was that the service area contained neither private banks nor more than one state-run bank.

3. Timeline

Baseline data collection started in September 2010 and finished in September 2014.⁶ In total, 4,066 households living in 50 pairs of service areas were interviewed at baseline: 17 pairs were surveyed between September 2010 and March 2011; 26 pairs were surveyed between October 2012 and August 2013; 7 pairs were surveyed between July 2014 and September 2014.

Endline data collection started in March 2013 and was completed in December 2016; 8 pairs were surveyed between March 2013 and May 2013; 34 pairs between February 2015 and August 2016; and 8 pairs between September 2016 and December 2016.

4. Theory of change, intervention and research questions

4.1 Theory of change

Our theory of change is shown in Figure 1. The opening of a new KGFS branch in a certain service area increases – or, in some cases, introduces for the first time – the availability of formal financial products in that area. This is especially true since the expansion of KGFS takes place in rural areas, which are less served or not served at all by other formal financial institutions. Indeed, according to the 2011 Census, only 54.4 per cent of rural Indian households use banking services, compared with 67.8 per cent of the urban households (Government of India, New Delhi).

Instead, informal lenders represent the main financial service providers operating in these areas (Government of India 2009). It follows that the expansion of KGFS branches offers rural households the opportunity to access a new range of formal financial products. The products offered by KGFS are cheaper than those offered by informal lenders. To this end, an in-depth study of rural markets in Tamil Nadu (IFMR LEAD 2016) shows that financiers set an average annualised interest rate of 54 per cent, whereas micro finance institutions in the same area levy 25 per cent as interest fees.

⁶ The gaps between survey rounds for the baseline can be accounted for by the unexpected delay in KGFS opening new branches. This was, in part, due to the outbreak of the microfinance crisis in 2010.

Once the loans from KGFS become available, we expect to see the KGFS branch expansion as having two main types of effect: i) at the household level; and ii) at the village level. Households living in service areas where KGFS expanded should increase their formal financial activity (borrowing and saving) and decrease their reliance on informal lenders. This should have an immediate effect on households' capacity to cope with shocks – indeed, when an unexpected event happens, households can now rely on cheaper sources of borrowing, which were not previously available. This, in turn, should have an effect on households' levels of psychological distress: better capacity to cope with shocks should translate into better psychological well-being.

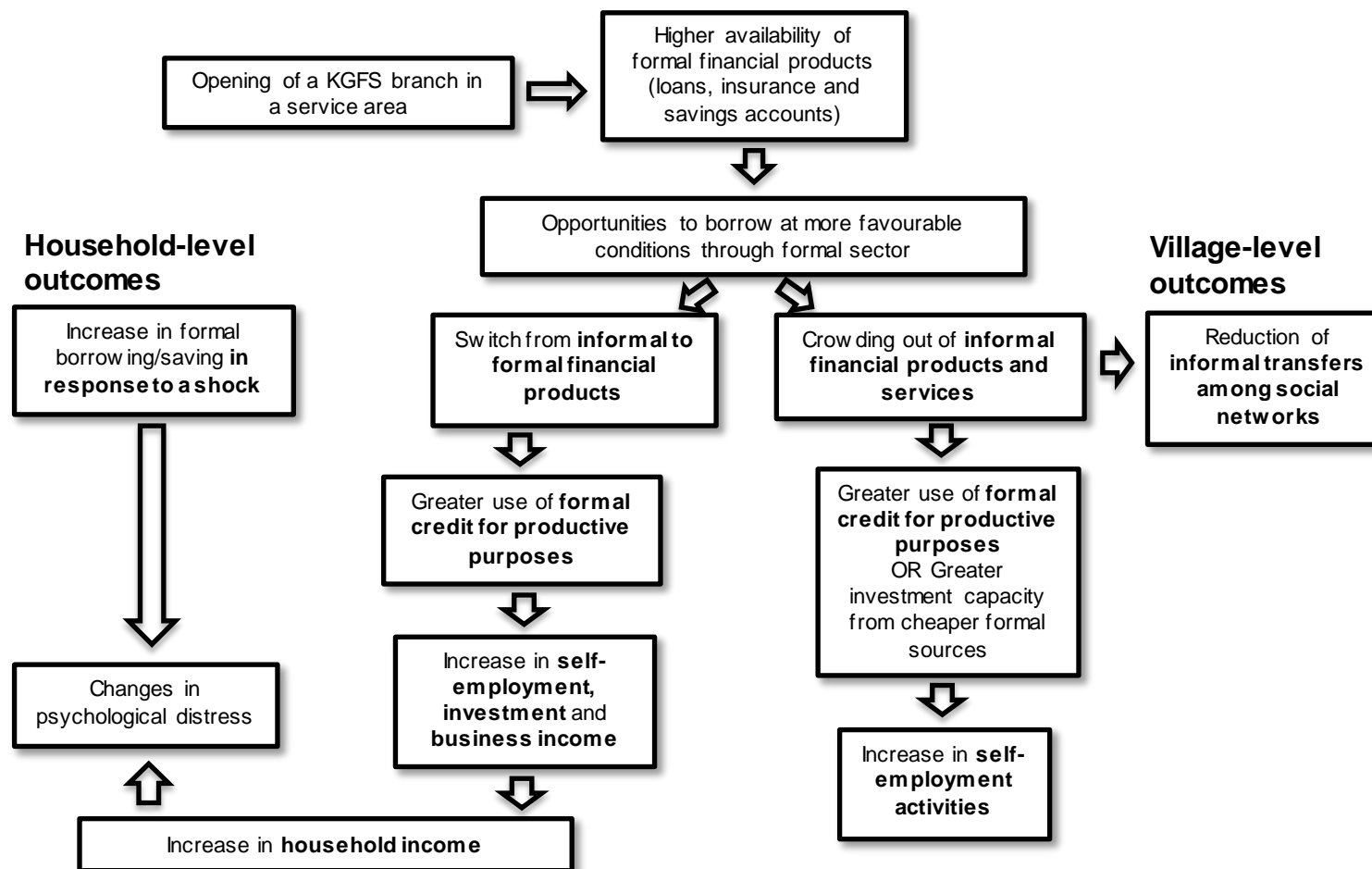
At the same time, as formal credit is cheaper than informal credit, we should observe, in terms of people's occupations, an increase in the use of formal loans for productive purposes. This should translate into higher investment in riskier but also higher-return investments and activities, such as self-employment. This should have a positive effect on business income and, potentially, on household income. It follows that household wealth and asset ownership should also increase, contributing in a positive way to households' well-being.

From a village-level perspective, the entry of a new formal financial institution in a certain area should increase the competition among financial service providers. Assuming that there is a much larger presence of informal rather than formal lenders, a village should see the informal lenders being crowded out by the formal ones. When this happens, informal lenders should adjust the prices or the credit terms of informal financial products in order to be competitive in the new financial landscape.⁷ In addition, the presence of a formal financial institution in a village should reduce the frequency of informal financial transfers within social networks, as they are replaced by formal financial transactions.

At the same time, for the same reasons explained earlier, once a formal financial institution enters a village, an increase in self-employment activities can be expected, as a result of cheaper, formal credit.

⁷ Preliminary results from looking in greater detail at the behaviour of informal lenders indeed suggest that they tend to adjust their behaviour with respect to the entry of KGFS branches by increasing flexibility in their contract terms.

Figure 1: Theory of change



4.2 Intervention⁸

The intervention involved providing a complete suite of formal financial services to rural populations living in Tamil Nadu through branches of KGFS in this study. Each KGFS branch is designed to be a regional institution serving a specific territory with distinct geographic and socio-economic characteristics. Each branch is considered a separate business unit and roughly serves a population of 10,000 individuals and 2,000 households. Each branch has on average two to three wealth managers, who perform all administrative tasks and provide service to customers. Each manager is a local resident of the area, with deep knowledge of his respective area.

The KGFS model operates on three broad principles: i) focused geographic commitment and complete population coverage; ii) client wealth management approach; and iii) access to a broad range of formal financial services. Such a model makes KGFS stand out from other financial institutions that serve the poor and low-income households in rural and remote areas.

The first key component of the KGFS branch expansion is to enrol the population that resides in its service area. Eligible customers must be between 18 and 58 years of age and must reside in the service area of the respective KGFS branch. Customers are considered enrolled if their details are entered into the KGFS database. As a first step, the individual details of the customers are collected and Know Your Customers norms are adhered to by collecting unique identity information details. The second part of the enrolment process relates to gathering customers' household information. This includes information on household income, expenditures, assets and liabilities. This information is used to generate a financial well-being report of each customer (at the branch level), which is then used to provide financial advice for each client. Based on each customer's financial report, the wealth manager offers customers financial products that will be well suited for their profile.

Products are grouped into four broad categories that correspond to clients' needs and objectives.

- **Plan:** Financial products that help people to manage short-term liquidity needs. These include savings, mutual funds, short-term loans, payment services, jewel loans, joint liability loans, emergency loans, etc.
- **Grow:** Financial products that help households to increase income or reduce expenses. These include business working capital loans, education loans, livestock loans, housing loans, etc.
- **Protect:** Financial products that help to mitigate risks. These include several types of insurance policies.
- **Diversify:** These include long-term investment instruments such as pension schemes, gold investment schemes, etc.

⁸ This section heavily borrows from the following report: Ananth, B, Chen, G and Rasmussen, S, 2012. *The pursuit of complete financial inclusion: the KGFS model in India*. CGAP and IFMR Trust. This section also draws on some recent visits to KGFS branches by the research team to understand the way the KGFS model works.

The partner KGFS initiated branch openings in March 2010. Once opened, each branch offered a suite of financial products (according to customer needs and profile), as mentioned above.

Starting in 2009, prior to the branch openings, we worked with KGFS to identify 101 service areas over the three districts of Ariyalur, Pudukkottai and Thanjavur, from which we formed 50 service area pairs.⁹ Our field team then randomly assigned service areas in each pair to treatment and control groups. Randomisation within matched pairs provided a natural framework for simultaneous surveying, and also minimised the imbalance in underlying characteristics across treatment and control service areas by imposing spatial symmetry¹⁰ on the treatment and control groups.

Each service area was assigned a branch location: KGFS branches were opened in treatment group service areas at the time of assignment, while expansion into control group service areas occurred no sooner than 24 months later. The average service area spanned a radius of 3–5 kilometres from its assigned branch location.

A total of 4,066 households were then randomly selected across all service areas to be included in the main component of the study. A separate survey was conducted on an additional 19,183 households to create detailed village network mappings as well.

4.3 Research questions

Our research design and extensive data collection allow us to address the following research questions:

- How does the borrowing and saving behaviour of households change?
- What is the effect on income and employment outcomes for household members?
- How are investments in agricultural and non-agricultural activities influenced?
- Are households better able to deal with shocks as measured by responses to health shocks?

In what follows, we address each of these questions in detail.

5. Programme implementation

5.1 Intervention implementation

IFMR LEAD worked closely with the implementing partners, to finalise the design of the study and monitor the timely implementation of the intervention. Bank branch openings occurred in three phases during 2010 and 2015, and researchers at IFMR LEAD were in constant engagement with the partners to discuss any challenges regarding implementation and any potential solutions. Eventually, of the 50 treatment group branches that were to be opened, only 48 could be opened due to logistical challenges faced on the field.¹¹

⁹ One service area ‘pair’ is a triplet, containing one treatment area and two control areas. Our 49 pairs and 1 triplet ‘pair’ give a total of 101 service areas, with 50 treatment areas and 51 control areas.

¹⁰ Pairs were formed based on a minimum distance criterion between service area branch locations. Thus, spatial symmetry exists between the treatment and control groups by design.

¹¹ The service areas for the two branches that were not opened are included in the study and have been classified as ‘intention to treat’.

5.2 Evaluation

5.2.1 Study sample

The details of the sampling strategy are provided in Appendix A. Table F2 (Appendix F) shows descriptive statistics of the study sample from the baseline surveys, which were administered from 2009. For a comprehensive description of the variables and how they were constructed, refer to Appendix E.

A total of 4,066 individuals were surveyed at baseline for the main household component. Average household size was 4.52 members of which, on average, 3.14 members were above 18 years of age. Overall, 72 per cent of households had a male head; household heads were on average 46.68 years of age, with an average of 7.49 years of education. The average distance from a household's residence to the closest KGFS branch was 2.18 kilometres.

In terms of occupation, 16 per cent of households reported being self-employed or owning a business at baseline, with an average business income of Rs. 2,435.54 in their most recent 30 days of business activity. Conversely, 63 per cent of households were employed in non-household wage labour or services in the last seven days, averaging a weekly wage labour income of Rs. 841.¹² As for agricultural labour specifically, 45 per cent of households included in the sample reported farming in the previous season. This is not surprising: the intervention under study specifically targeted rural areas. That said, only 55 per cent of the households in the sample own the land they farm – and 43 per cent live below the poverty line – when we look at households' wealth and properties.

As for financial access characteristics, the average numbers of formal and informal outstanding loans were 1.18 and 1.86, respectively. Over the 24 months preceding the baseline interview, households had borrowed on average Rs. 46,566.11 from formal sources and Rs. 41,326.46 from informal sources. The average probability of having any savings account (formal or informal) at baseline was 84 per cent. The average amount saved in any savings account was Rs. 5,424.46. Only 5 per cent of households in the study reported having given a loan to friends and relatives.

We also examined whether, in the past 12 months, households experienced any shocks. Of our sample, 39 per cent reported having experienced any type of income shock, while 21 per cent declared having been hit by a serious injury/illness over the same time span.

Table F1 (Appendix F) shows baseline randomisation checks in terms of: demographics, type of facilities, and financial sector characteristics at the service area level (Panel A); demographics and main outcome variables for the main household sample (Panel B); and the social network mapping sample described at the village level (Panel C).

Panel A shows that no imbalances are detected in terms of demographics, type of facilities and financial sector characteristics at the service area level.

When we focus on the household sample, as shown in Panel B, out of 22 indicators tested at the household level, we find significant differences between the control and

¹² All rupee amounts, including total weekly wage labour income and total business income in the most recent 30 days, have been top-coded to three standard deviations.

treatment groups on five measures only. Three are only weakly significant at the 10% level: distance to the nearest branch (with 0.15 kilometres less for the treatment group compared with the control group), informal borrowed amounts (only 8.5% less in the treatment group), and the probability that the household has experienced a shock in the last 12 months (with the difference at approximately 5%, i.e. economically very small).

Other statistically significant differences observed between treatment and control groups are: the age of the head of the household, the total borrowed amount from formal sources, and the number of informal loans taken out. Though statistically significant, the difference in the age of the head of the household appears to be less than one year. Nevertheless, due to this imbalance, we use the age of the head of the household as a control in the later analysis. The difference in total borrowed amounts from formal sources is economically small (9%). Finally, the difference in numbers of outstanding informal loans is also small (7%).

Among the three measures we compare across treatment and control groups in the social network mapping sample (Panel C), only one is weakly significant across the two groups: number of surveyed households in a village. Again, the difference is small in terms of magnitude (10%).

5.2.2 Randomisation

Within each pair, one site was randomly selected for branch opening, giving us a total of 50 service area pairs¹³ across three districts.¹⁴ In order to avoid any contamination, branch expansion in the control service area in each pair occurred no sooner than 24 months after the treatment service area branch was opened. The average service area of a branch spanned 3–5 kilometres from the branch office and encompassed an average of 10 villages and 2,400 households. Villages serviced by a single branch were typically well connected by roads and bus routes. The selection of potential branch sites and randomisation across them proceeded as follows:

1. **Geographic survey (GPS survey):** In conjunction with the bank, a GPS-based population survey was conducted to determine all relevant political, administrative and social boundaries. Patterns of business activity, road connectivity and land availability were also assessed.
2. **Nomination of branch sites:** Once all feasible branch locations in the district had been designated – using information from the GPS survey – sites for branch location were nominated, such that for each branch, a service area could be constructed to keep a population of 10,000 individuals within a rough 3-kilometre radius. The primary goal of KGFS in this process was to ensure that no pocket was left unserved. All nominated sites were reviewed by the infrastructure staff of KGFS and signed off at the level of implementing partner’s president.
3. **Nomination of service areas:** In conjunction with the bank, the research team then nominated units of population to be ‘mapped’ to each branch site, such that access on foot or by road was easy and also intuitive for the population served by

¹³ 101 service areas are covered. due to one triplet ‘pair’ containing two control areas.

¹⁴ The timing of the intervention was agreed with KGFS, with strict monitoring from the research team’s end, thus ensuring that the branches were opened as quickly as possible.

each branch. Service areas were defined down to the street level, with the intermediate units being political, administrative and social villages.

4. **Matching of branch sites:** The unit of randomisation in this intervention is the area served by a single branch. Yet, some issues for causal inference are confounding factors and clustering correlation. More specifically, we were faced with two problems: seasonality and geographic correlation in outcomes that are likely to bias the results when randomising at the service area level. For example, given the variation and seasonal nature of farming patterns at highly localised levels, it is important to ensure that the differences between treatment and control group service areas are minimised as much as possible, in order to prevent bias in the results. The solution to these problems was to use Edmond's algorithm for minimum distance matching to construct pairs of service areas. This matching for treatment and control group service areas allowed the study to overcome issues in seasonality and geographic correlation in outcomes by minimising differences between paired branches.¹⁵ It also improved balance across treatment and control group service areas on observed and unobserved factors, and provided a strong control variable at the service area level. For several 2001 Census village outcomes (including caste composition, number of primary schools, water facilities and proportion of irrigated land), we found that controlling for pair fixed effects explained roughly 70 per cent of the variance.¹⁶
5. **Randomisation of access:** One service area in each pair was then randomly selected to receive a bank branch first (treatment service area). Once the assignment was complete, the bank infrastructure staff attempted to locate premises on the designated and agreed branch site, succeeding about 90 per cent of the time. When suitable premises were not available, the infrastructure staff searched the service area for a nearest substitute and proposed an alternate location to the originally nominated site. The research team employed a detailed system of checks to ensure that such changes did not compromise the design of the study or the integrity of the randomisation. Following the opening of the branch in the treatment service area, expansion in the other service area (control) was delayed by a minimum of 24 months. Bank employees were not informed about the study, or whether their branch was a study branch or not. Treatment and control service areas of the same pair were surveyed simultaneously. Surveyors were also not informed of the treatment status of villages, and were rotated across treatment and control.

Further details on randomisation are provided in Appendix A.

¹⁵ The match assignment exploits geographic autocorrelation to explain fixed and time-variant factors with a geographic component.

¹⁶ See section 5.2.4 about data challenges for more details on the implementation of pair-wise matching methods for confounding factors and cluster correlation.

5.2.3 Data

This report uses data from two different survey components (Appendix B):

- *Household survey*: Several members of each randomly selected household are interviewed in each study village. Data collected include: sources and uses of income, including business and cultivation activities; financial literacy and activity in loans, savings and insurance (formal and informal); health; well-being; social capital; female empowerment; and household structure. Importantly, data collected at the household level are aggregated at the village level to address the impact of financial access along dimensions such as wage rates.
- *Social network mapping survey*: The full social network mapping survey was administered in a subset of villages from control and treatment service areas. The sample was composed of 102 treatment villages and 102 control villages. Within a selected village, we asked all households to name their contacts inside and outside their village. The exhaustive census we collected at the village level prior to surveying enables us to map social connections within each village. Information on outside contacts cannot be mapped since households can name households living in villages not included in our sample. The households were surveyed at baseline (prior to the opening of the bank branch) and at endline (18 to 24 months after the opening of the branch).

5.2.4 Data challenges

Our methodology allows us to address several common hindrances to causal attribution in microfinance evaluations:

1. Confounding factors in the analysis have been addressed primarily through the use of pair-wise matching methods at the service area level. These methods ensure that, within the randomisation, the influence of observable confounding factors balances across our treatment and control groups.
2. Selection bias at the branch level has been addressed primarily by randomisation. Further details can be found in Appendix A.
3. Direct spill-overs may have propagated from the treatment to the control, as control group residents sought financial services. However, because KGFS enforces strict residency norms for customers, and because the Centre for Micro Finance uses listings of control group residents to check for accidental enrolment by nearby branch area residents, direct spill-overs have been limited in practice. Observed accidental enrolment was addressed early in the intervention, and has been accounted for in subsequent analysis.
4. Indirect spill-overs through social networks or through market channels were anticipated, and their measurement is central to our evaluation. Externalities and spill-overs at the individual level are evaluated through the comparison of baseline with endline outcomes, as shown in this initial set of results on social networks. In future analysis, we will also study spill-overs at the group level.¹⁷
5. Contamination of the control group represents a challenge in the evaluations of microfinance programmes (Banerjee et al. 2015). Thus, our analysis needs to take into account the penetration of potential competitors of KGFS. In addition, to

¹⁷ In doing so, we also plan to employ a panel survey of financial welfare run jointly by Yale and the Centre for Micro Finance, to detect time trends in rural villages elsewhere in Tamil Nadu – and (cautiously) attribute residual changes in our sample to the KGFS intervention.

limit expectation effects or pressure on KGFS and field staff, it was made a double-blind intervention: KGFS management and infrastructure staff were informed of the randomisation scheme and of the evaluation design, but branch staff and local villagers were not.

6. Unreliable survey responses were addressed in different ways, depending on the outcome of interest: particularly, where financial variables are concerned, we will also make extensive use of transactions data collected in real time by KGFS.¹⁸
7. Cluster correlation is mitigated with an innovative pair-wise matching of treatment and control service areas. Proximate service areas often share access to facilities, have similar resource endowments, and can be expected to face common economic and political shocks. Pairing improves the precision of impact estimates by mitigating cluster correlation, at no added cost in data collection.

6. Impact results – household level

In what follows, we discuss the main first-stage results of the intervention. Our main specification models the effect of the randomised treatment, which consists of increased access to formal finance through the opening of a KGFS branch in a service area. We therefore estimate the following model using endline data:

$$Y_{ik} = \alpha_0 + \alpha_1 T_k + \delta_{pk} + \varepsilon_{ik}$$

Where i indexes the individual or household, and k indexes the service area. Y_{ik} is a given outcome (e.g. extensive and intensive margin of borrowing from formal/informal sources; extensive and intensive margin of savings; income and employment) for individual or household i in service area k . T_k is the service area treatment dummy, such that α_1 gives the intention to treat effect. δ_{pk} are pair fixed effects¹⁹ and ε_{ik} is the idiosyncratic error term. We cluster standard errors at the level of randomisation, i.e. at the service area level.

In a second specification, we also include a vector X_{ik} of household-level controls, measured at baseline: distance to the nearest bank branch, age of the head of the household, years of education of the household head, caste, religion and land ownership.

Further details on the specification used can be found in the Methods section of Appendix D. Appendix E provides a comprehensive description of the variables included in the analysis. Additional tables are shown in Appendix F.²⁰

¹⁸ The evaluators developed timely consistency checks and scrutiny processes to avoid this type of error.

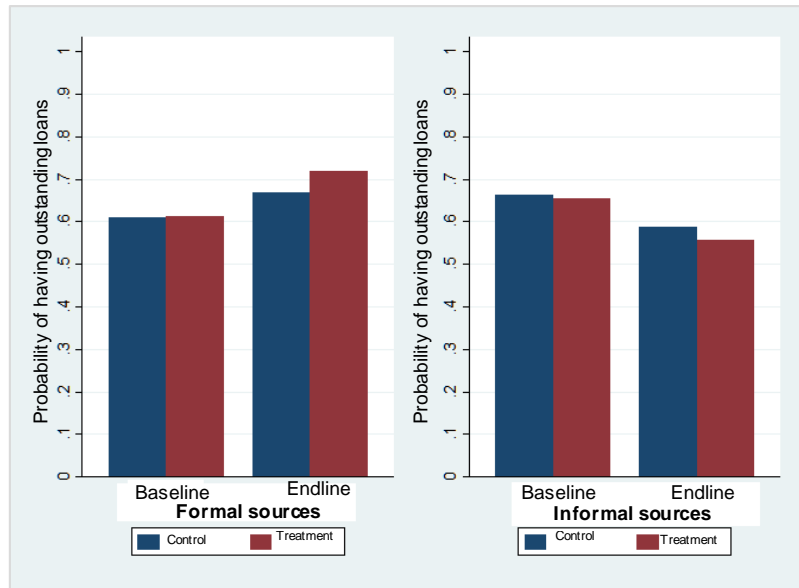
¹⁹ These are added to take into account the use of pair-wise matching described earlier in assigning randomisation.

²⁰ Since baseline checks show that there are no imbalances across treatment and control groups in the main outcome variables we analyse, we report here estimates for endline only. We must notice that including baseline variables appear to increase noise in the estimates, potentially because of different ways subjects report information across survey rounds. Therefore, difference-in-difference estimates are not shown here. However, they are available upon request.

6.1 First-stage effects: impact on borrowing, saving and transfers within social network

Figure 2 looks at households' probability of having either outstanding formal (Figure 2 left) or informal loans (Figure 2 right).²¹ It compares treated and control households, both at baseline and at endline. Interestingly, the two sub-figures are symmetric but opposite signed: on the one hand, the probability of taking out formal outstanding loans increases from baseline to endline (left). On the other hand, the probability of taking out informal outstanding loans decreases from baseline to endline, as if compensating for the increase in formal loans (right).

Figure 2: Probability of borrowing from formal and informal sources



We also focus on the differences between treated and control households. At endline, the likelihood of borrowing from formal sources is higher for treated than for control households (Figure 2 left). Conversely, treated households appear less likely to borrow from informal sources than control households (Figure 2 right). Overall, results from Figure 2 are suggestive of a shift from informal to formal sources of borrowing in treatment service areas as a result of the expansion of KGFS branches.

We test these results more formally by estimating first-stage impact on formal and informal borrowing. Results are shown in Table 1: Panel A and Panel B display estimates without and with household controls,²² respectively, for endline only.²³

²¹ We classify the following as formal sources of borrowing: private banks, NGOs or microfinance institutions, nationalised banks, primary agricultural cooperatives or cooperative banks and non-banking financial corporations. Conversely, friends, neighbours, relatives, shopkeepers, employers, moneylenders, pawnbrokers, self-help groups, landlords, rotating savings and credit associations, chit funds, financiers and religious trusts are classified as informal sources of borrowing.

²² Controls in Panel B include: age of the head of the household, education (in years) of the head of the household, caste, religion, distance to branch and land ownership. Further details can be found in the Pre-analysis plan in Appendix D.

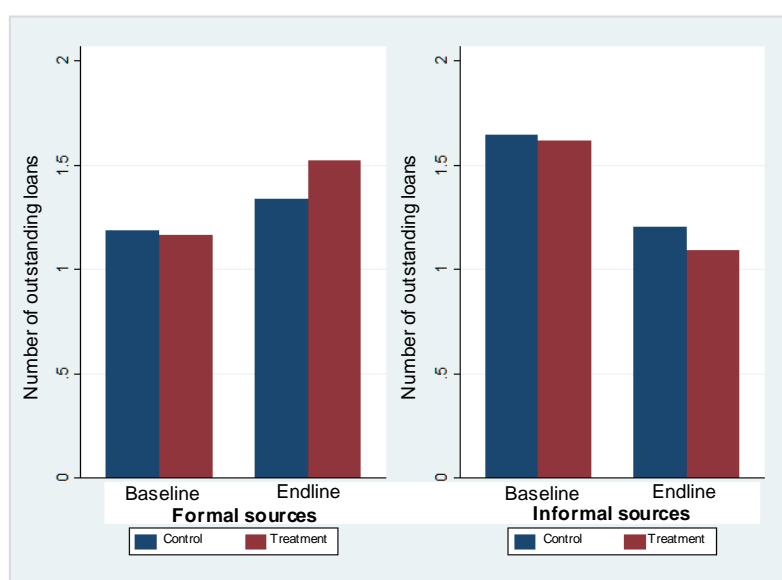
²³ As mentioned in footnote 20, tables do not include difference-in-difference estimates, although these results are available upon request.

Households in treatment service areas are five percentage points more likely to report formal outstanding loans (Column 1, Panel A). At the same time, Column 2 of Panel A shows that treated households are four percentage points less likely to have outstanding informal loans in the same period. Both coefficients are statistically different from zero.

Taken together, these results suggest that the presence of KGFS in a service area positively affects households' likelihood of having access to formal financial services, while it negatively affects their reliance on informal lenders.

Our intervention appears to have a differential impact across treatment and control groups, not only at the extensive margin of borrowing (probability of borrowing from formal and informal sources), but also at the intensive margin (amount borrowed from formal and informal sources). In Table 1, Column 3 of Panel A shows that, at endline, the number of formal loans borrowed by treated households is 14 per cent higher than in the control group; conversely, the number of informal loans by treated households at endline is 10 per cent lower than in the control group (Column 4, Panel A). These results can also be seen in Figure 3 below.

Figure 3: Number of loans borrowed from formal and informal sources



We also look at the total amount households borrowed in the last 24 months.²⁴ In line with previous results, Figure 4 shows that treated households have taken out a larger amount of debt from formal sources than households in control group (Figure 4 left). On the contrary, the reliance on informal credit appears lower for treated households than for control households (Figure 4 right). Results from Figure 4 are also confirmed by Columns 5 and 6 of Table 1: at endline, treated households borrow on average Rs. 7,038.67 more than the control group (12% more) from formal sources, while they borrow on average Rs. 4,308.81 less than the control group (11% less) from informal sources.

²⁴ This is computed as the sum of the principal amounts of all loans that were taken in the previous 24 months, whether they were still outstanding at the time of the survey or had been repaid in the previous 12 months.

Finally, we study whether there is a statistically significant shift from informal to formal credit, as our results so far suggest. In Table 1, Column 7 of Panel A indicates that the amount of formal credit over total credit that households borrow at endline is significantly greater for treated than for control households. This once again confirms that, in treatment service areas, households have been more likely to substitute formal credit for informal credit.

Results shown in Panel A of Table 1 are also robust after controlling for household characteristics, as displayed in Panel B of the same table.

Table 1: First-stage effects on formal and informal loansa

	P (Formal loan outstanding)	P (Informal loan outstanding)	No. of outstanding formal loans	No. of outstanding informal loans	Formal borrowed amount	Informal borrowed amount	Share of formal borrowed amount
Panel A: Without household controls							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treated	0.05 (0.01)***	-0.04 (0.01)***	0.19 (0.04)***	-0.15 (0.04)***	7038.7 (2262.3)**	-4308.81 (1667.9)*	0.07 (0.01)***
Control dep var mean	0.67	0.62	1.34	1.45	56443.38	39770.96	0.54
N	4158	4158	4156	4158	4156	4156	3645
Panel B: With household controls							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treated	0.05 (0.01)***	-0.04 (0.01)***	0.20 (0.03)***	-0.15 (0.04)***	7206.5 (2238.9)**	-4080.5 (1673.0)*	0.07 (0.01)***
Control dep var mean	0.67	0.62	1.34	1.45	56443.38	39770.96	0.54
N	4158	4158	4156	4158	4156	4156	3645

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Panel A reports the ordinary least squares (OLS) coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only. Panel B reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only and controls at the household level. Household-level controls are: age of the head of the household, education (in years) of the head of the household, caste, religion, distance to branch and land ownership. All regressions include pair fixed effects and survey round fixed effects (three rounds at endline). Standard errors are clustered at the service area level. All Rupee amounts are top-coded at three standard deviations. Refer to Appendix E for variable definitions.

Figure 4: Total borrowed amounts from formal and informal sources

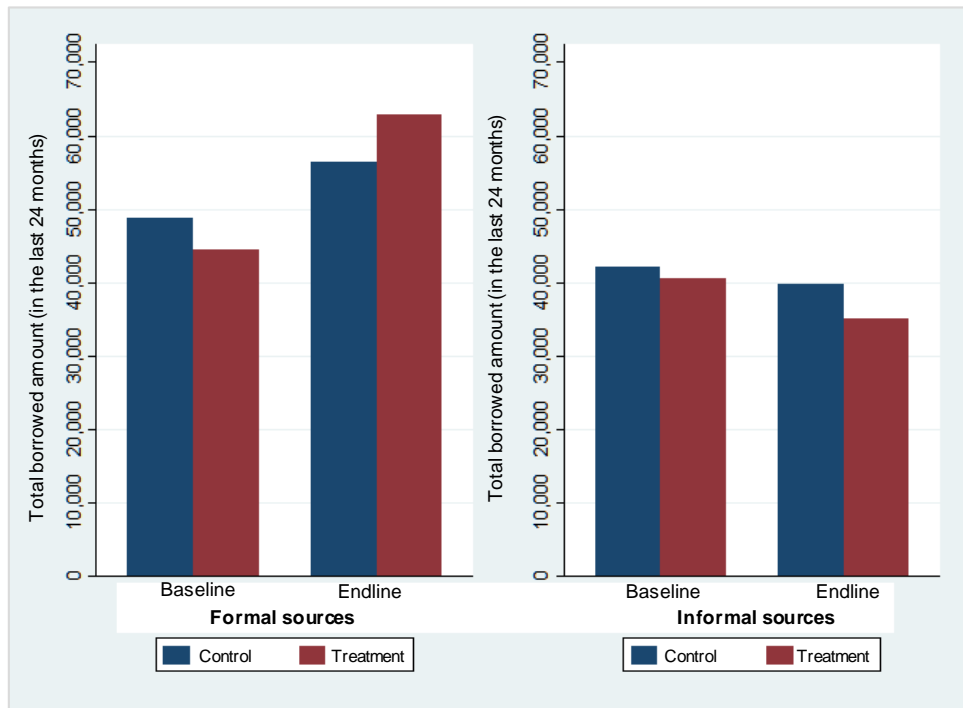


Table 2 complements results from Table 1 by looking at whether households substituted informal credit with formal credit for a range of different loan usage categories. Panel 1A and Panel 1B of Table 2 focus on informal loans. They show that treated households, compared with control households, are less likely to borrow from informal sources for house repairs, for weddings and ceremonies, and for education-related expenses. The magnitude of this reduction is quite large, at 12%, 29% and 32% for house repairs, weddings and education, respectively (Panel 1A). The results remain robust after including household controls in Panel 1B. Panel 2A and Panel 2B of Table 2 focus on formal borrowing. Compared with control households, and in line with the theory of change outlined in section 4.1, treated households are more likely to borrow from formal sources for farming and business investment (Column 1) and health-related expenses (Column 6). Results are robust after including household controls in Panel 2B.

The three most frequent reasons reported for borrowing from formal sources are: to make upgrades or repair houses, land or buildings (27% of the sample); to purchase day-to-day items for the household (20%); and to invest in farming and business (19%).²⁵ While both house repairs and upgrades, and daily purchases are also reported as the main reasons to borrow from informal sources (by 17% and 24% of the sample, respectively), the third most frequent reason households report borrowing from informal sources is for weddings (15%).²⁶

²⁵ Tables not shown.

²⁶ Tables not shown.

Table 2: First-stage effect on formal and informal borrowed amounts

	Farming and business investment	House and land repair	Weddings	Day-to-day expenses	Education- related expenses	Health- related expenses
Panel 1A: Informal borrowing amounts, without household controls						
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-430.47 (520.54)	-1262.50 (630.19)**	-2162.50 (565.22)***	12.08 (102.32)	-714.5 (233.71)***	62.18 (151.14)
N	4160	4160	4160	4160	4160	4160
Control mean	4992.650	10435.220	7539.290	2206.490	2236.210	2296.140
Panel 1B: Informal borrowing amounts, with household controls						
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-486.36 (513.2)	-1089.8 (610.5)*	-2300.8 (587.1)***	28.38 (103.8)	-702.4 (240.2)***	73.33 (149.90)
N	4160	4160	4160	4160	4160	4160
Control Mean	4992.650	10435.220	7539.290	2206.490	2236.210	2296.140
Panel 2A: Formal borrowing amounts, without household controls						
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	3110.14 (1383.64)**	949.94 (954.25)	-364.90 (492.43)	145.58 (195.17)	-88.90 (313.79)	397.41 (205.82)*
N	4160	4160	4160	4160	4160	4160
Control mean	13354.840	17415.210	4855.450	3546.830	3682.720	1769.300
Panel 2B: Formal borrowing amounts, with household controls						
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	3232.5 (1360.8)**	1058.2 (983.8)	-334.6 (512.7)	112.9 (193.3)	-71.35 (304.3)	364.8 (207.3)*
N	4160	4160	4160	4160	4160	4160
Control mean	13354.840	17415.210	4855.450	3546.830	3682.720	1769.300

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Panels 1A and 2A report the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only. Panels 1B and 2B report the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only and controls at the household level. Household level controls are: age of the head of the household, education (in years) of the head of the household, caste, religion, distance to branch and land ownership. All regressions include pair fixed effects and survey round fixed effects (three rounds at endline). Standard errors are clustered at the service area level. All Rupee amounts are top-coded at three standard deviations. Refer to Appendix E for variable definitions.

Table 3 complements the results shown in Table 2 by studying treatment effects on total borrowing amounts. Findings from Table 2 could in fact be explained by treated households resorting to cheaper – and larger – loans to a greater extent, for at least some of these types of expenditures. Therefore, one needs to understand whether or not the trends observed for either formal or informal loans are driven by a general trend in aggregated loans. A way of testing this hypothesis is to look precisely at households' total borrowing – from formal and informal sources – across these loan usage categories. For instance, we do not find an increase in total borrowing for health-related

expenses (Column 6), despite an increase in formal borrowing for this loan usage category in Table 2. This suggests that households use formal credit to a greater extent for health-related expenses (Column 6). On the contrary, households seem to reduce total borrowing for the purpose of weddings (Column 3). We also find suggestive evidence that households increase total borrowing in farming and business investments (Column 1, Panel B).

Overall, results so far confirm our theory of change: by penetrating into rural areas, KGFS should crowd out loans from informal lenders and informal transfers among social networks. In particular, among informal lenders, moneylenders and financiers should be the most negatively affected by KGFS, as they are usually the most active lenders in rural villages before the expansion of formal financial service providers.

Table 3: First-stage effect on total borrowed amounts

	Farming and business investment	House and land repair	Weddings	Day-to-day expenses	Education- related expenses	Health- related expenses
Panel A: Without household controls						
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	2789.6 (1714.0)	144.14 (1229.19)	-2619.8 (851.09)***	89.12 (262.20)	-645.6 (507.59)	194.85 (336.74)
Control dep var mean	18992.50	28683.37	13195.51	6010.77	6324.86	4646.70
N	4160	4160	4160	4160	4160	4160
Panel B: With household controls						
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	2871.8 (1670.4)*	408.6 (1273.7)	-2711.3 (867.0)***	78.21 (261.3)	-598.6 (503.8)	169.2 (339.94)
Control dep var mean	18992.50	28683.37	13195.51	6010.77	6324.86	4646.70
N	4160	4160	4160	4160	4160	4160

Note: ***, ** and * indicate significance at the 1%, 5%, and 10% levels, respectively. Panel A reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only. Panel B reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only and controls at the household level. Household level controls are: age of the head of the household, education (in years) of the head of the household, caste, religion, distance to branch and land ownership. All regressions include pair fixed effects and survey round fixed effects (three rounds at endline). Standard errors are clustered at the service area level. All Rupee amounts are top-coded at three standard deviations. Refer to the Appendix E for variable definitions.

We test this hypothesis in greater detail in Table 4 (showing changes in households' reliance on moneylenders and financiers), and Tables 5 and 6 (showing changes in households' reliance on informal transfers, inside and outside the village). Column 1 of Table 4 shows treatment effects for the extensive margin of borrowing from

moneylenders and financiers. Taken together, these two categories account for about one third of the informal loans that households took out at baseline.²⁷ In line with our predictions, we find that treated households are four percentage points less likely than control households to take out loans from moneylenders and financiers at endline. Similar treatment effects can be found at the extensive margin of borrowing: the number of outstanding loans from moneylenders and financiers is 14 per cent lower in the treatment group compared with the control group (Column 2, Panel A); similarly, the total amount borrowed from these two informal lenders is 12 per cent lower for treated households compared with control households at endline (Column 2, Panel A). Similar results are found when we include household controls, in Panel B.

Table 4: First-stage effect on moneylender and financier loans

	P (Moneyland fin loans outstanding)	No. of moneyland fin loans outstanding	Moneyland fin loans borrowed amount
Panel A: Without household controls			
	(1)	(2)	(3)
Treated	-0.04 (0.01)***	-0.09 (0.03)**	-2369.5 (1518.5)*
N	4158	4158	4158
Control mean	0.360	0.630	18380.380
Panel B: With household controls			
	(1)	(2)	(3)
Treated	-0.04 (0.01)***	-0.09 (0.04)**	-2185.3 (1504.6)
N	4158	4158	4158
Control mean	0.360	0.630	18380.380

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Panel A reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only. Panel B reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only and controls at the household level. Household level controls are: age of the head of the household, education (in years) of the head of the household, caste, religion, distance to branch and land ownership. All regressions include pair fixed effects and survey round fixed effects (three rounds at endline). Standard errors are clustered at the service area level. All Rupee amounts are top-coded at three standard deviations. Refer to Appendix E for variable definitions.

As already mentioned, expanding formal financial access should also have an effect on informal loans within households' social networks. In line with this hypothesis, we test the impact of KGFS expansion on households' likelihood to borrow from contacts that live either inside or outside the village. In Table 5, Panel 1 displays first-stage results for inside-village contacts, excluding moneylenders. Compared with control households, treated households rely on a significantly smaller number of inside contacts (-5%); in addition, households in treatment service areas appear less likely to be able to rely on inside contacts for business purposes (-13%). Moreover, they actually borrow a significantly smaller amount of credit from inside contacts (-13%), showing a lower reliance on informal transfers. This result is particularly relevant as one of the objectives of this study was to measure precisely the indirect spill-over effects resulting from the expansion of KGFS.

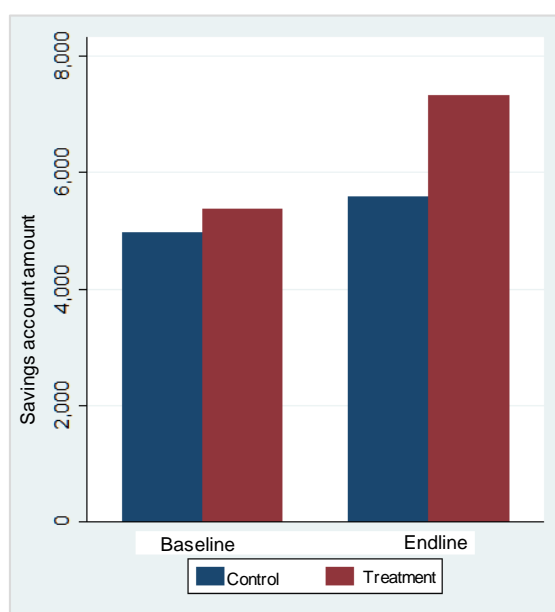
²⁷ The sum of the share of loans borrowed from moneylenders and financiers out of the total of informal loans is 33.4 per cent. Loans from friends, neighbours and relatives represent 35.6 per cent of the total of informal loans.

Table 5 Panel 2 replicates the same analysis as Panel 1, but for contacts outside the village. In a similar way, for contacts inside the village, we observe that treated households borrow significantly less from outside contacts (-12.5%).

Table 6 adds to Tables 4 and 5 as it focuses on households' borrowing from moneylenders. Panel 1 (top-coded values) shows, in particular, that treated households are less likely to resort to moneylenders both for emergency and business purposes. In addition, at endline, they report borrowing 11 per cent less credit from moneylenders than control households. Results from Panel 2 of Table 6 (not top-coded values) confirm results shown in Panel 1.

Finally, we look at the impact of KGFS expansion on households' ability to save, both formally and informally. First-stage results are shown in Table 7 (without and with controls, in Panel A and Panel B, respectively). At endline, treated households save significantly larger amounts in their savings accounts than control households (+22%), as shown in Column 2 of Panel A. This can also be seen from Figure 5.²⁸ We also look at treatment effects both at the intensive margin and at the extensive margin of informal loans given out by the household (Table 7, Columns 3 and 4, Panel A): treated households are significantly more likely to give out loans, and they also give out a significantly larger amount of informal loans than control households, at endline. Results shown in Panel A are again robust after controlling for household characteristics (Panel B).

Figure 5: Total saved amounts in any account



²⁸ We observe an effect at the intensive margin of saving but not at the extensive margin. The absence of the latter is mainly due to the large initial penetration level of savings, with 84 per cent of households declaring that they had a savings account at baseline. It is important to notice that KGFS does not take savings deposits directly. In fact, KGFS has a partnership with a formal financial institution, a commercial bank, in order to collect savings deposits. Moreover, KGFS strongly emphasises the importance of saving to its customers, notably through the well-being report produced for each client. Hence, the positive treatment effect we find on levels of savings can be reasonably attributed to the expansion of KGFS.

Table 5: First-stage effect on inside and outside village contacts

	Any contact	No. of contacts	Emergency borrowing capacity	Business borrowing capacity	Actual borrowed amount
Panel 1A: Inside village contacts, without household controls					
	(1)	(2)	(3)	(4)	(5)
Treatment	0.00	-0.14	-4161.67	-5007.40	-1345.68
	(0.01)	(0.07)**	(2540.21)	(2966.36)*	(716.49)*
N	19183	19183	19183	19183	19183
Control mean	0.890	3.010	31628.230	36999.360	10640.930
Panel 1B: Inside village contacts, with household controls					
	(1)	(2)	(3)	(4)	(5)
Treatment	-0.00	-0.13	-4213.21	-5111.35	-1257.64
	(0.01)	(0.07)*	(2878.36)	(3348.93)	(817.36)
N	19183	19183	19183	19183	19183
Control mean	0.890	3.010	31628.230	36999.360	10640.930
Panel 2A: Outside village contacts, without household controls					
	(1)	(2)	(3)	(4)	(5)
Treatment	0.00	-0.01	-2364.22	-2919.26	-1787.65
	(0.01)	(0.03)	(2393.35)	(2482.53)	(815.68)**
N	19183	19183	19183	19183	19183
Control mean	0.520	0.910	36834.360	41323.780	14331.680
Panel 2B: Outside village contacts, with household controls					
	(1)	(2)	(3)	(4)	(5)
Treatment	-0.01	-0.01	-2547.06	-3358.01	-1792.29
	(0.01)	(0.03)	(2772.87)	(2893.89)	(892.60)**
N	19183	19183	19183	19183	19183
Control mean	0.520	0.910	36834.360	41323.780	14331.680

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Panels 1A and 2A report the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated. Panels 1B and 2B include household controls, which are: distance to the nearest branch, age of the head of the household, years of education of the head of the household, caste, religion and land ownership. All regressions include pair fixed effects and round specific fixed effects. Standard errors are clustered at the service area level. All Rupee amounts are top-coded at three standard deviations. Refer to Appendix E for variable descriptions.

Table 6: First-stage effect at the household level on moneylender contacts

	Any contact	No. of contacts	Emergency borrowing capacity	Business borrowing capacity	Actual borrowed amount
Panel 1A: Moneylender contacts top-coded, without household controls					
	(1)	(2)	(3)	(4)	(5)
Treatment	-0.01 (0.02)	-0.02 (0.03)	-1353.86 (741.66)*	-1375.01 (783.60)*	-566.80 (391.71)
N	19183	19183	19183	19183	19183
Control mean	0.270	0.430	10277.810	10664.730	5316.670
Panel 1B: Moneylender contacts top-coded, with household controls					
	(1)	(2)	(3)	(4)	(5)
Treatment	-0.01 (0.02)	-0.02 (0.03)	-1464.23 (763.64)*	-1475.63 (820.66)*	-628.37 (397.85)
N	19183	19183	19183	19183	19183
Control mean	0.270	0.430	10277.810	10664.730	5316.670
Panel 2A: Moneylender contacts not top-coded, without household controls					
	(1)	(2)	(3)	(4)	(5)
Treatment	-0.01 (0.02)	-0.02 (0.03)	-2834.62 (1000.47)***	-3025.02 (1025.07)***	-1409.18 (583.19)**
N	19183	19183	19183	19183	19183
Control mean	0.270	0.430	12966.560	13619.220	6931.490
Panel 2B: Moneylender contacts not top-coded, with household controls					
	(1)	(2)	(3)	(4)	(5)
Treatment	-0.01 (0.02)	-0.02 (0.03)	-3049.56 (1054.11)***	-3359.02 (1074.84)***	-1532.63 (608.09)**
N	19183	19183	19183	19183	19183
Control mean	0.270	0.430	12966.560	13619.220	6931.490

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Panels 1A and 2A report the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated. Panels 1B and 2B include household controls, which are: age of the head of the household, education (in years) of the head of the household, caste, religion, distance to the nearest branch and land ownership. All regressions include pair fixed effects and round specific fixed effects. Standard errors are clustered at the service area level. All Rupee amounts are top-coded at three standard deviations. Refer to Appendix E for variable definitions.

Table 7: First-stage effect on formal and informal savings

	P (Any savings account)	Savings account amount	P (Giving out loans)	No. of informal loans given out	Informal loans given out amount	P (Active insurance)
Panel A: Without household controls						
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-0.003 (0.005)	1181.174 (592.741)**	0.006 (0.003)**	0.011 (0.005)**	215.579 (246.735)	-0.002 (0.009)
Control dep var	0.950	5442.870	0.010	0.020	522.080	0.800
mean						
N	4160	4159	4158	4158	4158	4160
Panel B: With household controls						
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-0.003 (0.005)	1393.2 (687.535)**	0.006 (0.003)**	0.010 (0.005)**	160.8 (243.750)	-0.002 (0.009)
Control dep var	0.950	5442.870	0.010	0.020	522.080	0.800
mean						
N	4160	4159	4158	4158	4158	4160

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Panel A reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only. Panel B reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only and controls at the household level. Household level controls are: distance to the nearest bank branch, age of the head of the household, years of education of the head of the household, caste, religion and land ownership. All regressions include pair fixed effects and survey round fixed effects (three rounds at endline). Standard errors are clustered at the service area level. All Rupee amounts are top-coded at three standard deviations. Refer to Appendix E for variable definitions.

6.2 REAL ECONOMY: EFFECTS ON INCOME AND STRUCTURAL CHANGES

The theory of change behind the studied intervention is that increased formal financial access has a positive impact on households' welfare. One of the channels is that formal financial access should push households towards more entrepreneurial activities (characterised by higher risk, but also higher return). If this prediction is confirmed, we should observe treated households more likely to be engaged in entrepreneurial activities at endline. In a similar spirit, we should expect an increase in the income of treated vis-à-vis control households, particularly deriving from business activities. In Table 8, Panel A reports treatment effects across a number of income and employment variables, which include wage labour income (we distinguish between governmental programmes, namely National Rural Employment Guarantee Act labour, and non-governmental wage labour), business income, and the household's self-reported income – which is also used to assess whether the household lives below the poverty line.

We also include an indicator of whether the household is self-employed, as well as number of employees and business investment.²⁹ In line with our hypotheses, treated households are two percentage points more likely than control households to be self-employed at endline (Column 2). The negative coefficient shown in Column 1, given its weak significance and the definition of the outcome variable (Appendix E), may also suggest that treated households are changing the nature of their involvement in agriculture. At the same time, Column 3 shows that, at endline, treated households are significantly more likely to hire employees for their business than control households (+17%). Similarly, we find both business income and business investment to be about 20 per cent higher for treated households compared with control, in Columns 8 and 9, respectively.

Consistent with this increase in business income and investment, we find that household income increases by 10 per cent in treatment groups compared with control groups (Column 4). Moreover, the share of households living below the poverty line decreases by two percentage points in treatment versus control groups. Results from Panel B confirm findings in Panel A.

²⁹ The 'self-employment' indicator excludes farming activity. Business investment (expressed in log) represents the total of the value of the equipment they purchased and the cost of maintenance/repair for property and equipment in the past 12 months (where property and equipment is used for business activity only).

Table 8: Impact on employment and income composition

	P (Farming)	P (Self- Employed)	P (Hires employees)	Log household income (30 days), top- coded	P (Below poverty line)	Log governmental wage labour income, top- coded	Log non- governmental wage labour income, top- coded	Log business income (30 days), top- coded	Log business investment (12 months), top-coded
Panel A: Without household controls									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treated	-0.016 (0.017)	0.0215 (0.008)**	0.0114 (0.005)**	0.103 (0.053)*	-0.0198 (0.010)*	-0.0116 (0.060)	0.0312 (0.065)	0.198 (0.077)**	0.181 (0.054)***
Control dep var mean	0.440	0.140	0.070	8.160	0.310	0.640	1.660	1.270	0.760
N	4157	4160	4160	4158	4160	4160	4160	4160	4160
Panel B: With household controls									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treated	-0.020 (0.0116)*	0.022 (0.008)***	0.011 (0.005)**	0.0987 (0.051)*	-0.0201 (0.010)*	-0.029 (0.061)	0.051 (0.064)	0.208 (0.075)***	0.194 (0.054)***
Control dep var mean	0.44	0.140	0.070	7.920	0.310	0.640	1.660	1.270	0.760
N	4157	4160	4160	4158	4160	4160	4160	4160	4160

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. For each heading dependent variable, we report the OLS coefficient estimate (standard errors) associated with regressing the dependent variable on the treatment dummy Treated, using endline data only. Panel A reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only. Panel B reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only and controls at the household level. Household level controls are: distance to the nearest bank branch, age of head of the household, years of education of the head of the household, caste, religion and land ownership. All regressions include pair fixed effects and survey round fixed effects (three rounds at endline). Standard errors are clustered at the service area level. All Rupee amounts are top-coded at three standard deviations. Refer to Appendix E for variable definitions.

On the whole, estimates shown in Table 8 convincingly indicate that access to formal financial services and products led to a positive, structural change in households' employment, thus generating an increase in business income and overall household income – point estimates remain unchanged, both in significance and magnitude of coefficients, also after including household controls.

Table 9: Changes in wages from non-household employment

	Total daily wage, per daily payment cycle	Total monthly wage, per monthly payment cycle
Panel A: Without household controls		
	(1)	(2)
Treated	10.39 (4.17)**	-13.01 (56.89)
Control dep var mean	126.90	950.70
Control % earns daily wage	0.50	0.50
Control % earns monthly wage	0.16	0.16
Control % earns wage	0.61	0.61
N	4157	4156
Panel B: With household controls		
	(1)	(2)
Treated	9.52 (4.03)**	-16.80 (54.94)
Control dep var mean	126.67	950.70
Control % earns daily wage	0.50	0.50
Control % earns monthly wage	0.16	0.16
Control % earns wage	0.61	0.61
N	4157	4156

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. For each heading dependent variable, we report the OLS coefficient estimate (standard errors) associated with regressing the dependent variable on the treatment dummy Treated, using endline data only. Panel A reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only. Panel B reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only and controls at the household level. Household level controls are: distance to the nearest bank branch, age of the head of the household, years of education of the head of the household, caste, religion and land ownership. All regressions include pair fixed effects and survey round fixed effects (three rounds at endline). Standard errors are clustered at the service area level. Refer to Appendix E for variable definitions.

Finally, we look at whether our intervention also had an impact on daily wages in our study areas. The underlying intuition is that the shift towards self-employment activities observed in Table 8 should have affected households' labour supply in other activities (i.e. wage labour and farming), and, therefore, daily wages. Consistent with this hypothesis, we find evidence in Table 9 that daily wages significantly increased for treated households as compared with control households. It may therefore be said that Table 9 provides the first suggestive evidence of the presence of general equilibrium effects, and positive externalities, in addition to the effects at the household level. Further analysis is needed in this direction to consolidate our results.

6.3 Shocks

We also study the impact of KGFS on treated households' ability to smooth consumption. Our theory of change predicts that increased access to formal financial services provides households with better means to borrow from formal sources in times of emergency, and to support themselves during the lean season (for farmers) or periods of slow employment. On the surface, we can explore this most directly by examining how the treatment affects borrowing behaviour in situations where a household is suddenly in financial need – or, in other words, when a household experiences an income shock.

Respondents were asked questions about the shocks their household experienced in the last 12 months that directly impacted their income, farming and health, and that were likely to indirectly affect other things as well. We collected data on the following shocks: loss of wage employment, death of household money earners, serious illness or injury, and severe weather conditions (such as floods, droughts and crop diseases). The most commonly reported shock was illness, with 21 per cent of baseline respondents reporting having a household member experience a serious illness or injury in the last 12 months that prevented the affected person from performing normal activities. Thus, in Table 10, we examine treatment effects on the same formal and informal borrowing outcomes as in Table 1 for households that experienced illness shocks.

In Table 10, Panel A shows the correlation between illness shock occurrence and borrowing behaviour over endline respondents only. Experiencing an illness shock is positively associated with a household's likelihood of borrowing at all; their number of outstanding loans; and their borrowed amounts, from both formal and informal sources. This illustrates what we would expect, especially if households must cover the cost of the injury or illness in full, or if they lose wage employment income if the ill household member is an income earner. This, combined with our theory of change, suggests that households that still borrow following illness shocks should be able to borrow less and substitute other forms of borrowing for informal borrowing.

Given that illness shocks are associated with more borrowing in general, Panels B and C (the latter with household controls) show whether the treatment changes these patterns for households that experienced both the intervention treatment and an illness shock (*Treated * Shock*). Results suggest that treated households borrow significantly fewer loans from informal sources (Column 4).

Combined, our results suggest that, even in the wake of an adverse shock, treated households are able to rely less on informal sources, borrow less than control households do, and still cope financially.

Table 10: Changes in borrowing following illness shocks

	P (Formal loan outstanding)	P (Informal loan outstanding)	No. of outstanding formal loans	No. of outstanding informal loans	Formal borrow ed amount	Informal borrow ed amount	Formal share of borrow ed amount
Panel A: OLS, shock							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Shock	0.067 (0.015)***	0.078 (0.015)***	0.138 (0.052)***	0.310 (0.052)***	8469.017 (3534.912)**	5902.653 (1777.974)***	-0.0086 (0.013)
N	4158	4158	4156	4158	4156	4156	3645
Mean for people w/o shock	0.67	0.62	1.34	1.45	56443.4	39771.0	0.54
Panel B: OLS, without household controls							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treated *Shock	0.0179 (0.028)	0.0243 (0.028)	0.0307 (0.0997)	-0.15 (0.104)	3807.327 (6334.60)	- (3397.210)**	0.0215 (0.025)
Treated	0.041 (0.017)**	-0.048 (0.0156)***	0.178 (0.0538)***	-0.0941 (0.0520)*	5453.712 (3471.597)	- (1926.513)	0.0618 (0.013)**
Shock	0.057 (0.022)***	0.066 (0.0165)***	0.121 (0.0736)	0.388 (0.0672)***	6444.718 (4974.242)	9489.767 (2325.523)***	-0.0207 (0.019)
N	4158	4158	4158	4158	4156	4156	3645
Control mean	0.67	0.62	1.35	1.54	56443.38	39770.96	0.54
Panel C: OLS, with Household Controls							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treated *Shock	0.00471 (0.028)	0.0127 (0.028)	-0.00901 (0.100)	-0.195 (0.106)*	3713.3 (6027.301)	-7549.8 (3420.091)**	0.0216 (0.025)
Treated	0.0463 (0.017)***	-0.0438 (0.016)***	0.193 (0.053)***	-0.0737 (0.058)	5663.9 (3376.783)*	-1181.3 (1924.882)	0.0612 (0.0135)**
Shock	0.0533 (0.021)**	0.0663 (0.0165)***	0.102 (0.0724)	0.392 (0.068)***	5408.8 (4905.057)	9087.6 (2315.0)**	-0.0208 (0.018)
N	4158	4158	4158	4158	4156	4156	3645
Control mean	0.67	0.62	1.37	1.54	56443.38	39770.96	0.54

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Shock is a dummy variable equal to 1 if a household has experienced an illness shock at endline, defined as a serious injury or illness that has prevented household members from participating in normal activities in the last 12 months. Panel A reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the Shock dummy using endline data only. Panels B and C report the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only. Panel C regressions additionally include household level controls: distance to the nearest bank branch, the age and years of education of the head of the household, caste, religion and landownership. All regressions include pair fixed effects and survey round fixed effects (three rounds at endline). Standard errors are clustered at the service area level. All Rupee amounts are top-coded at three standard deviations. Refer to Appendix E for variable definitions.

6.4 Well-being

Finally, we look at whether expanding financial access has an effect on households' well-being. To this end, we elicit a set of measures of the impact on households' life perceptions (Table 11) and psychological distress (Table 12).³⁰ Both tables report results excluding and including household controls, in Panels A and B, respectively. We do not find that financial access has significant impacts on households' happiness or future life perceptions. Yet, it seems to have an impact on how individuals see their past life. In a similar spirit, we do not find that the provision of formal financial services has an impact on households' psychological distress. The absence of concrete findings here could be due to competing effects between our well-being measures that we have yet to identify.

Table 11: Impact on life perceptions

	Happiness scale	Perception of current life	Better perception of life now than 5 years ago	Better perception of life in 5 years
Panel A: Without household controls				
	(1)	(2)	(3)	(4)
Treated	-0.001 (0.013)	-0.024 (0.042)	-0.027 (0.012)**	-0.001 (0.005)
Control dep var mean	2.84	4.750	0.530	0.940
N	4158	4156	4156	4147
Panel B: With household controls				
	(1)	(2)	(3)	(4)
Treated	-0.001 (0.0125)	-0.0175 (0.0405)	-0.0278 (0.0114)**	0.001 (0.005)
Control dep var mean	2.840	4.750	0.530	0.940
N	4158	4156	4156	4147

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Panel A reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only. Panel B reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only and controls at the household level. Household level controls are: distance to the nearest bank branch, age of the head of the household, years of education of the head of the household, caste, religion and land ownership. All regressions include pair fixed effects and survey round fixed effects (three rounds at endline). Standard errors are clustered at the service area level. Refer to Appendix E for variable definitions.

³⁰ Again, these variables are described in detail in Appendix E.

Table 12: Impact on psychological distress

	Self-assessed health	Felt nervous	Felt hopeless	Felt restless	Felt depressed	Felt everything was an effort	Felt worthless	K6 scale
Panel A: Without household controls								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated	-0.073 (0.046)	0.006 (0.023)	-0.036 (0.022)*	-0.004 (0.020)	-0.032 (0.028)	0.034 (0.029)	0.005 (0.021)	-0.019 (0.081)
Control dep var mean	6.25	2.730	2.340	2.640	2.560	2.930	1.780	14.980
N	3743	3742	3741	3739	3741	3742	3741	3736
Panel B: With household controls								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated	-0.080 (0.047)*	0.005 (0.023)	-0.033 (0.021)	-0.004 (0.021)	-0.029 (0.029)	0.038 (0.030)	0.039 (0.022)	0.011 (0.084)
Control dep var mean	6.25	2.730	2.340	2.640	2.560	2.930	1.780	14.980
N	3743	3742	3741	3739	3741	3742	3741	3736

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Panel A reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only. Panel B reports the OLS coefficient estimates (standard errors) associated with regressing each column heading dependent variable on the treatment dummy Treated, using endline data only and controls at the household level. Household level controls are: distance to the nearest bank branch, age of the head of the household, years of education of the head of the household, caste, religion and land ownership. All regressions include pair fixed effects and survey round fixed effects (three rounds at endline). Standard errors are clustered at the service area level. Refer to Appendix E for variable definitions.

7. Cost-effectiveness

Given the complex suite of products offered by KGFS, carrying out a comprehensive cost-effectiveness analysis of its model would require, at present, too many assumptions on take-up rates, prices and costs of the intervention. However, because KGFS is a private entity, one useful metric we can look at to understand if expansion of KGFS has been cost-effective is the institution's profitability.

The KGFS model falls under Pudhuaaru Financial Services Private Limited, which is a wholly owned subsidiary under DRCS, housed at the Dvara Trust.³¹ Based on DRCS's latest annual report (2015–16) available online, the company grew its business in almost all its units profitably, except for a few branches located in the north and east of India, although this was mostly because of extraneous reasons. Although such branches had a negative impact on the overall profitability of DRCS in the current financial year, the financial statement emphasises the exceptionality of such events. Moreover, we must

³¹ Dvara Rural Channels and Services (formerly IFMR Rural Channels and Services Private Limited), and Pudhuaaru Financial Services Private Limited, is a for-profit entity and governed under Section 134(5) of the Companies Act, 2013.

highlight that the KGFS branches pertaining to our study, which are located in the state of Tamil Nadu, southern India, recorded profits instead. In addition, according to the same report, DRCS (and KGFS) is expected to grow in a sustainable manner in the next financial year. Such positive signs of profitability are also confirmed by the fact that the institution is considering opening new branches as well.

In light of this, we can conclude that expansion of KGFS looks promising in terms of profitability and sustainability. As more information becomes available, we plan to refine our cost-effectiveness analysis to make it more granular, both product- and geography-wise.

8. Conclusions

In this report, we present the results from an innovative randomised controlled trial that is used to study the effects of the expansion of a rural branch banking model in Tamil Nadu, India. The partner, as a non-banking financial company and business correspondent, uses the financial services delivery model called Kshetriya Gramin Financial Services (KGFS) to provide a range of financial services. It also provides tailored financial advice through local brick-and-mortar village branches, thus representing an alternative to the standard microfinance movement in India, which has focused primarily on microcredit.

The type of financial products offered by KGFS, along with the large data collection effort carried out by the research team, allows our study to be the first to evaluate the impact of increased access to financial services as a whole. In addition, our focus on rural areas allows us to provide valuable insights into this model of expanding financial access to remote rural communities.

Our results show that living in an area where KGFS expanded increases the likelihood of households participating in formal banking. Compared with the control group, at endline, treated households are significantly more likely to have formal outstanding loans, have a larger number of formal loans, and borrow more from formal lenders. They also report higher savings. In addition, treated households are less likely than control households to borrow from informal sources such as moneylenders and financiers. Importantly, these household-level changes are paralleled in network changes: households in treatment groups report lower borrowing capacity, both from moneylenders and from individuals living inside and outside their village, compared to control group households.

Greater access to formal finance enables households to benefit from greater economic opportunities: our intervention increases households' likelihood of being self-employed and raises both business and household overall income. Consistent with a large body of theoretical research, we find that formal financial access promotes entrepreneurship and encourages households to take on riskier – but more profitable – activities. With more households becoming self-employed and diversifying their income-earning activities, we also observe that daily wages increase.

All in all, our initial results suggest that expanding access to formal financial products and services to rural households not only crowds out informal borrowing, but also has a positive impact on saving, on households' business activities, and on their ability to cope financially with health shocks. Increasing access to formal financial services seems to

have a positive impact on poor households through income stabilisation and increased financial security.

From a policy perspective, the results provide strong evidence on the links between financial inclusion and overall socioeconomic well-being of the households. We see that access to formal financial services to unbanked and underbanked population increases the usage of financial services as depicted in the form of increased likelihood to save and borrow from formal sources, leading to positive externalities on the overall welfare of households.

Financial inclusion has been identified as a key enabler by the World Bank in achieving the Sustainable Development Goals (World Bank 2018). Findings from our study are consistent with this narrative, as greater financial inclusion contributes to diversification of income sources and increased ability to cope with shocks.

Policy discussions around the impact of inclusive finance have largely centred around the impact of microfinance programmes that focus on providing access to microcredit to poor and low-income households. Banerjee and others (2015), in their assessment of six studies spanning six countries and four continents, find the impact of microcredit to be 'modestly positive, but not transformative' on the welfare indicators of the study households. However, financial inclusion in its holistic form goes far beyond mere access to credit, by encompassing a whole suite of financial products and services that are offered responsibly and sustainably, in a well-regulated environment. In this context, our study offers an extremely policy-relevant perspective, as it not just evaluates the impact of access to credit but looks at the overall impact of access to formal financial services in the form of a rural banking model. Our implementation partner, KGFS, provides a whole range of products and services such as savings, loans, insurance, remittances and other investment products. The key feature of the KGFS model lies in its ability to adopt a more 'hands-on' approach with its clients due to geographical proximity to the population it serves and the level of interaction it maintains with its clients. This allows KGFS to know the customer beyond the Reserve Bank of India regulated KYC or Know Your Customer norms and to be able to advise them on their financial decisions.

Recognising the potential of financial inclusion in improving the lives of the poor and low-income households, the Indian Government has taken several steps over the last few decades towards accelerating formal financial services for the financially excluded population. The Pradhan Mantri Jan Dhan Yojana scheme, one of the largest financial inclusion programmes in the world, is the most recent example showcasing the government's effort in this direction.³² However, despite sustained efforts, 47 per cent of Indians remain excluded from the formal financial system, and 43 per cent of total bank accounts remain dormant, implying significant barriers to their usage.

The results from this study indicate that a rural banking model (like KGFS) that reaches out to geographically remote areas, along with maintaining a high level of human contact with its client base, has the ability to overcome the various barriers to the sustained usage of formal financial services.

³² See: <<https://www.pmjdy.gov.in/>> [Accessed 22 June 2018].

From a policy perspective, our findings suggest that more efforts should be devoted to accelerating the access to formal financial services among the last-mile consumer. Given the links between financial inclusion and economic and social security, more attention should be devoted to understanding the key levers that influence the usage of formal financial services among low-income households, and to propose relevant solutions that remove these barriers. The KGFS model provides one solution to the long-pending question on the true impact of inclusive formal financial services on some of the most vulnerable populations of our society.

Online appendixes

Note to the readers: The appendixes for this report are available online only. These have not been copy-edited or formatted.

Online Appendix A: Sample selection and randomisation

<http://www.3ieimpact.org/sites/default/files/2019-01/ow31011-appendix-a-sample-selection.pdf>

Online Appendix B: Data

<http://www.3ieimpact.org/sites/default/files/2019-01/ow31011-appendix-b-data.pdf>

Online Appendix C: Power calculations

<http://www.3ieimpact.org/sites/default/files/2019-01/ow31011-appendix-c-power-calculation.pdf>

Online Appendix D: Pre-analysis plan, study design and method

<http://www.3ieimpact.org/sites/default/files/2019-01/ow31011-appendix-d-analysis-plan.pdf>

Online Appendix E: Variable definitions

<http://www.3ieimpact.org/sites/default/files/2019-01/ow31011-appendix-e-definitions.pdf>

Online Appendix F: Additional tables

<http://www.3ieimpact.org/sites/default/files/2019-01/ow31011-appendix-f-additional-tables.pdf>

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