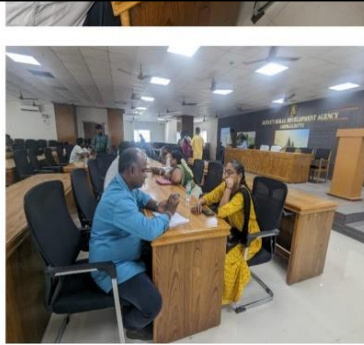INSTITUTE OF
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Impact Evaluation Report of Matching Grant Program (MGP)

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Study Context and Mandate

Background**:** This study represents a comprehensive impact evaluation of the Tamil Nadu Rural Transformation Project's (TNRTP) Matching Grant Program (MGP) intervention under the Vazhndhu Kattuvom Project. The evaluation is being conducted in accordance with TNRTP's monitoring and evaluation strategy to assess the program's effectiveness in fostering inclusive economic development and transformative growth in rural Tamil Nadu.

Evaluation Mandate This evaluation specifically focuses on:

1. Assessing the causal impacts of MGP intervention on enterprise survival and sustainability
2. Evaluating the effectiveness of the dual approach combining financial support with mandatory training
3. Measuring changes in investment patterns, business practices, and innovation adoption
4. Analysing the program's contribution to employment generation and financial inclusion objectives

Scope of the Study: This comprehensive evaluation of the MGP intervention encompasses an analysis of administrative data from 20,060 loan applications across seven distinct quarterly cohorts implemented between 2022-2024. The study employs a robust identification strategy exploiting quasi-random variation in loan application rejections due to administrative reasons and staggered implementation timing across cohorts.

The final analysis sample consists of 3,000 matched observations (1,500 treated and 1,500 control enterprises) derived through propensity score matching with Lasso-based covariate

selection, ensuring optimal balance across baseline characteristics for unbiased treatment effect estimation.

The evaluation examines six key dimensions of enterprise development and transformation. First, it assesses enterprise survival and sustainability, analysing survival rates, business continuity, and long-term viability indicators. Second, the study evaluates enterprise performance metrics including revenue growth trajectories, profit enhancement, cost efficiency, and investment behavior patterns. Third, it investigates employment generation outcomes examining job creation, employment quality, and work intensity effects. Fourth, the evaluation analyzes business practice improvements including record-keeping, financial planning, marketing strategies, and stock control capabilities. Fifth, it examines innovation adoption patterns across product development, technology adoption, process improvements, and marketing innovations. Finally, it assesses financial health outcomes including debt management, interest burden reduction, and overall financial sustainability.

By examining these interconnected aspects through both short-term and medium-term impact analysis, the study provides a holistic understanding of MGP's transformative effects on rural enterprises. This comprehensive scope allows for robust assessment of both direct financial impacts and broader business development outcomes, while establishing important insights for program scaling and sustainability.

Key Research Questions: This evaluation of MGP was guided by six core research questions that aligned with the program's dual objectives of addressing credit constraints and building managerial capabilities:

Enterprise Survival and Sustainability: How has MGP affected enterprise survival rates and long-term business viability, particularly among women-led enterprises and marginalized communities?

Financial Performance and Investment: What impacts has MGP had on key business metrics including revenue growth, profit enhancement, cost management, and investment behavior patterns?

Employment Generation: To what extent has the intervention contributed to job creation, employment quality improvements, and sustainable livelihood opportunities in rural areas?

Business Practice Enhancement: How has the mandatory training component influenced enterprises' managerial capabilities, record-keeping practices, financial planning, and overall business management systems?

Innovation and Technology Adoption: What role has MGP played in fostering innovation adoption, technology integration, and business modernization among rural enterprises?

Financial Health and Debt Management: How has the program's back-ended subsidy mechanism affected enterprises' debt portfolios, borrowing behavior, and overall financial sustainability?

Based on these research questions and evaluation scope, the following Executive Summary presents the key findings from the comprehensive evaluation of MGP's implementation and transformative impacts.

EXECUTIVE SUMMARY

The MGP Evaluation Report provides a comprehensive analysis of the Matching Grant Program's impact on enterprise survival, performance, investment patterns, business practices, innovation, employment, and financial health among rural enterprises in Tamil Nadu. The findings are presented using administrative data from 20,060 loan applications and employing propensity score matching and staggered difference-in-differences methodology to ensure robust causal identification.

The Matching Grant Program (MGP) has demonstrated exceptional performance that positions it among the most successful enterprise development interventions globally. MGP-supported enterprises achieved remarkable survival improvements of 39-40%, experienced 11.4% revenue growth, and fundamentally transformed their investment behavior. The program successfully addressed both demand-side and supply-side constraints through its innovative combination of a 30% back-ended loan subsidy with mandatory business training, creating sustainable pathways for rural enterprise growth.

Causal Identification of MGP Intervention Impact

Quasi-Natural Experiment: The study exploits two sources of variation - quasi-random variation in loan application rejections due to administrative reasons (documentation errors, technical glitches, procedural issues) rather than fundamental eligibility criteria, and staggered implementation across seven distinct quarterly cohorts between 2022-2024.

Robust Methodology: Using administrative data from the program's Management Information System (MIS), the study employs both propensity score matching with Lasso-based covariate

selection and staggered difference-in-differences design to estimate program impacts, ensuring internal validity of the causal impact estimates.

Study Sample

Application Sample: The study analyzed 20,060 loan applications, identifying 17,342 unique enterprises after consolidating multiple applications from the same applicants through the program's "revise and resubmit" mechanism.

Final Sample: Following propensity score matching and re-randomization procedures, the final sample consisted of 3,000 matched observations (1,500 treated and 1,500 control units), ensuring optimal balance across baseline characteristics for unbiased treatment effect estimation. By leveraging the natural experiment setup and carefully constructed methodology, the study robustly identifies both short-term and medium-term impacts of MGP intervention on enterprise outcomes and entrepreneurial development.

Key Findings:

1. Impact on Enterprise Survival and Sustainability

Survival Rates: MGP improved enterprise survival chances by 39-40% compared to non-MGP enterprises, representing one of the strongest survival effects documented in enterprise development literature.

Gender Equity: The survival benefits showed no significant gender differences, indicating that the program's focus on women-led businesses achieved equitable outcomes across demographic groups.

Long-term Viability: The sustained survival improvements suggest genuine enterprise graduation from survival-oriented to growth-oriented business models.

2. Enterprise Performance: Revenue, Costs, and Profits

Revenue Growth: MGP firms earned 11.4% more revenue compared to non-MGP enterprises, with the strongest effects emerging 2-3 quarters after program exposure.

Cost Efficiency: While overall cost impact was modest (-2.1%), enterprises that received MGP in early implementation cohorts (2023Q1-Q2) achieved significant cost reductions of 14.5%, indicating operational efficiency gains with longer exposure.

Profit Enhancement: MGP contributed an additional 9% to enterprise profits, with the most substantial improvements (17.9%) observed among the 2023Q1 cohort, demonstrating the importance of sufficient exposure duration for realizing program benefits. **Dynamic Effects**: Event study analysis reveals that profit improvements begin modestly but reach peak impacts of 12.9% at 3-4 quarters post-treatment, with sustained effects continuing through extended exposure periods.

3. Investment Transformation and Capital Formation

Investment Propensity: MGP enterprises were 27% more likely to invest and undertook 0.5 additional investment activities compared to control enterprises. Investment Scale: The size of investments was 57.4% higher for MGP enterprises, indicating substantial increases in capital formation.

Asset Creation: MGP firms were 5% more likely to invest in asset creation, with conditional investment amounts 90.4% higher than control enterprises, demonstrating capital deepening and long-term capacity building.

Strategic Capital Allocation: The combination of increased asset investment with stable working capital indicates efficient resource allocation and transition from operational dependency to productive capacity building.

4. Business Practices and Managerial Capabilities

Overall Improvement: MGP had a positive and statistically significant impact on total business practice scores (higher by 2.8%), though improvements were modest in scale.

Record Keeping: The strongest improvements were observed in record-keeping practices (4.4% increase), essential for formal business operations and credit access.

Stock Control: Stock control practices improved by 2.7%, indicating better inventory management capabilities.

Sectoral Variation: Manufacturing enterprises showed the strongest business practice improvements, while service and trade enterprises demonstrated more limited gains.

5. Innovation and Technology Adoption

Innovation Propensity: MGP firms were 4.1% more likely to adopt at least one innovation across six categories (products, technology, logistics, marketing, websites, email).

Innovation Count: Treated enterprises undertook 0.071 additional innovation activities on average, with a marginally higher total innovation score.

Investment in Innovation: While innovation investment was 11.4% higher among MGP firms, this effect was not statistically significant.

Sectoral Differences: Service sector enterprises showed stronger innovation adoption patterns compared to manufacturing and trade enterprises.

6. Employment Generation and Job Quality

Employment Growth: MGP enterprises achieved substantial employment increases, with 2022 and 2023 cohorts showing 0.199 and 0.143 standard deviation increases in total employment respectively.

Permanent Employment: The employment growth concentrated in permanent workers (0.148 standard deviation increase for 2022 cohort), indicating sustainable job creation with long-term security.

Work Intensity: Permanent labour days increased by 0.21 standard deviation for the 2022 cohort, demonstrating both job creation and work intensification effects.

Equitable Outcomes: Employment effects showed no significant gender or sectoral differences, indicating broad-based job creation benefits.

7. Financial Health and Debt Management

Debt Reduction: MGP significantly reduced enterprise indebtedness by 4.3 percentage points, demonstrating improved financial sustainability rather than debt dependency.

Temporal Dynamics: Early treatment cohorts showed the strongest debt reduction effects (11.0% decrease for 2022Q3 cohort), indicating that longer exposure enables more effective debt restructuring.

Strategic Debt Management: The program appears to enable debt substitution, where subsidized capital replaces high-cost credit, improving overall financial portfolio management.

Interest Rate Effects: While average interest rates showed modest improvement, the primary benefit operated through debt portfolio optimization rather than securing better borrowing terms.

Program Effectiveness and Areas for Improvement and Innovation

The MGP evaluation reveals exceptional performance across multiple dimensions, achieving results that place it at the upper end of international benchmarks for enterprise development interventions. The program's success demonstrates that well-designed interventions combining financial support with capacity building can overcome traditional market failures constraining small business growth. However, the evaluation identifies specific areas requiring experimental enhancements to maximize program impact:

Need for Improving Business Practices

While the program achieved strong financial outcomes, business practice improvements (2.8%) remained modest, indicating the need for experimental approaches to strengthen managerial capabilities:

Intensive Mentoring Pilots: Test extended mentoring programs with monthly one-on-one sessions over 12-18 months to determine optimal intensity for transformative practice adoption Peer Learning Networks: Experiment with enterprise clusters and peer-to-peer learning groups to leverage social learning mechanisms for business practice diffusion.

Technology-Enabled Training: Pilot digital training platforms and mobile-based learning modules to scale high-quality business practice training cost-effectively.

Sector-Specific Interventions: Design and test tailored business practice modules for manufacturing, services, and trade enterprises based on observed sectoral variations.

Market Linkage Strengthening Experiments

The identification of weak market linkage activities requires systematic experimentation to develop sustainable market access solutions:

Value Chain Integration Pilots: Test interventions that embed enterprises into formal value chains with guaranteed offtake agreements and quality standards support.

Digital Marketing Platforms: Experiment with e-commerce integration and digital marketing training to expand market reach beyond local boundaries.

These experimental approaches are critical for developing evidence-based enhancements that can transform the program from a successful financial intervention into a comprehensive enterprise development ecosystem capable of driving sustained economic transformation in rural Tamil Nadu.

Chapter 1: Introduction

Small and medium enterprises (SMEs) are critical in driving economic growth, job creation, and innovation in developing economies. Yet, these firms face persistent challenges, particularly in accessing formal credit, acquiring managerial capabilities, and overcoming information asymmetries(Bruhn et al., 2012). Lenders are often reluctant to finance innovative activities because innovation produces intangible assets and has uncertain returns (Hall and Lerner, 2009; Kerr and Nanda, 2014). Consequently, SMEs may under-invest in learning and innovation, either because they underestimate the gains from using business development services or because these gains spill over to other firms, reducing individual incentives to invest (McKenzie et al., 2017). Lenders are often reluctant to finance such investments, making it harder for SMEs to innovate. While various interventions aim to address these challenges, a critical gap remains in understanding how dynamic incentive mechanisms can simultaneously tackle multiple constraints while ensuring program sustainability.

To address these challenges, Matching Grant Programs (MGPs) have emerged as a key policy instrument to enhance enterprise performance by subsidizing investments in business development services (McKenzie et al., 2017). MGPs are designed to mitigate market failures that prevent SMEs from investing in innovation and capacity building. MGP generally offers partial subsidies, typically covering up to 50% of the costs for activities such as marketing initiatives, financial management upgrades, and training. MGPs incentivize firms to undertake projects they might otherwise forgo due to resource constraints (Grimm et al., 2024). These programs not only alleviate financial barriers but also reduce informational gaps by connecting firms with qualified service providers and financial institutions (Grimm et al., 2024).

MGP is commonly known as Partial Loan Subsidy (PLS) or Conditional Loan Subsidy (CLS). MGP helps alleviate both demand-side and supply-side constraints that hinder SMEs' growth.

On the demand side, SMEs in developing countries are often credit-constrained and may lack the willingness to invest due to perceived risks and uncertainty about returns. MGP helps lower the borrowing cost of capital and labour through subsidies, thereby reducing perceived risks and encouraging enterprises to invest in growth and innovation. Furthermore, MGP programs often include training and capacity-building components that help entrepreneurs develop managerial abilities, enhancing their skills in preparing business plans and effectively utilizing financial resources. This not only improves their investment decisions but also builds trust with financial institutions, addressing the common lack of confidence towards formal financial engagement.

On the supply side, financial institutions frequently hesitate to lend due to insufficient information on SMEs' cash flow patterns and profitability (Fafchamps and Woodruff, 2016). MGP facilitates an environment where firm owners engage directly with financial institutions, providing an opportunity to financial institutions to capture detailed information on SMEs' operations. Improved repayment behavior is encouraged through the incentive mechanism of MGP. If up to 70% of the loan is repaid within a certain period, the remaining 30% is waived off. It reduces the risks associated with co-financed investments. Entrepreneurs signal project viability to financial institutions, thereby reducing appraisal and management costs. This enhanced transparency and reduced perceived risk motivate financial institutions to extend credit to SMEs, ultimately improving access to finance.

The fundamental rationale for MGPs stems from two critical market imperfections. First, severe credit constraints limit firms' ability to invest in productivity-enhancing activities, particularly in fragile contexts where traditional financing channels are underdeveloped (de Mel et al., 2008). Second, information asymmetries regarding returns to human capital investments and heightened uncertainty discourage potentially profitable investments in innovation and capacity-building (Fafchamps and Woodruff, 2016). Another rationale for these

subsidies is that owners of small firms may under-invest in learning and innovation, because they underestimate the gains from using business development services.

Mandatory training is essential within MGP to transform financial capital into productive investments. Training enhances managerial practices, financial literacy, and strategic decision-making, which are crucial for sustaining firm growth (Anderson et al., 2018). As far as the supply side is concerned, identifying firms with high growth potential is difficult due to information asymmetries. It adds one more layer of difficulties for informal small firms. Business plan submissions serve as an effective screening mechanism to identify such firms (Fafchamps & Woodruff, 2016). Submitting a business plan and securing a loan is similar to winning a business plan competition. It provides formal recognition to beneficiaries.

Directly providing funds to private firms, rather than solely adjusting macroeconomic policies, is justified by the employment generation and positive spillover effects to non-programmatic areas (Srhoj et al., 2023.). Funding private firms can be viewed as investing in a quasi-public good, as its spillover effects benefit fellow firm owners. This approach addresses both supply and demand-side problems by enhancing firms' access to capital and encouraging investment in productivity-enhancing activities.

This report examines whether and how dynamic incentive mechanisms in matching grant programs can trigger sustained enterprise growth. We evaluate Tamil Nadu's MGP, which innovatively combines a 30% back-ended loan subsidy with mandatory business training. We investigate how this dual approach simultaneously addresses credit constraints and managerial capacity gaps while ensuring program sustainability through its novel repayment incentive structure.

Our identification strategy exploits two sources of variation. First, we leverage quasi-random variation in loan application rejections by comparing enterprises that received MGP to similar

enterprises rejected due to random administrative reasons (documentation errors, technical glitches, or procedural issues) rather than fundamental eligibility criteria. Second, we utilize the program's staggered implementation across seven distinct quarters cohorts between 2022-2024. Using administrative data from 20,060 loan applications, we employ both propensity score matching and a staggered difference-in-differences design to estimate program impacts.

1.1 Problem Statement

How can incentive mechanisms in enterprise support programs through MGP trigger firm growth outcomes? Small enterprise development in rural India faces complex challenges, including limited access to formal credit, managerial deficits. Despite significant expansions in formal banking and microfinance in rural areas, small enterprises remain credit constrained. This paradox arises from the misalignment between supply-side and demand-side constraints in rural credit markets. While standalone interventions like credit access or managerial training attempt to address these issues, their effectiveness remains limited due to the interconnected nature of financial, managerial, and social capital constraints.

On the supply side, financial institutions face three primary challenges in extending credit to small enterprises. First, information asymmetries prevent lenders from accurately assessing the quality and viability of small businesses, as most lack formal documentation, credit histories, or standardized financial practices. Second, high transaction costs associated with evaluating and monitoring small loans render them commercially unviable. Third, perceived high risks due to limited collateral and uncertain returns from small business investments further discourage lending. These challenges are particularly acute for innovative activities that generate intangible assets or require long-term returns. Consequently, without mechanisms to mitigate risks or credibly signal borrower quality, lenders are reluctant to engage.

On the demand side, entrepreneurs face corresponding challenges. Many lack the managerial capabilities needed to develop formal business plans or financial documentation, essential for securing formal credit. Further, there is unrealised benefits of business development services (BDS) because entrepreneurs perceive training or formal requirements as bureaucratic hurdles rather than opportunities for growth. Additionally, competitive dynamics in rural villages often discourage knowledge sharing among entrepreneurs, limiting collective learning and collaboration. These constraints directly undermine the growth potential of enterprises and, more broadly, the rural economy.

The interplay of these constraints creates a vicious cycle, where neither entrepreneurs nor financial institutions are incentivized to address their respective limitations. Lenders remain unwilling to invest in better assessment mechanisms without credible signals from borrowers, while entrepreneurs see little value in adopting formal business practices without guaranteed access to credit. This stalemate underscores the need for an integrated approach that simultaneously addresses supply-side, demand-side.

MGP program aims to address these challenges by combining financial support with mandatory training to trigger private actions. MGP works through three key mechanisms. First, the requirement to submit a business plan, prepared with the help of One-Stop Facility (OSF) centres, helps entrepreneurs present their business potential more formally, sending a strong signal of creditworthiness to banks. Second, the program offers a 30% loan subsidy (waived if 70% of the loan is repaid within certain period), which reduces the risk for both banks and entrepreneurs, encouraging better repayment behavior. Third, mandatory training sessions improve the managerial skills of entrepreneurs, helping them run their businesses more effectively.

Chapter 2: Theoretical Background

The foundational rationale behind Matching Grant Programs (MGPs) is rooted in Market Failure Theory, which posits that certain inefficiencies arise when markets, left on their own, fail to allocate resources optimally (Stiglitz, 1989). Within this theoretical lens, one critical dimension is Information Asymmetry Theory, based on Akerlof's (1970) classic insight that buyers and sellers often hold unequal information, leading to suboptimal investment and lending decisions. In the context of small and medium enterprises (SMEs), information asymmetries manifest when entrepreneurs underestimate the returns to business development services (BDS) or struggle to credibly signal profitability, thereby discouraging lenders from extending credit (Bruhn et al., 2012; Hall and Lerner, 2009; Kerr and Nanda, 2014). As a result, SMEs remain trapped in a cycle of under-investment in innovation and capacity building, which, in turn, perpetuates low-growth equilibria.

MGPs intervene by providing targeted subsidies that reduce the perceived risk and cost of acquiring external services, effectively "level playing field" where traditional markets fail. By compensating for these market imperfections, MGPs facilitate a learning-by-doing process, encouraging enterprises to test new ideas, adopt professional business practices, and enhance their managerial capabilities. This approach aligns with Human Capital Theory (Becker, 1964), which emphasizes the role of investments in skills and knowledge as drivers of productivity and economic growth. Mandatory training sessions embedded in MGP programs serve to improve managerial practices, financial literacy, and strategic decision-making, ensuring that beneficiaries not only have access to capital but also the competencies to utilize it effectively (Anderson et al., 2018).

Another integral aspect of MGP design and evaluation is the concept of Additionality. Originating from the public economics literature, Additionality Theory stresses that government interventions should yield outcomes that would not have materialized absent the

subsidy. Thus, MGPs must create genuinely new investments—rather than subsidizing investments firms would have made anyway—to generate public benefits, such as spillover effects and increased competition among input and service providers. Coupled with Financial Inclusion Theory, MGPs also seek to bridge the gap between SMEs and formal financial institutions. By lowering the cost of borrowing and mitigating perceived risks, these subsidies induce lenders to engage with entrepreneurs who were previously side-lined, thus expanding the frontier of financial inclusion.

2.1 Conceptual Model

MGP program aims to identify and support dynamic, growth oriented MSMEs by providing subsidized financial capital and mandatory managerial training. These interventions target shortages in skills and finance to enhance productivity, profits, and ultimately, employment. The ultimate goal of MGP is to create a sustainable impact on investment, enterprise survival, and economic growth. Firms face constraints in production decisions due to imperfect capital markets and limited managerial capabilities. Firms choose inputs of labour (L) and capital (K) at the cost of w and r respectively, to produce output valued at the market price p using production technology $f(A, L, K)$, where A reflects the firm's total factor productivity, subject to a possible credit constraint which depends on the entrepreneur's wealth level (W), given imperfect capital markets. The optimization problem for firms is:

$$Max\ \pi(w, r) = p * f(A, L, K) - wL - rK$$

Subject to: $wL + rK \leq \varphi W$, where φ reflects access to credit determined by the entrepreneur's wealth level W, and higher φ indicates easier access to credit (McKenzie and Puerto, 2017). Given the program's rules, this model focuses on the firm-level business context, excluding household-level utility maximization problems. Given the program's rules that were in place for MGP, we focus only on the firm and ignore the household, i.e., we assume MGP can only

be used for the firm owner's business and, hence, we ignore the household's utility maximization problem and any alternative use of the support within the household. The MGP program seeks to alleviate both financial and managerial constraints, thereby improving A, K and overall productivity through the following pathways:

Capital Investment (Increasing K): MGP reduces financial constraints by providing a repayment-linked subsidy (e.g., waiving 30% of the loan for successful repayment). This mechanism relaxes credit constraints (Increase φ), enabling firms to invest in physical capital. For credit-constrained firms, this relaxation leads to a direct increase in K, which positively impacts output and profitability ($\Delta K > 0$) (McKenzie and Puerto, 2017). In contrast, for non-constrained firms, the grant may result in a substitution effect, where public funds replace private capital without additional output gains (Michalek et al., 2015).

Managerial Training (Improving A): The mandatory training component of MGP directly enhances A by improving managerial skills, financial management, and strategic planning capabilities. Enhanced managerial practices increase efficiency and enable firms to achieve higher output with the same inputs ($\Delta A > 0$). These gains manifest through improved record-keeping, marketing aligning with the view of managerial practices as a form of technology (Bloom et al., 2016).

Certification Effects: The program also acts as a signal of quality to financial institutions, improving access to credit for participating firms. This certification effect enhances φ beyond the direct subsidy, enabling firms to secure additional funding for future investments (Martí & Quas, 2018).

Behavioural Effects: Winning the subsidy through business plan submission and training requirements increases entrepreneurs' confidence and commitment, fostering better business

practices and resilience to economic shocks. Therefore, they will put more effort in their business.

Chapter 3: Institutional Background

3.1 Country Context

India is currently among the fastest-growing global economies, with GDP growth estimates ranging from 6.0% to 6.8% for the fiscal year 2023-24, depending on the evolving global economic and political landscape (Economic Survey, 2022-23). Despite this rapid growth, the employment structure remains heavily reliant on agriculture, with the agricultural workforce declining from 41% in 2019 to 44% in 2021, likely due to economic disruptions from the COVID-19 pandemic (World Bank Group). This trend underscores the critical need for economic diversification and the development of alternative income sources beyond agriculture.

Tamil Nadu, one of India's leading states, provides an illustrative example of how regional policies contribute to national development. Tamil Nadu is the second-largest state economy in India, with a Gross State Domestic Product (GSDP) of ₹13,842 billion (US$210 billion) and a per capita GDP of $3,000 in 2014-15, making it the third highest in India. The state's economy is diversified, with key contributions from the service sector (45%), manufacturing (34%), and agriculture (21%). Between 2004-05 and 2015-16, the secondary sector, driven by manufacturing and construction, grew at an average rate of 14.08%, while the primary sector grew at 16.47%. The state also serves as an attractive investment destination, with cumulative FDI inflows of US$ 21.54 billion during April 2000 to March 2016. Tamil Nadu's strong growth trajectory, diversified industrial base, and thriving services sector underscore its importance as an economic hub.

Despite its economic strengths, Tamil Nadu faces challenges, particularly in rural areas. There is a need to integrate vulnerable groups—such as Scheduled Tribes, marginal farmers, landless labourers, and women—into higher-level income opportunities. This requires targeted interventions to modernize agriculture, support traditional livelihoods, and increase rural workforce participation, especially for women. As per the Tamil Nadu Rural Transformation Project (TNRTP), only 10% of women are engaged in economic activities, with the majority participating at the subsistence level. Women from marginalized communities face constraints in accessing working capital, raw materials, and finance at low interest and face occupational health issues due to a lack of appropriate equipment. Addressing these barriers is crucial for inclusive growth in Tamil Nadu.

The Vazhndhu Kattuvom Project, also known as the Tamil Nadu Rural Transformation Project (TNRTP), represents a significant example of the application of Matching Grant Programs (MGPs) to promote rural economic development. Supported by the World Bank, the TNRTP targets rural transformation by enhancing the sustainability and prosperity of rural communities through promoting rural enterprises, facilitating access to finance, and generating employment opportunities. The TNRTP aims to foster rural enterprises, increase access to financial services, and create job opportunities in targeted areas of Tamil Nadu. The project addresses both demand-side challenges, such as credit constraints, and supply-side obstacles, such as weak management capacity and information asymmetry. By providing financial support and facilitating training and skill development, the program empowers rural entrepreneurs to overcome barriers to growth.

3.2 Matching Grant Program (MGP): Design

The Matching Grant Program (MGP) is a pivotal financial instrument within the Vazhndhu Kattuvom Project (VKP) to foster inclusive economic development and transformative growth in rural Tamil Nadu. Rural enterprises face many challenges, particularly in accessing finance and technical support. MGP is designed to incentivize Partnering Financial Institutions (PFIs) to extend credit to entrepreneurs who are often perceived as high-risk by mainstream lenders. Matching grant that rewards timely loan repayment, the program addresses both demand-side and supply-side constraints.

The MGP operates through a collaborative framework involving multiple stakeholders. Community Professionals (CPs) are responsible for sourcing, screening, and profiling potential individual entrepreneurs from the village panchayats. They ensure that applicants meet the eligibility criteria and assist them in the initial stages of the application process. One-Stop Facility (OSF) Centers are tasked with preparing detailed business plans and conducting risk assessments for both individual entrepreneurs and collective enterprises like Enterprise Groups (EGs) and Producer Collectives (PCs). They provide technical and business development services, facilitating convergence with line departments and partnerships with the private sector. These robust screening mechanisms help to identify firms with growth potential.

At the next level, the application goes to the Block level at the Block Task Force (BTF), comprising officials from TNRTP and representatives from financial institutions, which conducts preliminary appraisals of loan applications up to ₹5 lakhs. They review the business plans and approve applications for forwarding to PFIs. For loan applications above ₹5 lakhs, the District Task Force (DTF), chaired by the District Collector, reviews and recommends them. The DTF also approves all matching grant claims, ensuring that the program's financial incentives are appropriately allocated. Partnering Financial Institutions (PFIs), which include banks and non-banking financial companies, then sanction loans to approved applicants. PFIs

are responsible for disbursing loans, maintaining the matching grant funds in a Subsidy Reserve Fund (SRF), and adjusting the grant upon successful loan repayment.

The MGP specifically targets women-led businesses, SHG women entrepreneurs who have completed at least one loan cycle with full repayment, first-time entrepreneurs, differently abled persons, and collective enterprises such as Enterprise Groups and Producer Collectives. This focus aims to encourage female entrepreneurship, promote gender equality, and offer inclusive opportunities for marginalized groups to engage in entrepreneurial activities.

Financially, the program categorizes loans into three segments: Nano Enterprises (loans up to ₹5 lakhs), Micro Enterprises (loans between ₹5 lakhs and ₹15 lakhs), and Small Enterprises (loans above ₹15 lakhs). A matching grant of 30% of the total project cost, up to a maximum of ₹40 lakhs, is provided as a back-ended subsidy. This grant is kept in a Subsidy Reserve Fund account within the PFI and is adjusted against the loan after the entrepreneur fulfils certain conditions, such as completing a minimum lock-in period of 18 months from the date of loan disbursement and full repayment of the net principal loan amount and all interest due.

The MGP is strategically designed to overcome several critical barriers. It improves access to finance by mitigating the perceived risks associated with rural lending, encouraging PFIs to extend credit to underserved entrepreneurs. The matching grant reduces the effective cost of borrowing, making loans more affordable. The program also addresses capacity gaps through mandatory Entrepreneurship Development Programs (EDP), which enhance the managerial and technical skills of beneficiaries by covering business planning, financial management, marketing, and compliance.

MGP addresses financial constraints, capacity gaps, and market access issues; the MGP creates an enabling environment for rural entrepreneurs to thrive. Through strategic partnerships with PFIs and a robust support system involving CPs, OSFs, and task forces at the block and district

levels, the MGP effectively mobilizes social and financial capital, bridging critical gaps in the rural entrepreneurial ecosystem. This comprehensive design not only fosters individual enterprise growth but also contributes to the broader objective of transformative economic development in rural Tamil Nadu.

3.3 Eligibility for MGP

The eligibility criteria for the Matching Grant Program (MGP) are based on two primary requirements: (a) achieving a minimum score of 30 out of 60 on a designated evaluation form submitted at the Enterprise Community Professional (ECP) level in the villages, and (b) maintaining a CIBIL credit score above 700. At least 25 points of the 30-point threshold are attributed to objective eligibility criteria like whether a member of SHG or not, repayment status of SHG loans, etc.

A distinctive feature of the MGP eligibility process is its flexible approach to assessing creditworthiness. While a CIBIL score above 700 is preferred, lower-score applicants are not automatically rejected. Instead, the program encourages these entrepreneurs to engage in alternative credit-building activities. For instance, they may be advised to obtain credit products like gold loans and demonstrate repayment discipline. By successfully repaying these loans, applicants can improve their credit scores and subsequently reapply for MGP.

Rather than issuing outright rejections, the program employs a "revise and resubmit" approach for applications with correctable deficiencies, such as documentation errors and discrepancies in Know Your Customer (KYC) information. Each resubmission at the One-Stop Facility (OSF) level generates a new application ID, ensuring that applicants' efforts to comply with requirements are systematically recorded and tracked. Corrections required at later evaluation stages, such as the Block Task Force (BTF) or District Task Force (DTF), are processed within the original application to maintain continuity.

Chapter 4: Evaluation Design: Sampling Framework, Identification Strategy, Study Sample

4.1 Sampling Framework

Our main sampling framework draws on the Management Information System (MIS) database of the program. We use exact same data that the selection committee used to allocate the MGP. This data set contains all information that TNRTP collects from applicants throughout all the stages. This database captures detailed information from all stages of the application process, including applicant and enterprise details, application flow statuses, and rejection or approval decisions. It will allow us to control for all factors considered in the selection process using matching methods (Delius and Sterck, 2023).

MGP eligibility is built on stringent criteria, including a minimum score of 30 in the initial application phase and a credit bureau score (CIBIL score) of over 700, along with successfully submitting a business plan. These robust screening mechanism helps to identify the potential of the firm owner. These criteria ensure that MGP is accessible to enterprises with demonstrated growth potential and financial discipline.

An integral feature of the MGP process is its iterative "revise and resubmit" approach. Applicants who fail to meet the eligibility criteria in their initial application are encouraged to reapply after addressing issues such as incomplete documentation, improving their CIBIL score, or refining their business plan. However, each resubmission generates a new application ID for the same applicant, resulting in duplicate entries in the database. This duplication creates challenges in accurately tracking and distinguishing unique applicants, as the same individual may appear multiple times under different application IDs. Our first task was to identify and consolidate unique applicants in the dataset. This step ensures that each applicant is represented only once.

4.1.1 Identification of Unique Applicants

In analysing the MGP implementation data till June 2024, which included 20,060 loan applications, a systematic approach was developed to identify unique enterprises and track their application trajectories. Unique applicant identification was crucial given that enterprises could submit multiple applications over time, either due to initial rejections or as part of the program's "revise and resubmit" mechanism.

To address this complexity, we developed a multi-stage identification strategy using a hierarchy of unique identifiers: Aadhaar card numbers (national identification), Udyam Registration numbers (business registration), and a composite key combining multiple applicant characteristics. Additionally, applicant names paired with their respective panchayat locations served as a fallback to capture potential matches that might have been missed due to documentation errors or variations. Each identifier was assigned a unique group ID, and missing values were replaced with placeholder values to ensure comprehensive matching. This multi-layered approach significantly reduced both false positives (erroneously matched duplicates) and false negatives (overlooked duplicates).

Based on this identification process, enterprises were classified into six distinct groups based on number of attempts of application and their accept and rejection station: (1) enterprises that applied once and received the loan, (2) those that applied multiple times and eventually received the loan, (3) enterprises with a single rejected application, (4) those with multiple rejected applications, (5) enterprises with a single application still under process, and (6) those with multiple applications under process. This classification system captures both the extensive margin (single versus multiple applications) and the intensive margin (final outcome of the application process).

Table 1: Distribution of Unique Applications

Group	Description	Freq.	Percent
1	Applied once and Received (Treated)	3782	21.81
2	Applied more than once and Received (Treated)	867	5.00
3	Applied once and Rejected (Never Treated)	7192	41.47
4	Applied more than once and Rejected (Never Treated)	786	4.53
5	Applied once and under process (Yet to Treat)	4066	23.45
6	Applied more than once and under process (Yet to Treat)	649	3.74
	Total	17342	100.00

Identifying unique enterprises also provides critical insights into program accessibility and effectiveness, enabling the estimation of the "duration effect" of MGP on enterprise performance. By leveraging the variation in the timing of MGP exposure, we can examine how differences in application outcomes affect enterprise trajectories. For instance, two entrepreneurs who initiated their applications at the same time but experienced differing outcomes—one receiving early approval and the other encountering delays due to initial rejection—represent varying levels of exposure to MGP. The former benefits from early access to resources and potential performance enhancements, while the latter faces deferred support, which may influence the timing and magnitude of enterprise outcomes. This variation, driven by programmatic processes rather than inherent enterprise characteristics, provides a quasi-random mechanism to assess the causal impact of exposure timing on enterprise performance. Such insights are critical for understanding how the iterative application process and associated delays shape the effectiveness of MGP in fostering enterprise growth and resilience.

4.2 Identification Strategy

As discussed earlier, rejected applicants in the MGP program were encouraged to reapply after addressing the deficiencies that led to their initial rejection. With the support from District /Block team, we manually collected all the reasons why their application was rejected at the first attempt. To systematically analyse the reasons for rejection, we documented all rejections into seven broader groups.

Table 2: Rejection Reasons

Sl. No	Rejection Reasons	Freq.	Percent
1	Documentation Errors	2662	29.38
2	Eligibility Issues	671	7.41
3	Financial Criteria mismatch	870	9.60
4	Lack of Interest and Commitment	997	11.00
5	Procedural Errors	2453	27.08
6	Scrutinized and Rejection	646	7.13
7	Technical Issues	761	8.40
	Total	9060	100.00

Among these categories, Documentation Errors, Procedural Errors, and Technical Issues were identified as "random" rejection reasons. These reasons are unrelated to the entrepreneurs' inherent eligibility, business potential, or capacity to meet program requirements. Instead, they arise from factors such as incomplete paperwork, clerical mistakes, or system glitches—circumstances that could affect any applicant regardless of their enterprise characteristics.

We isolate enterprises rejected due to these random factors. Therefore, we reduce concerns of selection bias, as these reasons are unlikely to correlate with unobserved characteristics affecting outcomes. This enables a credible counterfactual for estimating the causal impact of program participation. This subset of rejections provides an exogenous source of variation, creating a quasi-experimental setup.

We exploit the random variations in the rejection reason and compare the outcome and practices of the business with enterprises that successfully received MGP and Enterprises whose applications were rejected due to random factors, thereby serving as the counterfactual group.

The unintended variation in MGP allocation between enterprises that successfully received MGP and those rejected due to random reasons offers a unique opportunity for a natural experiment. By comparing these two groups, we isolate the program's impact on enterprise performance.

4.2.1 Cohort Generation or Variation in Treatment Timing

Our identification strategy exploits two complementary sources of variation in program participation: cross-sectional variation from random rejection reasons and temporal variation from staggered implementation. The MGP support was disbursed across seven distinct cohorts between 2022 and 2024, creating natural variation in treatment timing. The first cohort received support during 2022Q3, followed by each quarter of 2023 and first two quarters of 2024. This staggered implementation provides an additional source of identification beyond our primary strategy.

Specifically, enterprises that received support in later cohorts serve as a comparison group for those treated in earlier cohorts prior to their own treatment, allowing us to control for time-invariant unobserved characteristics that might affect both selection into the program and outcomes. By comparing enterprises across these cohorts, we leverage the variation in treatment timing induced by the program's operational processes, which is assumed to be exogenous. We exploit this variation through a Staggered Difference-in-Differences (DiD) approach, where identification relies on the assumption that conditional on enterprise and time-fixed effects, the timing of support receipt is uncorrelated with time-varying determinants of enterprise outcomes. The presence of multiple cohorts enables us to test this assumption by examining pre-trends across cohorts and assessing whether treatment effects vary systematically with implementation timing.

Figure 1: Cohort generation
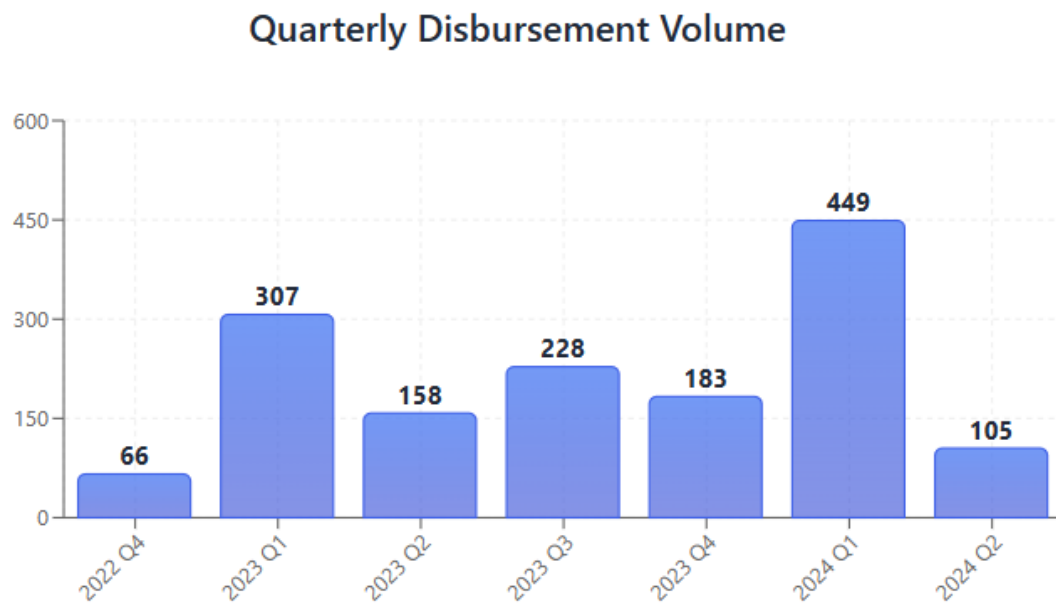
4.3 Lasso-based Matching

Although we have formulated comparison group based on the applicants, rejected due to random reasons. Still this groups affected to selection bias. Owing to non-random allocation of the MGP to entrepreneurs, simple comparison of outcome variables will give us bias estimates of program impact. Based on program design and rollout strategy, there are multiple sources of self-selection and program placement bias. MGP is demand driven program and hence firm exposed to treatment can be systematically different from those who did not choose to apply for the MGP. In that case, it is quite likely that the differences in outcomes are due to pre-program differences. In addition to selection bias, there could also be program placement bias. It leaves us with matching options. Matching methods rely on three key assumptions to ensure valid causal inference. First, the un-confoundedness assumption states that, conditional on a vector of control variables X, the potential outcomes are independent of treatment status. Under unconfoundedness, treatment assignment is quasi-random, and matching and experimental methods generate similar, consistent results (Heckman et al., 1997; Dehejia and Wahba, 2002;

Diaz and Handa, 2006). Yet, matching methods receive bad press among economists because they have been used in contexts where confoundedness is unlikely to be satisfied.

In our study, we argue that the unconfoundedness assumption is plausible, supported by four key points (McKenzie, 2021). First, we have a detailed understanding of how MGP loans were allocated. The selection process was transparent, and the decision-making criteria were well-documented. Second, we have access to the exact same data used by the selection committee during the allocation process, ensuring that the variables influencing treatment assignment are observable and included in our analysis. Extensive consultations with program staff confirm that no additional, unobserved information was used in the selection process. Third, the treatment and control groups operated within the same economic environment and were subject to identical surveys and data collection protocols, minimizing the risk of systematic differences between the groups. Finally, the selection of unobservables would need to be implausibly large to overturn our findings, as demonstrated through sensitivity analysis (Oster, 2019).

To ensure robust estimation of treatment effects, we adopted a machine learning-based covariate selection approach using the Least Absolute Shrinkage and Selection Operator (Lasso). Lasso is particularly suited for high-dimensional datasets, as it systematically selects the most predictive covariates while shrinking the coefficients of less relevant variables to zero. In lasso-based covariate selection, we minimize researcher discretion and address concerns related to potential omitted variable bias and multicollinearity.

Lasso with cross-validation to identify the optimal penalty parameter (λ) that balances the trade-off between model complexity and predictive accuracy. The Lasso estimator minimizes the following objective function: $L(\beta) = -l(\beta) + \lambda\sum|\beta_j|$, where $l(\beta)$ is the log-likelihood function and λ is the penalty parameter that determines the strength of regularization. This approach offers three key advantages:

- Automatic variable selection through coefficient shrinkage

- Prevention of overfitting in high-dimensional settings

- Enhanced prediction accuracy through bias-variance trade-off

The treatment variable, defined as whether an entrepreneur received support under the Matching Grant Program (MGP), was regressed on a set of covariates. These covariates were drawn from both the literature on enterprise development and the MIS database as baseline covariates. The variables encompass socio-demographic characteristics (e.g., age, gender, marital status, and community classification), financial indicators (e.g., CIBIL scores, household income, and working capital), enterprise-specific factors (e.g., business type, equipment availability, and skilled labour access), and program-specific metrics (e.g., requested loan amount, risk mitigation plans, and loan categories). All data were sourced from the program's Management Information System (MIS), ensuring consistency with the data available to the selection committee during the program's implementation phase. The cross-validation process yielded a parsimonious model comprising 37 covariates (Table 3). Key predictors include gender (coefficient: 0.207), higher CIBIL scores (e.g., 650–750; coefficient: 0.104), education levels such as postgraduate qualifications (coefficient: 0.131), and loan category (coefficient: 0.550). These variables align with the theoretical underpinnings of program participation, underscoring the role of financial discipline, human capital, and enterprise readiness in determining MGP eligibility.

Table 3: Lasso-selected variables with coefficients and significance levels.

Variables	Active
Gender	0.207
CIBIL score	
300 - 500	-1.054
550 - 650	-0.269
650- 750	0.104

ECP Score	0.003
Highest Education	
Graduate	0.013
ITI	-0.257
Middle-6th to 7th Standard	-0.272
Postgraduate	0.131
Primary - 1st to 5th Standard	-0.231
Secondary - 8th to 10th Standard	-0.076
Religion	
Muslim	0.148
Others	12.063
Community	
BC	0.101
FC	1.446
MBC/DND	-0.208
ST	0.336
Marital Status (2=Married)	0.103
Number of household members	0.055
Own/Rented House (1=Own)	-0.182
Covid loan Beneficiary (1=No)	-0.146
Other Source of income	0.000
Type of ownership (2=Company)	-0.582
Existing business (1=Existing)	0.160
Actual Working Capital	0.000
Category of enterprise	
Green	-0.336
White	0.113
Vehicle	0.000
Household assets	-0.000
Jewels	0.000
Equipment availability (1=No)	-0.388
Skilled labor availability (1=No)	0.166
B2C (1=No)	-0.115
B2B (1=No)	0.240
Risk mitigation plan	-0.209
Loan Category	0.550
_cons	-0.568

After model selection we use Propensity Score Matching (PSM) to construct a valid comparison group for estimating the counterfactual outcome, following the methodology outlined by Heinrich, Maffioli, and Vazquez (2010), We use propensity scores to match enterprises that received the Matching Grant Program (MGP) treatment with a control group

of non-beneficiaries. The propensity scores are calculated based on a set of covariates selected through a lasso-based covariate selection model, as proposed by Rosenbaum and Rubin (1983). In this approach, the treatment status (MGP participation) is regressed on a set of pre-determined variables, which include enterprise characteristics such as gender, credit score, education, community type, and business specifics (e.g., ownership type, working capital, and risk mitigation strategies). This method ensures that we control for potential confounders that could influence both the likelihood of receiving MGP and the enterprise outcomes. We estimate the probability of getting a BC license using a logit model that includes lasso selected variables from the application process. The most important factors influencing the likelihood of receiving support under the Matching Grant Program (MGP) include gender, CIBIL score, enterprise category, and equipment availability. The positive coefficient on gender reflects the emphasis on supporting female entrepreneurs, aligning with the program's objective of promoting gender equality in entrepreneurial opportunities. Similarly, higher CIBIL scores (e.g., 750–900) are associated with an increased probability of receiving MGP support, indicating that financial discipline and creditworthiness are critical in the selection process. Community classification also plays a significant role, with Forward Class entrepreneurs being more likely to receive MGP support compared to other community groups, as evidenced by the positive and statistically significant coefficient. This may reflect a historical trend of Forward Class entrepreneurs having greater access to resources and networks that enhance their eligibility. On the other hand, the negative coefficient on the Most Backward Classes highlights disparities in access to entrepreneurial support. Enterprise-specific factors, such as equipment availability and type of enterprise category, are also central to the selection process. The negative coefficient on equipment availability (1=No) suggests that enterprises lacking basic infrastructure are less likely to receive support, underscoring the program's intent to prioritize businesses with readiness for scaling. Similarly, enterprises categorized as "Green" are less

likely to receive support, potentially reflecting their nascent stage or lower alignment with program priorities, compared to enterprises in other categories. Interestingly, other variables, such as skilled labour availability and the type of business ownership, show mixed or insignificant results, indicating that these factors are less critical in the committee's decision-making process. The role of financial variables, such as working capital and household assets, also emerges as nuanced. While household assets have a marginal negative association with receiving MGP, other indicators, such as requested loan category, show strong positive effects. Specifically, the positive coefficient on loan category (1=Micro) aligns with the program's focus on supporting micro-enterprises, which are often more financially constrained but exhibit high potential for growth. These results demonstrate that the MGP selection process is guided by a mix of socio-demographic, financial, and enterprise-specific factors. Importantly, the results reveal no significant bias toward enterprises with pre-existing advantages in terms of stock levels or skilled labour, supporting the unconfoundedness assumption and confirming that the selection committee's decisions were driven by observable eligibility criteria rather than subjective assessments of enterprise success.

The rest of the two assumptions of PSM, (a) Conditional Independence (CI) and (b) common support (CS), are then applied. CI implies that MGP outcomes are independent of the treatment status of enterprise in the absence of treatment, conditioned on observables that include enterprise level covariates. The conditional independence condition is expressed as:

$$[(Y_i^D, Y_i^C) \perp D_i | X_i]$$

Where Y_i^D and Y_i^C represent outcomes for participants and non-participants, D_i is the treatment status and X_i are the lasso selected variables. Applying this, we calculate the propensity scores as in Table 4. Table 4 shows that no variable collected during the application process perfectly predicts the success or failure of an application. In fact, the pseudo-R-squared of the regression

is quite low (0.036) suggesting that the selection process was largely driven by quasi-random bureaucratic happenstance.

Table 4: Entrepreneur selection Model: Generating Propensity Score

Lasso selected covariates	Coefficient
Female	0.203***
	(0.063)
CIBIL Score	
-1 to 0	-0.394***
	(0.098)
300 to 550	-1.051***
	(0.257)
550-650	-0.270*
	(0.154)
750-900	0.107*
	(0.064)
ECP Score	0.003
	(0.004)
Highest Education Qualifications	
Graduation	0.003
	(0.076)
ITI	-0.231
	(0.184)
Middle- 6th to 7th Standard	-0.256*
	(0.141)
Postgraduate	0.136
	(0.120)
Primary - 1st to 5th Standard	-0.228*
	(0.137)
Secondary - 8th to 10th Standard	-0.073
	(0.072)
Religion	
Muslim	0.155
	(0.202)
Others	0.000
	(.)
Community	
Backward Class	0.098
	(0.064)
Forward Class	1.454
	(1.070)
Most Backward Class	-0.205***
	(0.069)
ST	0.336
	(0.329)

Marital Status (2=Married)	0.107
	(0.088)
Number of Household members	0.057**
	(0.024)
Own/Rented House (1=Own)	-0.152
	(0.152)
Covid loan Beneficiary (1=No)	-0.156**
	(0.065)
Other Sources of income	0.000
	(0.000)
Type of ownership (2=Company)	-0.541*
	(0.324)
Existing business (1=Existing)	0.165***
	(0.056)
Actual Working Capital	0.000*
	(0.000)
Proposed Category of the enterprise	
Green	-0.326***
	(0.086)
Whitw	0.118
	(0.084)
Vehicle	0.000*
	(0.000)
Household assets	-0.000**
	(0.000)
Jewels	0.000
	(0.000)
Equipment availability (1=No)	-0.380***
	(0.058)
Skilled labor availability (1=No)	0.138
	(0.136)
B2C (1=No)	-0.101
	(0.101)
B2B (1=No)	0.246***
	(0.061)
Risk mitigation plan (1=No)	-0.209***
	(0.062)
Loan Category (1=Micro)	0.533***
	(0.136)
_cons	-0.555
	(0.397)
Observations	6342
Pseudo R-squared	0.036
Log likelihood	-3980.232

Notes: Standard errors in parentheses, The dependent variable is a dummy equal to one if received MGP.* p<0.10, ** p<0.05, *** p<0.01

CS assumption ensures that, for each unit, there exists a corresponding comparison unit with a similar propensity score. It requires that the probability of receiving the treatment is bounded

away from zero and one. In the context of assigning MGP this assumption implies that every applicant had a chance to be selected for a MGP and no applicant was pre-determined to receive one for sure. This condition is critical for ensuring that we are comparing similar units, minimizing bias in the estimation of the counterfactual outcomes. CS Assumptions ensures that conditional on X_i, treated unit have neighbouring comparison entrepreneurs in the propensity score distribution. This then implies:

$$0 < P\,(D_i|X_i)\, < 1$$
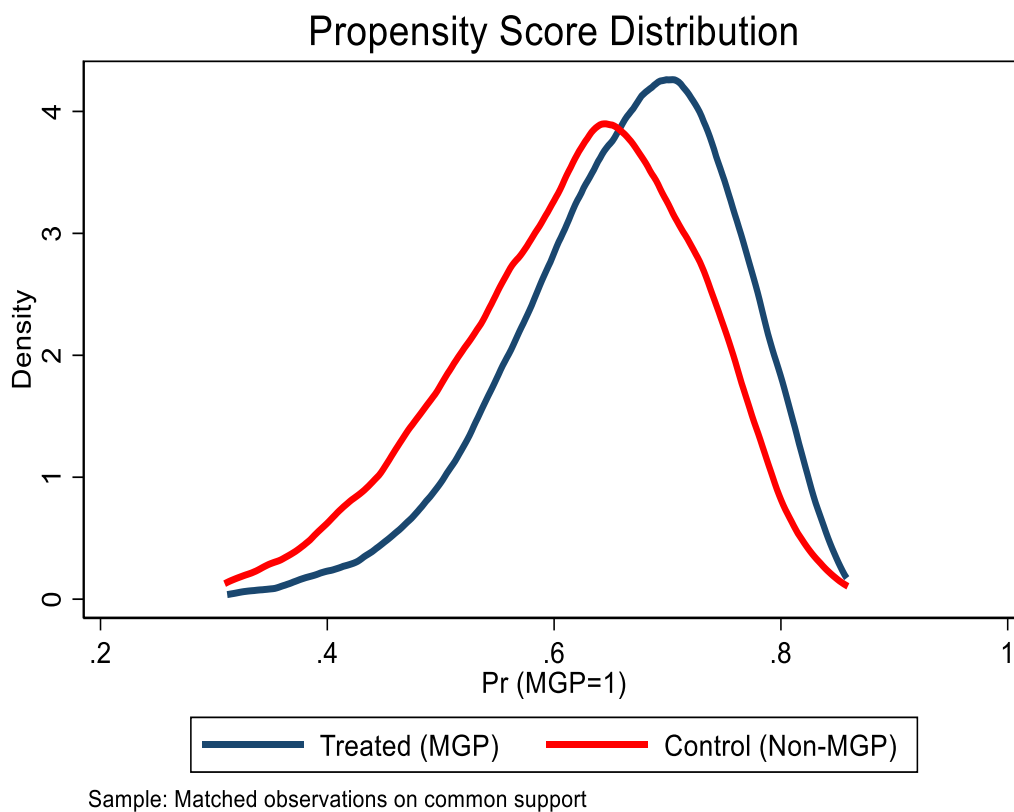
Figure 2: Area of Common Support: Kernel Density Estimate

As shown in Figure 3, the propensity score distribution exhibits satisfactory overlap between treated and control groups, confirming the validity of the common support condition. For our data, the region of common support is given by (0.302, 0.967). To further match units, we use

the nearest neighbour matching method, which assigns weights based on the proximity of propensity scores.

As the unconfoundedness, Conditional Independence, and Common Support assumptions are plausible in our study, we are confident that matching methods are a sensible choice to evaluate the average treatment effect of applicants receiving a MGP, conditional on a fixed number of MGP that would be allocated.

The nearest neighbour matching algorithm is a widely used method in propensity score matching (PSM) to estimate treatment effects by constructing a comparison group for treated units. Mathematically, the nearest neighbour matching is formulated as follows: Let D_i be the treatment indicator (1 if treated, 0 if control) for unit i, and p_i is the estimated propensity score for unit i, where propensity scores represent the probability of treatment given a set of observed covariates selected from lasso $[Pr(MGP = 1)]$. In the nearest neighbour matching algorithm, the goal is to match each treated unit i with a control unit j such that the absolute difference in their propensity scores, $|\hat{P}_i - \hat{P}_i|$ minimized:

$$j^* = \min_{j \epsilon \{0\}} |\hat{P}_i - \hat{P}_i| \ \text{ for treated unit } i$$

This matching is based on the closest distance in the propensity score distribution between treated and control units, which can be further restricted by setting a calliper. The calliper defines a maximum allowable difference in propensity scores between matched units, ensuring that matched units are sufficiently similar in their estimated probabilities of receiving treatment. The nearest neighbour matching process is repeated for all treated units, where each treated unit is assigned a matched control unit. The matched units are weighted based on the closeness of their propensity scores. In the case of nearest neighbour matching with calliper, if

no match is found within the specified distance, the treated unit may be excluded from the sample, reducing the risk of poor matches that could lead to biased treatment effect estimates.

This algorithm is particularly useful in observational studies, where random assignment is not possible, but the matching process allows us to approximate randomization by comparing treated and untreated units that are similar based on their propensity scores. The outcome of this process is a smoothed weighted estimator, where the closest matches receive higher weights, providing a more accurate estimate of the treatment effect for the population.
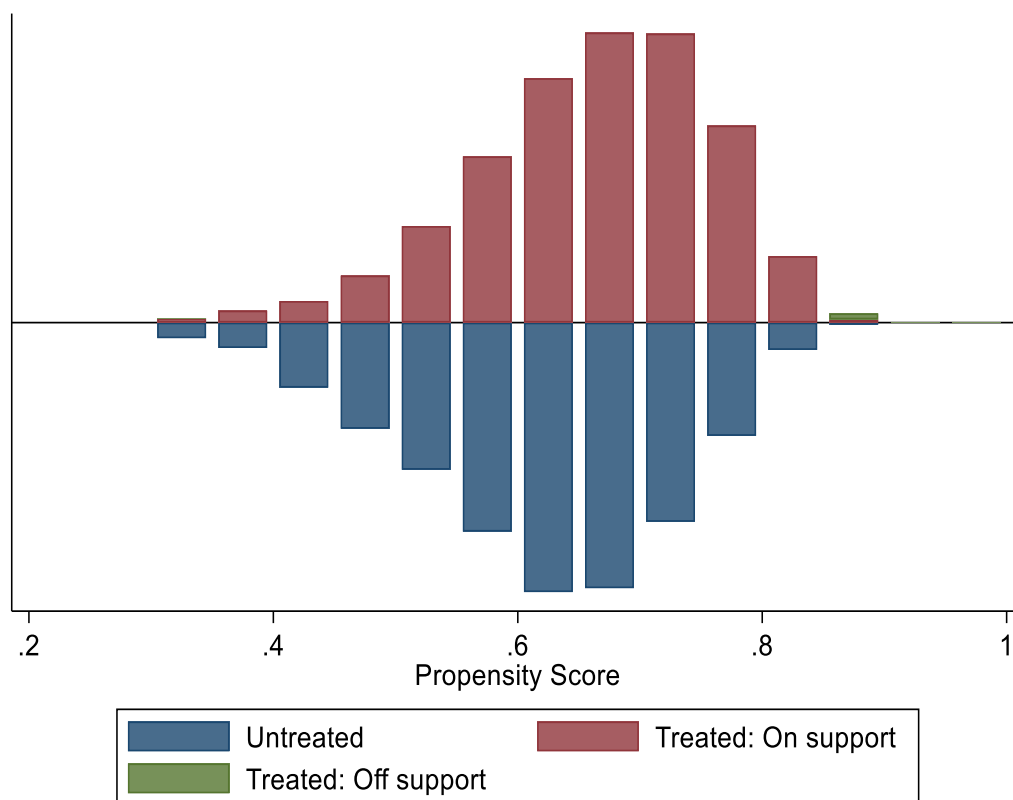
Figure 3: Distribution of estimated propensity scores.

The figure 4 illustrates the distribution of propensity scores for treated and untreated units, with a clear region of common support observed between the two groups. The majority of treated and untreated units exhibit overlapping propensity scores, ensuring the feasibility of valid matches under the propensity score matching (PSM) framework. However, a small fraction of

observations lies outside the overlap region, as evident from the tails of the distribution. These observations violate the overlap assumption, a typical occurrence in propensity score analyses.

To address this issue, we applied trimming to exclude observations outside the common support region. Specifically, we removed observations with propensity scores below 0.302 or above 0.967, as determined by the minimum and maximum values of the propensity score range. Trimming resulted in a negligible reduction of the sample size, with only 9 observations excluded, ensuring that the majority of the sample is retained for analysis.

The trimmed sample was subsequently used for all estimators to maintain consistency across methods and ensure comparability of results. For propensity score matching (PSM) estimators, the propensity scores were re-estimated after trimming to reflect the adjusted sample distribution. This approach aligns with best practices in the literature (Imbens and Wooldridge, 2009; Lechner et al., 2011) to ensure robustness and reliability of the estimated treatment effects.

This procedure substantially reduced the bias across covariates and ensured comparability between groups. The mean percent bias decreased from 22.1% in the unmatched sample to 1.4% in the matched sample, and the median bias dropped from 6.3% to 1.3%. Additionally, the overall bias statistic (B) fell from 45.4% to 11.3%, while the variance ratio (R) improved from 0.88 in the unmatched sample to 1.02 after matching, indicating similar covariate variances across groups.

Key covariates displayed notable improvements in balance post-matching (table 5). For instance, the proportion of female entrepreneurs was nearly identical in the treated (67.4%) and control (67.3%) groups, with a minimal bias of 0.2%. CIBIL scores across various ranges showed biases well within acceptable thresholds, such as -2.5% for scores between 550 and 650 and -1.4% for scores between 750 and 900. Educational attainment, another critical

covariate, exhibited biases of 3.5% for graduates and 1.1% for postgraduates, reflecting successful balance. Enterprise-level characteristics, including working capital, risk mitigation plans, and loan category, also showed significant reductions in bias, such as -3.9% for loan categories.

The propensity score diagnostics confirmed the robustness of the matching process. The pseudo-R-squared for the logit model dropped from 0.036 to 0.002, indicating that treatment status was no longer systematically associated with covariates after matching. The likelihood ratio (LR) chi-squared statistic similarly decreased from 295.86 to 26.37, demonstrating improved model fit and balance. These diagnostics highlight the effectiveness of the matching procedure in satisfying the conditional independence assumption.

Table 5: Balance after Matching

Variables	Mean		Percent Bias	*p*-value
	Treated	Control		
Gender (1= female)	0.674	0.673	.2	0.925
CIBIL Score (300 to 550)	0.007	0.006	.7	0.679
CIBIL Score (550 to 650)	0.029	0.033	-2.5	0.249
CIBIL Score (750 to 900)	0.275	0.281	-1.4	0.537
ECP Score (Out of 60)	50.559	50.500	.4	0.679
Highest Education Qualifications (Graduate)	0.249	0.234	3.5	0.114
Highest Education Qualifications (ITI)	0.021	0.022	-0.7	0.758
Highest Education Qualifications (Middle- 6th to 7th Standard)	0.039	0.039	0	1.000
Highest Education Qualifications (Postgraduate)	0.070	0.067	1.1	0.630
Highest Education Qualifications (Primary - 1st to 5th Standard)	0.040	0.042	-0.8	0.697
Highest Education Qualifications (Secondary - 8th to 10th Standard)	0.321	0.332	-2.4	0.288
Religion	0.023	0.023	0	1.000
Community (Backward Classes)	0.382	0.393	-2.4	0.285
Community (Forward Classes)	0.001	0.000	1.9	0.180
Community (SC)	0.225	0.214	2.4	0.250
Community (ST)	0.007	0.006	1.8	0.413
Marital Status	0.880	0.878	.6	0.786
Number of Household members	2.156	2.152	.4	0.852
Own Rented House	0.962	0.959	1.5	0.494
Covid loan Beneficiary	0.759	0.753	1.3	0.553

Other Source of income				79826	83792	-2.100	0.353
Type of ownership (2=Company)				0.005	0.006	-0.600	0.762
Existing business (1=Existing)				0.613	0.631	-3.700	0.100
Actual Working Capital				94519	98937	-2.800	0.249
Propose category of enterprise (Green)				0.292	0.302	-2.200	0.320
Propose category of enterprise (White)				0.573	0.556	3.6	0.108
Vehicle				1.20e+05	1.20e+05	0.000	0.992
Household assets				85476	80370	1.2	0.382
Jewels				3.90e+05	4.00e+05	-1.400	0.582
Equipment availability				0.602	0.608	-1.300	0.587
Skilled labor availability				0.044	0.044	-0.100	0.914
B2C				0.078	0.080	-0.700	0.652
B2B				0.662	0.662	.1	0.963
Risk mitigation plan				0.250	0.264	-3.200	0.135
Loan Category				1.973	1.982	-3.900	0.021

Table 6: Matching Result

Sample	Ps R2	LR chi2	p>chi2	Mean Bias	Median Bias	B	R	%Var
Unmatched	0.036	295.860	0.000	22.100	6.3	45.4*	0.880	75
Matched	0.002	26.370	0.880	1.4	1.3	11.300	1.020	75
* If B>25%, R outside [0.5; 2]								

4.4 Final Sample

To finalize the sample for analysis, we employed the minimum maximum t-statistic (min-max t-stat) simulation as part of a re-randomization strategy. This approach was chosen to achieve the best possible balance in covariates between the treatment and control groups (Bruhn & McKenzie, 2009). It involves generating multiple random treatment assignments and selecting the one that minimizes the maximum t-statistic across covariates, thereby achieving optimal balance.

In our implementation, we conducted 1,000 iterations of re-randomization. For each iteration, we assigned treatment randomly while maintaining the original proportions of treated and control units, calculated the t-statistics for each covariate by regressing them on the treatment variable, and identified the maximum t-statistic across all covariates. The iteration with the lowest maximum t-statistic was selected as the final assignment. This process ensured that the

treatment and control groups were as balanced as possible on baseline characteristics, minimizing the risk of bias in treatment effect estimation.

The resulting sample consisted of 3,000 matched observations, including 1,500 treated and 1,500 control units, derived from the original matched sample. Observations with extreme imbalances or outliers were excluded during this process, ensuring that the final sample adhered to the common support assumption.

Table 7 presents the balance of final sample for key covariates. For instance, the mean age of entrepreneurs in the treated and control groups is nearly identical (34.54 vs. 34.44, mean difference = -0.102), and gender proportions are balanced (67.4% vs. 67.3%, bias = 0.2%). Financial indicators such as household income and savings also show minimal differences, with a mean difference of ₹24,500 and ₹22,053, respectively. Similarly, enterprise-level characteristics, such as working capital (mean difference = ₹721) and loan requests (mean difference = ₹2,624), exhibit no significant disparities. Key covariates relevant to enterprise readiness and eligibility, such as the Enterprise Asset Index (bias = 0.078, $p<0.1$) and equipment availability (bias = 0.024, $p>0.1$), were balanced post-simulation. The variables showing minor differences, such as "existing business" (-0.048, $p<0.05$), were addressed through trimming and re-weighting, ensuring these did not affect the final sample comparability.

Table 7: Final Sample Balance

Variables	Comparison Group		Treated Group		Pairwise t-test	
	N	Mean/(SE)	N	Mean/(SE)	N	Mean difference
Age of the entrepreneur	1054	34.44	1500	34.542	2554	-0.102
		(0.259)		(0.160)		
Gender	1056	1.335	1500	1.344	2556	-0.009
		(0.018)		(0.012)		

CIBIL score	1056	4.059	1500	4.001	2556	0.058
		(0.033)		(0.025)		
ECP Score	1056	50.337	1500	50.707	2556	-0.370
		(0.257)		(0.166)		
Highest Education	1056	5.241	1500	5.149	2556	0.092
		(0.097)		(0.066)		
Religion	1056	1.994	1500	2.002	2556	-0.008
		(0.017)		(0.009)		
Community	1056	2.689	1500	2.747	2556	-0.058
		(0.058)		(0.040)		
Marital Status	1056	2.129	1500	2.123	2556	0.007
		(0.012)		(0.009)		
Number of Household members	1056	2.152	1500	2.166	2556	-0.014
		(0.046)		(0.029)		
Household Income	1056	2,65,000	1500	2,41,000	2556	24500.604
		(18290.422)		(7952.495)		
Household Consumption	1056	81048.554	1500	78601.275	2556	2447.279
		(3616.654)		(2623.630)		
Household Savings	1056	1,84,000	1500	1620000	2556	22053.325
		(17223.126)		(6602.977)		
Own or Rented House (1=Own house)	1056	1.038	1500	1.043	2556	-0.006
		(0.008)		(0.005)		
Type of Dwelling (1=Kutcha House)	1056	1.659	1500	1.676	2556	-0.017
		(0.018)		(0.012)		
CAP Beneficiary (1=No)	1056	1.238	1500	1.233	2556	0.005
		(0.017)		(0.011)		
Other Source of income	1056	86044.329	1500	80441.972	2556	5602.357
		(11302.472)		(4832.418)		
Type of ownership (3=Individual/Sole Proprietary)	1056	3.010	1500	3.015	2556	-0.006
		(0.006)		(0.005)		
Existing business (1=Existing)	1056	1.360	1500	1.407	2556	-0.048**
		(0.018)		(0.013)		
Actual Working Capital	1056	97086.496	1500	96365.075	2556	721.421
		(8177.793)		(4456.130)		
	1056	395000	1500	397000	2556	-2624.665

Requested Loan Amount		(11311.188)		(5227.621)		
Vehicle	1056	1,29,000	1500	1,21,000	2556	7761.049
		(8772.825)		(5118.602)		
Jewels	1056	386000	1500	381000	2556	5201.833
		(12885.710)		(8016.320)		
Enterprise Asset Index	1056	1.805	1500	1.727	2556	0.078*
		(0.036)		(0.023)		
Water	1056	1.028	1500	1.029	2556	-0.001
		(0.006)		(0.004)		
Equipment availability (1=No)	1056	1.410	1500	1.386	2556	0.024
		(0.019)		(0.013)		
Skilled labour availability (1=No)	1056	1.959	1500	1.962	2556	-0.003
		(0.008)		(0.005)		
B2C (1=No)	1056	1.929	1500	1.919	2556	0.009
		(0.009)		(0.007)		
B2B (1=No)	1056	1.323	1500	1.346	2556	-0.023
		(0.017)		(0.012)		
Risk mitigation plan (No)	1056	1.732	1500	1.740	2556	-0.008
		(0.017)		(0.011)		
Loan Category (2=Nano)	1056	1.979	1500	1.970	2556	0.009
		(0.007)		(0.005)		
Current Supply (Annual)	1056	186000	1500	158000	2556	28799.090
		(58949.853)		(26568.983)		
Present Demand (Annual)	1056	335000	1500	443000	2556	-1.07e+05
		(70191.147)		(90008.175)		

Significance: ***=.01, **=.05, *=.1. Errors are robust. Observations are weighted using variable _weight as pweight weights.

4.5 Field Survey

The Matching Grant Program (MGP) field survey represents a comprehensive data collection instrument designed to capture detailed enterprise-level information across multiple dimensions of business performance, entrepreneurial behavior, and program impact. The survey employs a longitudinal design, collecting data across three years (2022-2024) to enable before-and-after analysis of program interventions. The survey architecture follows a multi-tiered approach, beginning with basic enterprise identification and progressing through increasingly detailed modules covering financial performance, operational practices, innovation adoption, and program-specific experiences. This hierarchical structure ensures data quality while maintaining respondent engagement throughout the extensive interview process. The questionnaire includes specific routing logic to capture different experiences based on program participation status, with dedicated modules for defunct enterprises to understand survival dynamics and failure patterns.

The survey captures comprehensive financial data including monthly revenue patterns differentiated by peak and usual business periods, detailed cost structures across nine categories encompassing raw materials, space, machinery, utilities, and other operational expenses, along with sophisticated profit calculations. This granular approach enables precise measurement of program impacts on business performance while accounting for seasonal variations common in rural enterprises. The financial modules employ multiple validation mechanisms to ensure data accuracy, including cross-checks between related variables and verification summaries for complex calculations.

A investment tracking system records annual investment activities across four primary categories including working capital, asset creation, debt reduction, and new enterprise development. The survey captures not only investment amounts but also sources of financing,

modes of payment, and temporal patterns, enabling comprehensive analysis of how MGP influences capital allocation decisions and business growth strategies. The investment modules include running totals and consistency checks to ensure accurate reporting across the three-year observation period.

Detailed employment modules track both permanent and temporary workers across the surveyed period, including comprehensive wage structures, working hours, and seasonal employment patterns. This approach enables measurement of job creation effects while distinguishing between different types of employment security and quality. The employment data collection extends beyond simple headcounts to capture work intensity, payment methods, and employment conditions, providing insights into the quality of jobs created through program intervention.

The survey includes extensive assessment of marketing practices, inventory management, record-keeping systems, and financial planning capabilities. These sections use both binary indicators and detailed follow-up questions to measure the quality and sophistication of business practices, enabling evaluation of program impacts on managerial capabilities beyond pure financial outcomes. The business practices modules incorporate verification mechanisms where respondents can demonstrate their record-keeping systems and financial management tools.

The innovation module employs a multi-dimensional framework capturing six types of innovation including product and service development, technology adoption, process improvements, marketing innovations, and digital infrastructure development such as websites and email systems. For each innovation type, the survey records implementation status, investment levels, underlying motivations, and scope of impact. This comprehensive approach

enables thorough assessment of program effects on enterprise modernization and competitive positioning within local markets.

The survey incorporates standardized psychological instruments including digit-span recall tests to measure cognitive capacity, risk-taking scenarios to assess entrepreneurial orientation, and entrepreneurial spirit scales. These measures provide crucial insights into selection effects and help explain differential program impacts across different entrepreneur types. The cognitive assessment modules follow established protocols to ensure reliability and comparability with international standards.

The survey is organized into nineteen distinct modules, each designed to capture specific aspects of enterprise operations and entrepreneurial experience. The modules include enterprise identification and basic information, entrepreneur personal characteristics, operational status tracking across multiple years, investment structures for 2022-2024, comprehensive loan histories, detailed revenue analysis by year, employment and labour dynamics, operational cost structures, enterprise asset inventories, innovation and technology adoption patterns, cognitive assessment through digit-span tests, risk-taking behavior evaluation, entrepreneurial orientation measures, entrepreneurial spirit assessment, and comprehensive business skills and practices evaluation. Additionally, specialized modules focus on MGP-specific experiences for beneficiaries, parallel experiences for non-beneficiaries, and social network analysis to understand knowledge sharing and business advice networks. This modular structure enables flexible data collection while ensuring comprehensive coverage of all relevant enterprise dimensions.

For program participants, the survey captures detailed loan utilization patterns using an innovative bean distribution methodology where respondents allocate ten beans representing different uses of their loan across various categories. This approach provides more accurate

data on fund utilization than traditional recall methods while making the exercise engaging for respondents. The MGP module tracks repayment status, additional loan applications, confidence changes in dealing with financial institutions, and perceived program benefits across multiple dimensions.

For non-participants, the survey captures parallel application experiences, detailed rejection reasons, alternative financing sources pursued, and counterfactual business development strategies implemented. This comprehensive data collection enables sophisticated analysis of selection effects and alternative pathways for enterprise development. The non-beneficiary module ensures that control group experiences are captured with equal detail to treatment group experiences.

A specialized social network module maps business advice networks, capturing relationship types, interaction frequencies, geographic distribution of contacts, and knowledge exchange patterns. This data enables analysis of program spillover effects and the role of social capital in enterprise development. The network analysis includes assessment of relationship strength, frequency of interaction, and types of business support exchanged.

The survey incorporates multiple data validation mechanisms throughout the questionnaire design, including cross-checks between related variables, verification summaries for complex calculations, and mandatory confirmation steps for potentially problematic responses. Revenue and cost data include built-in consistency checks comparing annual totals with monthly averages, while investment modules maintain running totals to ensure accurate reporting. The three-year longitudinal design includes retrospective validation questions and cross-temporal consistency checks to minimize recall bias and ensure data reliability across the observation period.

The questionnaire employs conditional logic routing to minimize respondent burden while maximizing data completeness. Different sections activate based on operational status, program participation, and previous responses, ensuring relevant data collection without unnecessary questioning. The survey includes detailed interviewer instructions and standardized definitions to ensure consistent data collection across multiple enumerators and locations. The technology integration enables automatic calculations, conditional questioning, and real-time validation, facilitating efficient field implementation while maintaining the data quality standards essential for rigorous impact evaluation. We also conducted daily High Frequency Check (HFC) across several module to imporve the data quality.

The comprehensive field survey was conducted at block offices across the surveyed districts, with respondents traveling to these centralized locations for interviews. This approach ensured standardized survey conditions while providing respondents with a neutral, professional environment for detailed discussions about their enterprise operations and program experiences. The block office setting facilitated access to necessary documentation and records that respondents could bring for verification purposes, enhancing data accuracy and enabling interviewers to observe actual business records and practices. The centralized administration also allowed for better supervision of data collection quality and immediate resolution of any technical or procedural issues that arose during the survey process.

Chapter 5: Methodology

To evaluate the impact of the MGP on enterprise performance, we estimate the following econometric models. These models leverage both cross-sectional and temporal variations arising from random rejection reasons and staggered implementation cohorts, ensuring robust causal identification.

Average Treatment Effect on the Treated (ATT) under Propensity Score Matching (PSM)

The Average Treatment Effect on the Treated (ATT) represents the causal impact of the MGP on enterprises that participated in the program. It is computed as the difference between the observed outcomes of treated units and comparison units of those same units. Since the counterfactual outcomes for treated units cannot be directly observed, propensity score matching (PSM) is employed to construct a suitable control group. Mathematically, ATT is expressed as:

$$ATT = E[Y_i(1) - Y_i(0)|T = 1] = E[Y_i(1)|T = 1] - E[Y_i(0)|T = 1]$$

where:

- $Y_i(1)$: Potential Outcome for treated unit

- $Y_i(0)$: Potential Outcome for untreated unit

- T: Indicator for treatment status (1 if treated, 0 otherwise).

Under PSM, the ATT is estimated as a weighted average of the differences between outcomes for treated units and their matched control counterparts:

$$ATT = \frac{1}{N_T} \sum_{i=1} \left[Y_i - \sum_{j \in C(i)} w_{ij} - j \right]$$

where:

- N_T: Number of treated units ($T_i = 1$).

- $C(i)$: Set of control units matched to treated unit i.

- w_{ij}: Matching weights that ensure appropriate comparisons based on the propensity score distribution.

- Y_i: Outcome for treated unit i.

- Y_j: Outcome for control unit j.

The estimation is formalized using the following regression model:

$$Y_{it} = \beta_0 + \beta_1 MGP_i + \beta_2 X_{it} + \alpha_b + u_{it}$$

Where, Y_{it} Outcome variable of interest (e.g., revenue, profit, employment) for enterprise, MGP_i is a binary treatment indicator, equal to 1 if the enterprise received MGP and 0 otherwise. X_{it} is a Vector of pre-treatment covariates (e.g., demographic, financial, and enterprise-specific variables) selected through the Lasso. α_b is block fixed effect and u_{it} is error term. The coefficient β_1 captures the causal effect of MGP on enterprise outcomes. By including block fixed effects (α_b) and controlling for observable covariates (X_{it})

Staggered Difference-in-Difference (DiD) Specification:

To evaluate the causal impact of the MGP under the Matching Grant Program (MGP) on enterprise performance, we implement a staggered Difference-in-Differences (DiD) methodology. This approach leverages the variation in treatment timing across enterprises while addressing potential biases associated with heterogeneous treatment effects and staggered adoption. The empirical model is specified with the outcome variable Y_{it}, representing key enterprise performance metrics (e.g., revenue, profit, or cost) for enterprise i at time t. The model includes enterprise-level fixed effects (α_t) to control for time-invariant characteristics, time fixed effects (γ_t) to capture common shocks across all enterprises, and a

series of event-time indicators ($D_{it}^{(k)}$), where k represents relative time to treatment. Specifically, $k = 0$ refers to the year of treatment, $k > 0$ captures post-treatment years, and $k < 0$ captures pre-treatment years. The coefficients on these event-time indicators β_k measure treatment effects, capturing how the impact of MGP evolves over time. The final model is specified as:

$$Y_{it} = \alpha_t + \gamma_t + \sum_{k=-K}^{L} \beta_k * D_{it}^{(k)} + \epsilon_{it}$$

The staggered DiD framework relies on two key assumptions: the parallel trends assumption, which posits that treated and untreated enterprises would have followed similar trends in the absence of treatment, and the no-anticipation assumption, which assumes that enterprises do not adjust their behavior in anticipation of MGP treatment. To ensure robustness, we follow the methodology proposed by Callaway and Sant'Anna (2021), which estimates group-specific Average Treatment Effects on the Treated (ATT) for each cohort and time period. This approach explicitly accounts for staggered treatment adoption and avoids biases arising from comparing early-treated and late-treated units. To address potential serial correlation in outcomes, standard errors are clustered at the enterprise level. The ATT estimates are aggregated across cohorts to provide an overall measure of the causal impact of MGP. By using clean control groups, comprising untreated units or those yet to be treated, the model ensures credible identification of treatment effects.

Chapter 6: Impact of MGP on Enterprises

6.1 Impact on Enterprise Survival:

While MGP was designed to strengthen the performance, innovation and expansion activities of the enterprises, the sustainability of rural enterprises is a critical dimension of enterprise growth story. Therefore, we anticipate that the intervention also has the potential to improve the survival rate of MGP enterprises. We used multiple Causal-ML specifications including OLS with PDS controls and PDS-Lasso to estimate the impact of MGP on survival rates. The specification included several baseline covariates, including the variables that were recorded as part of the program's MIS database. These include enterprise location, enterprise age, education of enterprise owner, and attention span of the entrepreneur (forward and backward digit span score). The results from figure 4 suggest that MGP improved the chances of survival of enterprises by 39% compared to non-MGP enterprises. Similar findings emerge when we use OLS with PDS controls (i.e., 40%).
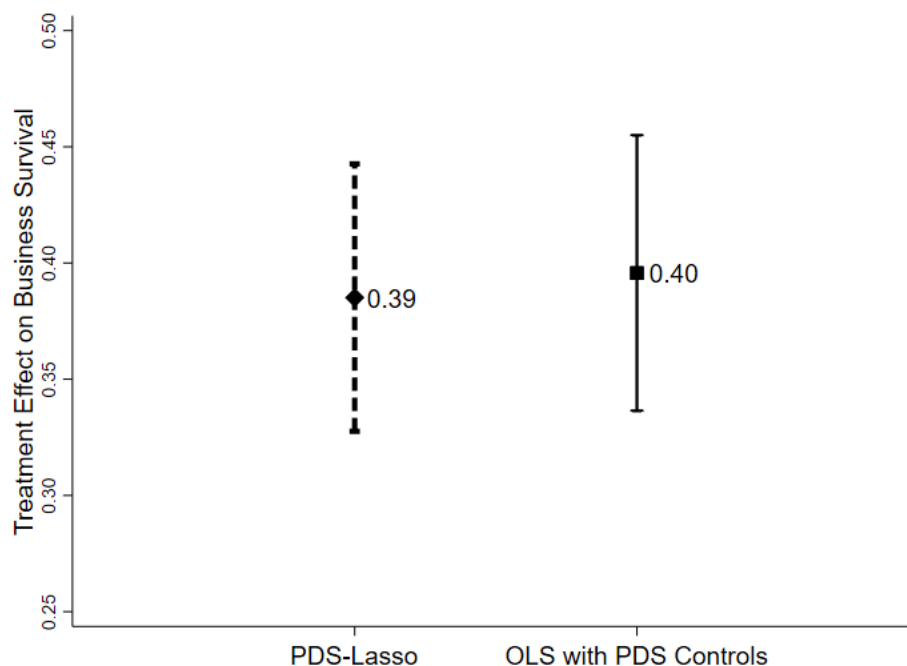
Figure 4: Treatment effect on Business Survival

6.1.1 Impact of MGP on survival by gender:

We then ask the question whether the likelihood of survival of enterprises is different among female and male entrepreneurs. We have used the random causal forest method to explore the differential impact of MGP on a firm's survival by gender. The training and testing data was divided in 75:25 ratio and four such splits were conducted, and the heterogeneity analysis was conducted in each split. The result from figure 5 suggest that the impact of MGP in survival of firms led by males and female entrepreneurs is identical and there is statistically no significant difference in the MGP impact based on gender.

Figure 5: HTE on Business Survival

6.2 Impact on Enterprise Performance: Revenue, Cost, and Profits

As discussed earlier, the data on the firm's revenue and cost was collected for four quarters before the rollout of MGP and 7 quarters after the introduction of the conditional loan subsidy initiative. Therefore, we can estimate the dynamic effect of the MGP initiative instead of only providing a snapshot of the program's impact. The dynamic estimation of program effects is based on utilizing the staggered exposure of enterprises to MGP support. We have leveraged the des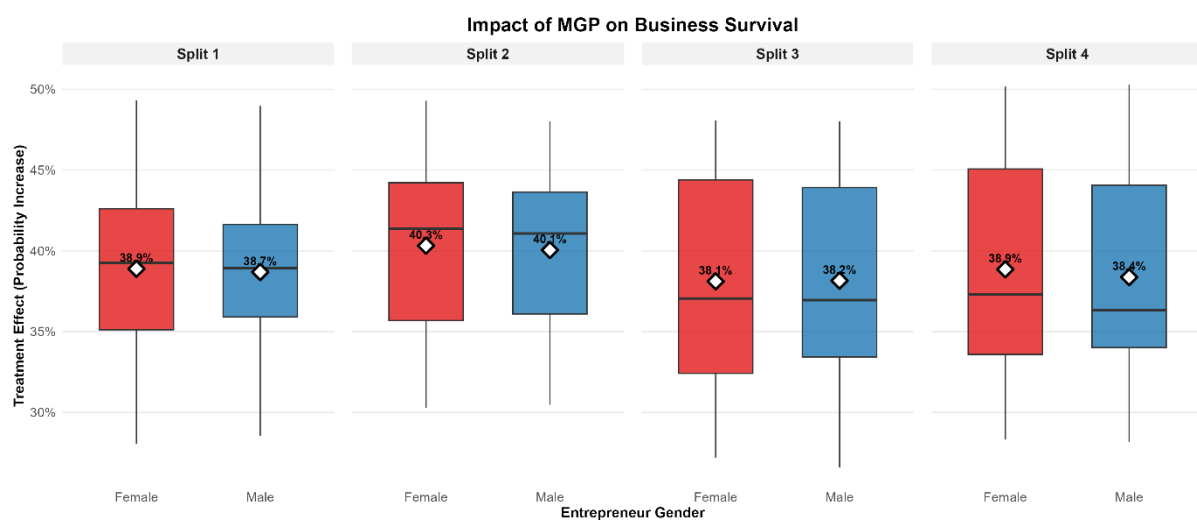ign of the initiative to estimate the staggered effect on financial performance. One of the unique features of the MGP intervention was that it allowed enterprises to reapply even if they were to face rejection previously. On examining the various reasons for rejection (as this information was recorded by OSFs), we observed that quite a few categories of reasons for the rejection are not related with the quality of the business proposal or the qualification of the entrepreneur. Instead, they were based on reasons that were almost 'as if random'. However, due to such random rejections, the exposure of the enterprise was reduced (if they were to succeed subsequently). We, therefore, argue that for such enterprises the exposure to MGP is the outcome of a quasi-random process. We identified such enterprises using the MGP's MIS database, and we now present the staggered impact of the intervention.

The results from staggered DiD are presented in Table 8. Several findings emerge: First, the impact of MGP on the firm's revenue is positive and statistically significant. The MGP firms on average earned 11.4% more revenue compared to the non-MGP firms. While, the impact of MGP on firm's cost of production is not significant but it did suggest that cost reduced marginally by 2.1%. The increase in the revenue can also result in increase in the cost because more revenue is linked with more production and hence the increase in revenue can be offset by the increase in cost. However, the impact on profit is in line with the cost findings. The results show that the MGP component contributed an additional 9% to the profit of the MGP firms compared to the non-MGP enterprises. Second, when we analyse the impact of MGP over

a period of time, we find that the firms that received MGP assistance during the first quarter of 2023 (i.e., 2023 Q1 cohort) recorded highest improvement in their profits at the time of survey which was conducted during the first and second quarter of 2025. For the same set of treated firms, the cost of production was lower by 14.5% compared to non-MGP enterprises. Both the findings are statistically significant. Similar findings are observed for the first who received MGP in the second quarter of 2023. It seems that the MGP impact on firm's performance is driven by the allocation of the same in these two quarters. Other cohorts also suggest a positive effect on profits and revenue but most of the estimates are not significant. The question arises that why the early cohort enterprises did not register statistically significant impact on profits, and revenue. One plausible explanation is that our estimates do not sufficiently account for implementation dynamics. For instance, during the first phase of implementation, the program would go through several calibrations at various levels including how would ECPs identify potential enterprises, functioning patters of OSF, their working relationship with the banks and so on and so forth. As a result, it is likely that much of the implementation efforts were invested to rollout the program. Therefore, while the enterprises seem to have received the MGP support they realized the benefits much later.

Table 8: Impact of Matching Grant Program on Enterprise Performance

	Profit	Revenue	Costs
Panel A: Average Treatment Effects on Treated	0.089***	0.114***	-0.021
	(0.030)	(0.023)	(0.028)
Observations	18580	20212	18580
Control Variables	No	No	No
Enterprise Fixed Effects	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes

Standard errors in parentheses
Panel A shows overall Average Treatment Effects on Treated (ATT).
$^{*} p < 0.10$, $^{**} p < 0.05$, $^{***} p < 0.01$

	Profit	Revenue	Costs
Panel B: Overall Group Average	0.084***	0.123***	-0.012
	(0.030)	(0.023)	(0.029)
2022Q3 Cohort	0.094	0.170**	0.060
	(0.108)	(0.078)	(0.100)
2022Q4 Cohort	0.033	0.051	-0.001
	(0.057)	(0.047)	(0.055)
2023Q1 Cohort	0.179***	0.079	-0.145**
	(0.069)	(0.050)	(0.067)
2023Q2 Cohort	0.137***	0.140***	-0.068
	(0.052)	(0.046)	(0.061)
2023Q3 Cohort	0.080	0.174***	0.025
	(0.083)	(0.049)	(0.075)
2023Q4 Cohort	0.085	0.098**	-0.007
	(0.062)	(0.048)	(0.059)
2024Q1 Cohort	-0.071	0.248***	0.187**
	(0.065)	(0.062)	(0.080)
Observations	18580	20212	18580
Control Variables	No	No	No
Enterprise Fixed Effects	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes

Standard errors in parentheses
Panel B shows treatment effects by first treatment quarter.
Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Estimation uses Callaway and Sant'Anna (2021) doubly robust difference-in-differences estimator
with not-yet-treated control units. All outcomes are standardized (z-scores).
$^{*} p < 0.10$, $^{**} p < 0.05$, $^{***} p < 0.01$

Findings from the event study analysis are in line with the estimates of the staggered DiD. Two sets of findings emerge from Table 9. First, in the absence of MGP (i.e., before MGP as shown in periods t-1 to t-4), there is no systematic difference in the firm's profits, revenue, and cost. This is an important finding because it suggests that the MGP and non-MGP enterprises are comparable. Second, starting from the second quarter after the rollout of the MGP, the firms who received MGP experienced a positive impact on their profits and revenue. However, more recently treated firms (i.e., t+7 and t+8) are yet to realize the positive effects of MGP.

Event Study

Table 9: Dynamic Treatment Effects of Matching Grant Program

	(1) Profit	(2) Revenue	(3) Costs
Pre-treatment average	-0.010	0.022***	0.024***
	(0.008)	(0.006)	(0.007)
Post-treatment average	0.106***	0.134***	-0.015
	(0.037)	(0.029)	(0.035)
t-4	-0.018	0.043	0.049
	(0.027)	(0.027)	(0.031)
t-3	-0.011	0.009	0.026
	(0.018)	(0.015)	(0.021)
t-2	-0.033*	-0.005	0.020
	(0.019)	(0.016)	(0.020)
t-1	0.020	0.042**	0.002
	(0.020)	(0.017)	(0.022)
t=0	0.029	0.077***	0.014
	(0.027)	(0.021)	(0.027)
t+1	0.044	0.119***	0.027
	(0.032)	(0.025)	(0.033)
t+2	0.068**	0.122***	0.007
	(0.033)	(0.025)	(0.032)
t+3	0.129***	0.102***	-0.065**
	(0.035)	(0.026)	(0.032)
t+4	0.129***	0.101***	-0.105***
	(0.045)	(0.034)	(0.041)
t+5	0.169***	0.152***	-0.070
	(0.049)	(0.040)	(0.047)
t+6	0.155**	0.134***	-0.074
	(0.061)	(0.049)	(0.056)
t+7	0.065	0.170***	0.091
	(0.068)	(0.054)	(0.063)

t+8	0.168	0.228[**]	0.042
	(0.120)	(0.106)	(0.122)
Observations	18580	20212	18580
Controls	No	No	No
Enterprise FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Standard errors in parentheses
Notes: Event study coefficients from Callaway and Sant'Anna (2021) estimator.
t=0 is the quarter of first grant receipt. All outcomes standardized.
Standard errors clustered by enterprise. *** p<0.01, ** p<0.05, * p<0.1
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The event study analysis of revenue (figure 6) effects demonstrates that matching grants generate substantial and persistent improvements in enterprise sales performance, with the benefits strengthening as exposure duration increases. The pre-treatment period shows no systematic differences between treatment and control groups, validating the parallel trends assumption, while the post-treatment trajectory reveals immediate positive effects that begin at grant receipt (t=0) with a 0.077 increase in standardized revenue (significant at 1% level). The exposure effects intensify over time, reaching peak impacts of 0.152 at t+5 and maintaining strong effects of 0.134 at t+6, both statistically significant, indicating that longer exposure to MGP support enables enterprises to implement more effective sales and marketing strategies. Notably, the revenue benefits appear to accelerate again in later periods, with effects reaching 0.170 at t+7 and 0.228 at t+8, suggesting that extended program exposure may unlock additional growth channels or market opportunities that take considerable time to develop. The sustained and growing magnitude of revenue effects with longer exposure duration provides compelling evidence that matching grants create lasting improvements in enterprise sales capacity rather than temporary boosts, highlighting the importance of allowing sufficient time for program benefits to fully materialize.
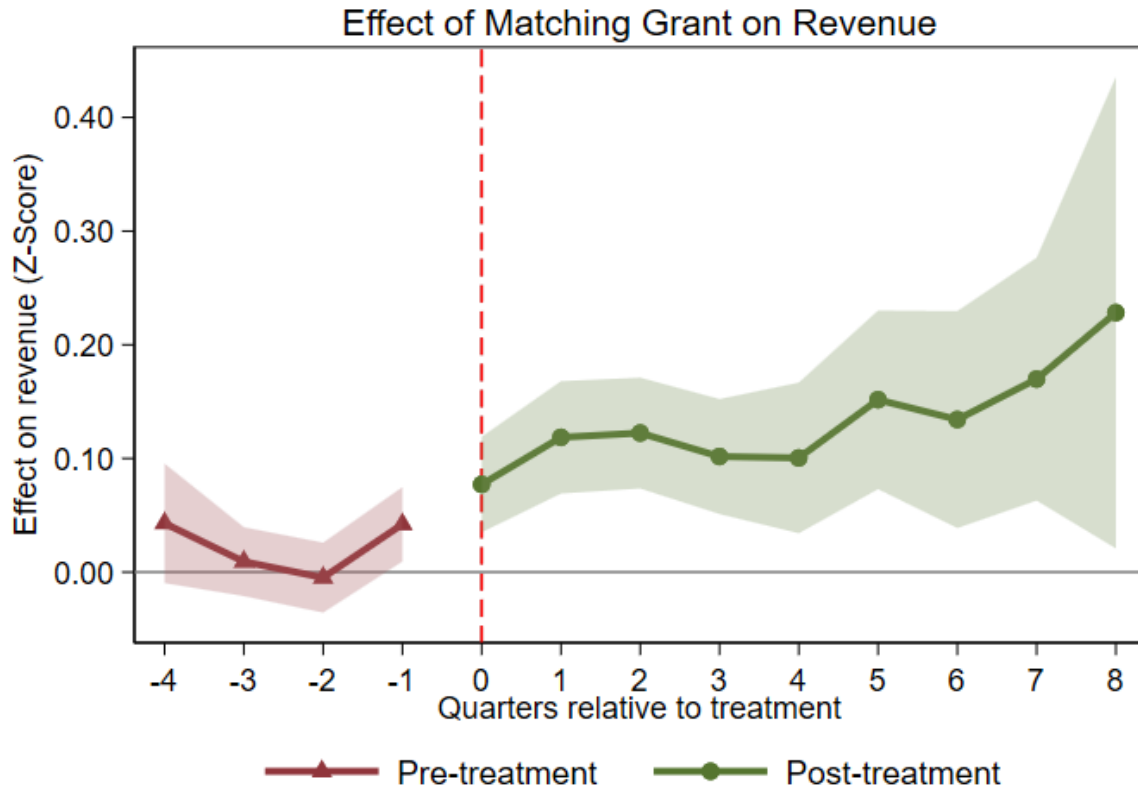
Figure 6: Event Study of Revenue

The event study analysis of profit (figure 7) effects reveals that matching grants generate substantial and sustained improvements in enterprise profitability, with exposure effects that strengthen markedly over time. Pre-treatment trends show no systematic differences between groups, validating the identification strategy, while post-treatment effects demonstrate a clear pattern of increasing returns to longer program exposure. Profit improvements begin modestly at t+1 (0.044) and t+2 (0.068, significant), but reach their peak during the middle exposure period at t+3 and t+4 (both 0.129, highly significant), before experiencing some volatility in later periods with a notable dip at t+7 (0.065, not significant) followed by recovery at t+8 (0.168). The cost analysis provides crucial insights into the profit generation mechanism, showing that longer exposure to MGP support enables enterprises to achieve significant cost efficiencies, with the most pronounced cost reductions occurring at t+3 (-0.065, significant) and t+4 (-0.105, highly significant), precisely when profit effects peak. This synchronized

pattern of cost reduction and profit maximization during the middle exposure periods suggests that enterprises require 3-4 quarters of program exposure to fully optimize their operations and achieve the greatest efficiency gains, after which cost management becomes more variable as firms potentially expand into new markets or product lines that temporarily increase operational complexity.
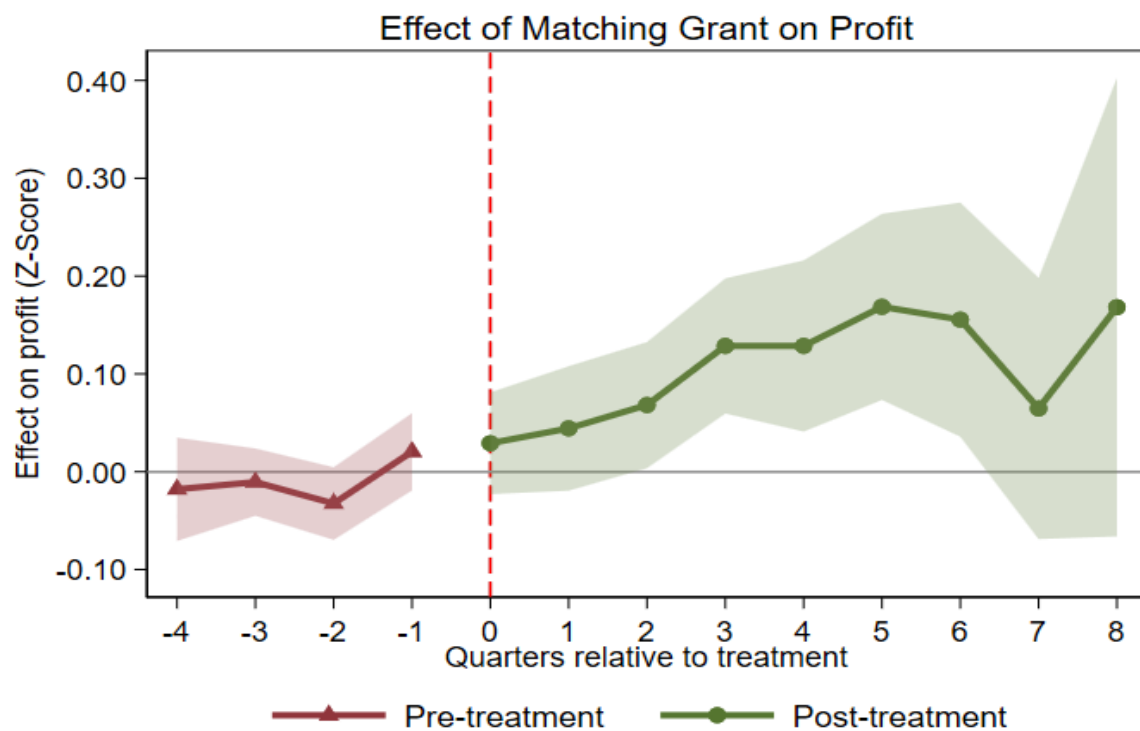
Figure 7: Event Study of Profit
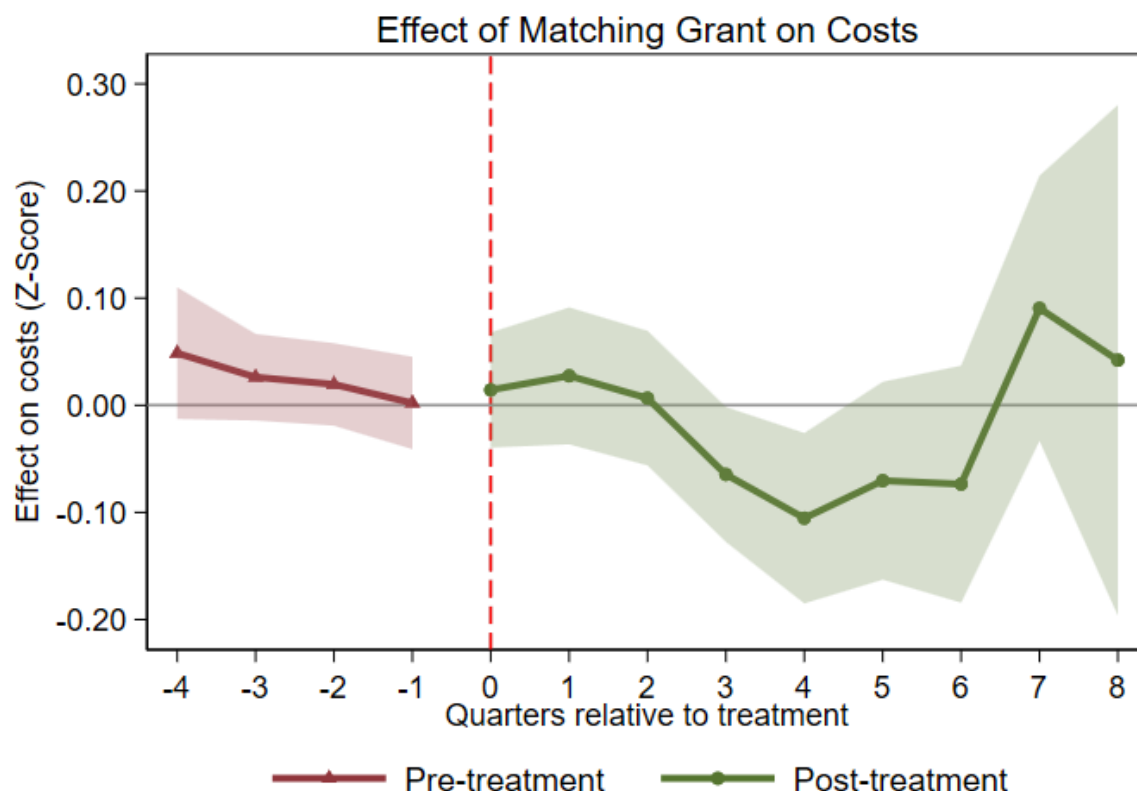
Figure 8: Event Study of Cost

6.3 Impact on Structure of Enterprise Investment

The MGP survey recorded information on annual investment by enterprises for three years starting in 2022. This information allowed us to estimate the long run impact of MGP on a firm's investment activities including whether they invested, size of investment and the structure of the investment. The results in Table 10 suggest that firms that received MGP in 2022 are 27% more likely to invest compared to non-MGP enterprises and undertook 0.5 additional count of investments. The size of investment is 57.4% higher for MGP enterprises compared to their non-MGP counterparts. We also examine the structure of investment and find that MGP firms are 5% more likely to invest in asset creation and the size of such investments

(conditional) is 90.4% higher compared to non-MGP enterprises. Similar findings are observed

for the firms received MGP benefits in 2023 and later.

Table 10: Impact of MGP on Investment

	Whether invested	Log Total Invest	Count Invest	WC Invest	AC Invest	Log WC Amount	Log Asset Amount	WC Share	Asset Share
Treatment effect in 2022 (treated*2022)	0.266***	0.574***	0.498***	0.021	0.047***	0.706***	0.904**	0.010	0.005
	(0.074)	(0.163)	(0.075)	(0.023)	(0.014)	(0.264)	(0.402)	(0.036)	(0.017)
Treatment effect in 2023 (treated*2023)	0.196***	0.416***	0.435***	0.004	0.051***	0.407***	2.085***	-0.034***	0.024**
	(0.031)	(0.071)	(0.028)	(0.008)	(0.018)	(0.082)	(0.519)	(0.012)	(0.011)
Treatment effect in 2024 (treated*2024)	-0.080***	-0.104	0.037	-0.013	0.008	-0.114	0.190	-0.031***	0.006
	(0.031)	(0.067)	(0.031)	(0.008)	(0.017)	(0.075)	(0.659)	(0.012)	(0.012)
Year=2023	0.108***	0.259***	0.175***	0.001	0.012	0.178***	-0.082	-0.005	0.003
	(0.021)	(0.040)	(0.016)	(0.006)	(0.009)	(0.046)	(0.362)	(0.007)	(0.006)
Year=2024	0.137***	0.312***	0.410***	0.005	0.021	0.285***	-0.040	-0.007	0.005
	(0.026)	(0.037)	(0.025)	(0.006)	(0.016)	(0.038)	(0.624)	(0.009)	(0.009)
Observations	5482	3805	7125	3805	3805	3686	201	3805	3805
Comparison Group Mean	0.649	11.784	0.440	0.974	0.043	11.745	11.952	0.963	0.034
Joint Test P-value	0.000	0.000	0.000	0.064	0.011	0.000	0.001	0.012	0.103
Enterprise FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Covariates	NO	NO	NO	NO	NO	NO	NO	NO	NO
SE Clustering	Block	Block	Block	Block	Block	Block	Block	Block	Block

Standard errors clustered at the block level. WC Share implies a ratio of Working Capital and Total Investment. Asset Share implies a ratio of Fixed Capital and Total Investment $^* p < 0.10,$ $^{**} p < 0.05,$ $^{***} p < 0.01$

6.4 Impact of MGP on Business Practices

A significant component of MGP is strengthening the business practices in small enterprises.

Therefore, the MGP survey recorded several types of such practices associated with marketing

activities, stock control, record keeping, and financial planning. We first developed a Business

Practice score for each surveyed enterprise by using 26 binary indicators across four domains:

marketing (7 practices), buying and stock control (3 practices), record-keeping (8 practices),

and financial planning (8 practices). Each domain score represents the proportion of practices adopted, and the total score is the average of all domains.

Results in Table 11 show MGP had a small but positive and statistically significant impact on the total score of business practices (i.e., higher by 2.8% in MGP firms). Almost all business practices are found to be stronger in magnitude in the MGP firm; however, the size of the effect is relatively modest. The stock control score is higher by 2.7%, record keeping practices by 4.4% and financial planning score by 2%.

Table 11: Impact of MGP on Business Practices

	Marketing	Stock Control	Record Keeping	Financial Planning	Total Score
Panel A: PDS-Lasso	0.023	0.027**	0.044***	0.020*	0.028***
	(0.016)	(0.014)	(0.013)	(0.010)	(0.010)
Mean of Comparison Group	0.594	0.674	0.660	0.409	0.571
Observations	2375	2375	2375	2375	2375
P-value	0.156	0.043	0.001	0.054	0.007

Standard errors in parentheses
Panel A displays results from PDS-Lasso model for covariate selection.
All scores represent the proportion of good business practices adopted in each category.
$^{*} p < 0.10,\ ^{**} p < 0.05,\ ^{***} p < 0.01$

	Marketing	Stock Control	Record Keeping	Financial Planning	Total Score
Panel B: OLS with PDS-Lasso Selected Covariates	0.017	0.020	0.030**	0.011	0.019**
	(0.015)	(0.012)	(0.013)	(0.010)	(0.008)
Mean of Comparison Group	0.594	0.674	0.660	0.409	0.571
Observations	2375	2375	2375	2375	2375
P-value	0.264	0.118	0.025	0.246	0.023
PDS-Lasso Selected Controls	Yes	Yes	Yes	Yes	Yes
Block Fixed Effects	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses
Panel B uses only the covariates selected by PDS-Lasso in Panel A.
All specifications include Block fixed effects with standard errors clustered at the Block level.
Business practice scores developed using 26 binary indicators across four domains: marketing (7 practices), buying and stock control (3 practices), record-keeping (8 practices), and financial planning (8 practices).
Each domain score represents the proportion of practices adopted, and the total score is the average of all domains.

Variables selected by PDS-Lasso for each outcome: Column 1 (Marketing): Located in main marketplace, Located in residential area, Age of the enterprise (years), Years of education of enterprise owner, Standardized digit span score; Column 2 (Stock Control): Located in main marketplace, Located in secondary marketplace, Age of the enterprise (years), Standardized digit span score; Column 3 (Record Keeping): Located in secondary marketplace, Located in residential area, Age of the enterprise (years), Years of education of enterprise owner, Standardized digit span score; Column 4 (Financial Planning): Age of the enterprise (years), Years of education of enterprise owner, Standardized digit span score, Missing indicator: Standardized digit span score; Column 5 (Total Score): Located in secondary marketplace, Located in residential area, Age of the enterprise (years), Years of education of enterprise owner, Standardized digit span score;
$^{*} p < 0.10,$ $^{**} p < 0.05,$ $^{***} p < 0.01$

The heterogeneous treatment effect (see Table 12) suggests that the impact of MGP on business practices is driven by manufacturing firms. There is no significant differential impact of MGP based on the gender of enterprise owner or the sector except for the manufacturing sector.

Table 12: Heterogeneous Treatment Effect on Business Practices

Characteristic	Subgroup Treatment Effects		
	No	Yes	Difference
Female entrepreneur	0.008	0.025	0.017
	[0.011]	[0.010]**	[0.014]
Manufacturing enterprise	0.011	0.043	0.032
	[0.009]	[0.014]***	[0.017]*
Trade/Retail/Sales enterprise	0.024	0.006	-0.018
	[0.008]***	[0.015]	[0.016]
Service enterprise	0.022	0.014	-0.008
	[0.010] **	[0.011]	[0.015]

Controls variable selected by pdslasso. Robust standard errors in parentheses clustered at Block level. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

6.5 Impact of MGP on Innovation:

We tracked the innovation activities of the enterprises in the sample. These included questions on whether the enterprises introduced any new product or service, or new technology, or new and improved logistics, or adopted an improved or new marketing approach such as business websites and email. We first find the impact on whether any of these innovation activities were conducted by the enterprise. The results in Table 13 show that MGP firms are 4.1% more likely to adopt at least one or more of the 6 innovations that we inquired about. They invested 11.4%

more in innovative practices; however, this finding is not statistically significant. The total innovation score is marginally higher (i.e., 0.012 on a scale of 6) but statistically significant.

Table 13: Impact of MGP on Innovation

	Any Innovation	Total Number of Innovation	Total Investment made in Innovation (Log)	Innovation Score
MGP	0.041*	0.071**	0.114	0.012**
	(0.024)	(0.036)	(0.123)	(0.006)
Mean of Comparison Group	0.447	0.581	0.978	0.097
Observations	2375	2375	2375	2375
P-value	0.090	0.045	0.356	0.045
Selected Covariates	Yes	Yes	Yes	Yes
Block FE	Yes	Yes	Yes	Yes

Standard errors in parentheses
Results from PDS-Lasso model for covariate selection.
Innovation indicators based on survey questions: New/improved products/services,
New/improved technology, New/improved logistics/delivery,
New/improved marketing methods, Business website, Business email).
Variable construction: Any Innovation = 1 if any of the 6 innovation types were introduced;
Total Count = sum of 6 innovation types (product, technology, process, marketing, website, email);
Investment = total investment made in any of the innovations (Rs.);
Innovation Score = average proportion of innovation indicators adopted out of total 6 indicators
Standard errors clustered at block level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Results from heterogeneity analysis (see Table 14) suggest that MGP firms in the services sector are more likely to engage and invest in innovation activities compared to firms in other sectors. There are no gendered effects with respect to innovation.

Table 14: HTE on Innovation by Gender and Sector

Baseline characteristic	Any innovation introduced			Innovation Score (proportion)		
	Subgroup Treatment Effects			Subgroup Treatment Effects		
	No	Yes	Difference	No	Yes	Difference
Female entrepreneur	0.012	0.054	0.042	0.008	0.013	0.005
	[0.035]	[0.028]*	[0.041]	[0.010]	[0.008]	[0.012]
Manufacturing enterprise	0.037	0.027	-0.011	0.014	-0.003	-0.017
	[0.026]	[0.045]	[0.051]	[0.007]**	[0.012]	[0.013]
Retail enterprise	0.054	-0.005	-0.059	0.015	-0.000	-0.015
	[0.027]**	[0.034]	[0.040]	[0.007]**	[0.009]	[0.011]
Service enterprise	0.009	0.068	0.060	-0.001	0.025	0.026
	[0.027]	[0.033]**	[0.040]	[0.007]	[0.008]***	[0.010]***

Regressions control variables selected by pdslasso.
Robust standard errors in parentheses clustered at Block level.
*, **, and *** denote significance at the 10, 5, and 1 percent levels respectively.

6.6 Impact of MGP on Employment:

One of the objectives of the MGP assistance program was to enable firms to expand their business activities. While we do find that MGP had a positive impact on several indicators of expansion including profits, revenue, investment size and the structure of investment (there was an increase in asset creation), and innovation activities, a major indicator of such expansion is employment. Therefore, we analyzed the impact of MGP on the firm's employment. The results in Table 15 show that the size of total employment is 0.143 standard deviation more for the 2023 cohort and 0.20 standard deviation higher for the 20222 cohort as compared to the non-MGP enterprises, and the findings are statistically significant. On further examining the type of labor employment we find that the growth in employment is in the form of permanent workers (i.e., 0.148 standard deviation higher in the 2022 cohort and 0.067 standard deviation higher in the 2023 cohort). This then implies that the MGP businesses were hiring keeping in mind the long run growth of their enterprises. Not only the number of permanent workers increase, the number of permanent labor days also increased by 0.21 standard deviation in 2022 cohort and 0.134 standard deviation in the 2024 cohort.

Table 15: Impact of MGP on Employment

	Any Employment	Total Employment (z)	Permanent Workers (z)	Temporary Workers (z)	Permanent Workdays (z)
Treatment effect in 2022 (treated*2022)	0.078	0.199*	0.148**	-0.038	0.210*
	(0.066)	(0.106)	(0.072)	(0.082)	(0.122)
Treatment effect in 2023 (treated*2023)	0.021	0.143***	0.066**	0.100**	0.081
	(0.016)	(0.051)	(0.029)	(0.049)	(0.056)
Treatment effect in 2024 (treated*2024)	0.040*	0.140***	0.088***	-0.018	0.134**
	(0.020)	(0.044)	(0.031)	(0.031)	(0.066)
Year=2023	-0.024**	-0.121***	-0.049**	-0.056**	-0.005
	(0.010)	(0.038)	(0.020)	(0.025)	(0.026)
Year=2024	-0.019	-0.131***	-0.060**	-0.003	0.052
	(0.014)	(0.038)	(0.024)	(0.026)	(0.041)
Observations	5482	6612	5482	5482	1492
Comparison Group Mean	0.289	-0.022	-0.018	-0.018	0.010
Joint Test P-value	0.209	0.004	0.024	0.029	0.161
Enterprise FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Covariates	NO	NO	NO	NO	NO
SE Clustering	Block	Block	Block	Block	Block

Standard errors clustered at the block level
Z-score variables are standardized with mean 0 and standard deviation 1
Permanent and temporary workers refer to employment contract types
Workdays measure work intensity beyond headcount effects
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The heterogeneity analysis shows that there are no sectoral or gender specific differences of the MGP effect.

Table 16: HTE on Employment w.r.t Gender, Sector

Baseline characteristic	Employed any workers in any year (2022-2024)			Total employment in 2024 including owner		
	Subgroup Treatment Effects			Subgroup Treatment Effects		
	No	Yes	Difference	No	Yes	Difference
Female entrepreneur	0.078	0.053	-0.025	0.378	0.284	-0.094
	[0.034]**	[0.027]*	[0.043]	[0.191]**	[0.120]**	[0.201]
Manufacturing enterprise	0.058	0.060	0.003	0.247	0.357	0.110
	[0.022]***	[0.048]	[0.049]	[0.118]**	[0.225]	[0.230]
Trade/Retail/Sales enterprise	0.072	0.031	-0.042	0.361	0.121	-0.240
	[0.028]***	[0.038]	[0.049]	[0.138]***	[0.158]	[0.195]
Service enterprise	0.041	0.080	0.039	0.213	0.354	0.141
	[0.031]	[0.031]**	[0.045]	[0.142]	[0.153]**	[0.186]

Controls variable selected by pdslasso.
Robust standard errors in parentheses clustered at Block level.
*, **, and *** denote significance at the 10, 5, and 1 percent levels respectively.

Table 17: HTE on Employment w.r.t Gender, Sector

Baseline characteristic	Share of paid employment in total employment (2024)			Share of unpaid employment in total employment (2024)		
	Subgroup Treatment Effects			Subgroup Treatment Effects		
	No	Yes	Difference	No	Yes	Difference
Female entrepreneur	0.038	0.045	0.007	-0.038	-0.045	-0.007
	[0.023]	[0.016]***	[0.028]	[0.023]	[0.016]***	[0.028]
Manufacturing enterprise	0.032	0.047	0.015	-0.032	-0.047	-0.015
	[0.014]**	[0.029]	[0.030]	[0.014]**	[0.029]	[0.030]
Trade/Retail/Sales enterprise	0.046	0.016	-0.030	-0.046	-0.016	0.030
	[0.018]***	[0.020]	[0.027]	[0.018]**	[0.020]	[0.027]
Service enterprise	0.028	0.045	0.017	-0.028	-0.045	-0.017
	[0.018]	[0.020]**	[0.026]	[0.018]	[0.020]**	[0.026]

Controls variable selected by pdslasso.
Robust standard errors in parentheses clustered at Block level.
*, **, and *** denote significance at the 10, 5, and 1 percent levels respectively.

6.7 Impact of MGP on loan

A policy concern regarding matching grant programs is whether they create debt dependency or genuinely improve enterprise financial sustainability. To address this question, we collected comprehensive data on all loans taken by sample enterprises over the past five years and constructed a panel dataset of loan variables to track changes in borrowing behavior and debt composition. We have logarithmic transformation of outcome variables to encounter the issue of skewed data and easier interpretation. Table 18 provides compelling evidence that the MGP enhances rather than undermines financial health, with the program significantly reducing enterprise indebtedness by 4.3 percentage points (marginally significant at the 10% level) while decreasing the average interest rate across all loans, although this latter effect remains statistically insignificant. This pattern suggests that matching grants enable enterprises to manage their debt portfolios more strategically rather than simply adding to their existing borrowing obligations. The temporal dynamics of debt relief effects reveal important insights about program maturation and the mechanisms through which grants improve financial outcomes. Early treatment cohorts demonstrate substantially stronger debt reduction effects, with the 2022Q3 cohort experiencing an 11.0% decrease in indebtedness (significant at the 5% level), the 2022Q4 cohort showing an 8.5% reduction (significant at the 10% level), and the 2023Q2 cohort achieving a 3.5% reduction in debt burden, while later cohorts exhibit minimal effects. This temporal pattern suggests that enterprises require sufficient time to restructure their debt portfolios and fully realize the financial benefits of grant receipt, with the most pronounced improvements occurring among firms that have had at least 18-24 months to implement debt management strategies. The economic interpretation of these findings points to a debt substitution mechanism whereby matching grants serve as a substitute for more expensive forms of credit, enabling enterprises to use subsidized capital strategically to pay down existing high-interest obligations, avoid taking on additional costly credit, and improve

their overall cash flow management. The observation that total indebtedness declines while interest burden remains relatively stable indicates that firms are not simply accessing more credit at better rates but rather using the grants as a tool to escape high-cost debt traps and achieve more sustainable working capital structures that support long-term growth and financial stability.

Table 18: Impact of Matching Grant Program on Loan Outcomes

	Interest Burden (Log)	Indebtedness (Log)
Panel A: Average Treatment Effects on Treated (ATT)	-0.004	-0.043*
	(0.018)	(0.024)
Observations	7141	6420
Control Variables	No	No
Enterprise Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes

Standard errors in parentheses
Panel A shows overall Average Treatment Effects (ATT).
$^* p < 0.10, ^{**} p < 0.05, ^{***} p < 0.01$

	Interest Burden (Log)	Indebtedness (Log)
Panel B: Treatment Effects by Cohort Overall Group Average	-0.004	-0.038*
	(0.016)	(0.022)
2022Q3 Cohort	0.141	-0.110**
	(0.160)	(0.054)
2022Q4 Cohort	-0.012	-0.085*
	(0.026)	(0.046)
2023Q1 Cohort	-0.022	-0.049
	(0.022)	(0.037)
2023Q2 Cohort	-0.007	-0.035*
	(0.015)	(0.020)
2023Q3 Cohort	-0.003	-0.027
	(0.020)	(0.030)
2023Q4 Cohort	-0.015	-0.031
	(0.017)	(0.026)
2024Q1 Cohort	0.027	-0.003
	(0.020)	(0.007)
Observations	7141	6420
Control Variables	No	No
Enterprise Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes

Standard errors in parentheses
Panel B shows treatment effects by first treatment quarter.
Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

The event study (figure 9,10) analysis reveals the dynamic exposure effects of matching grants on enterprise loan outcomes, demonstrating how the length of exposure to treatment influences debt management behavior. The figures clearly illustrate that longer exposure to the MGP generates progressively stronger debt reduction effects, with enterprises experiencing cumulative benefits that intensify over time. In the immediate quarter of grant receipt (t=0), the indebtedness reduction is modest at -0.012, but exposure effects become increasingly pronounced as treatment duration extends. By the second quarter post-treatment (t+2), enterprises with longer exposure show a -0.031 reduction in indebtedness (significant at 10%), expanding to -0.042 at t+3 and -0.044 at t+4. The most substantial exposure effects emerge among enterprises with extended treatment duration, reaching -0.063 at t+6, -0.083 at t+7, and -0.107 at t+8, all statistically significant. This pattern indicates that the cumulative exposure to MGP support enables enterprises to implement increasingly sophisticated debt restructuring strategies over time. The interest burden results, while consistently negative in the post-treatment period, remain statistically insignificant across all exposure periods, suggesting that the primary channel through which longer exposure operates is debt portfolio optimization rather than securing better borrowing terms.
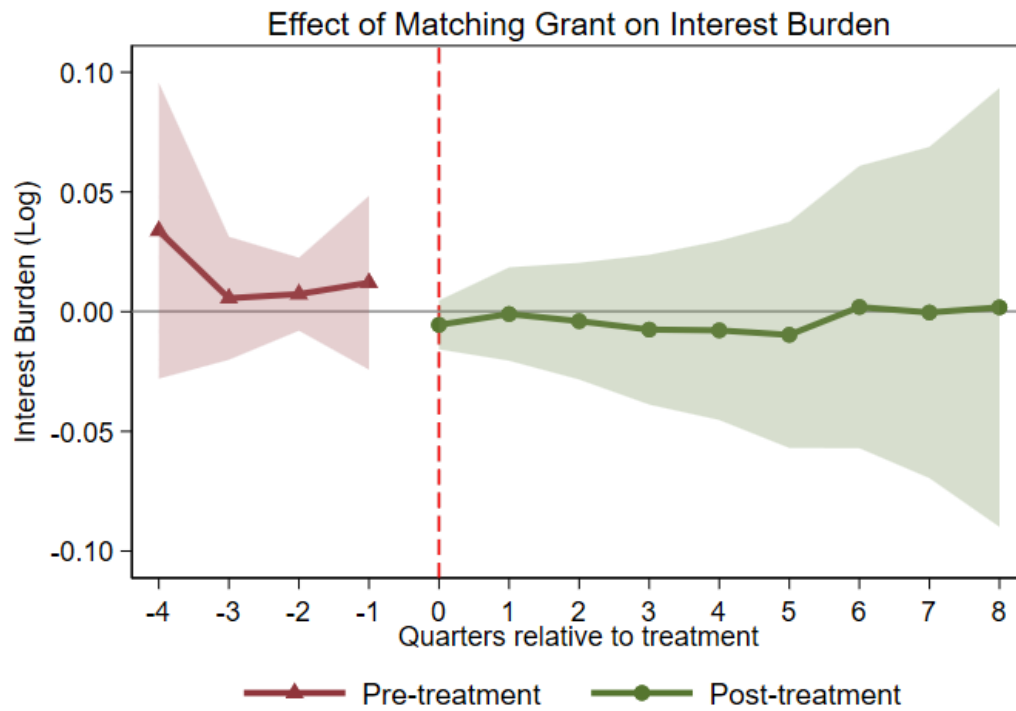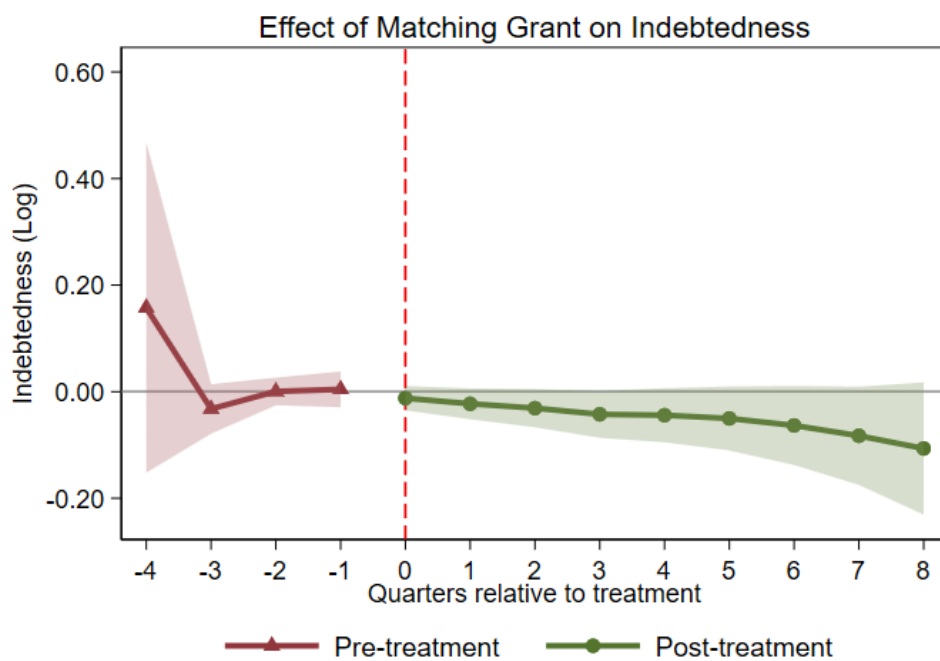
Figure 9: Event Study of Average Interest Rate

Figure 10: Event Study of Indebtedness

Chapter 7: Conclusion

The matching grant program evaluation reveals exceptional performance that positions it among the most successful enterprise development interventions globally. The program achieved 39-40% improvements in enterprise survival, 11.4% revenue growth, and fundamentally transformed investment behavior, with firms becoming 27% more likely to invest and increasing investment sizes by 57.4%. These results place the program at the upper end of international benchmarks for enterprise development interventions, which typically achieve survival improvements of 15-40% and revenue growth of 5-25%.

The program's success demonstrates that well-designed enterprise development interventions can overcome traditional market failures constraining small business growth. Most significantly, the results indicate genuine enterprise graduation - the transition from survival-oriented operations to growth-oriented businesses capable of sustainable development impact. However, the evaluation also reveals critical insights about program limitations and scaling requirements that must inform future implementation.

The program's investment patterns reveal economically significant indicators of business maturation and sustainability. The 90.4% increase in asset investment combined with stable working capital demonstrates capital deepening - enterprises moving beyond basic operations to strategic capacity building. This pattern aligns with development economics theory on enterprise graduation, where successful businesses transition from working capital dependency to productive asset accumulation.

Asset investments create lasting productive capacity that persists beyond program completion, unlike working capital that supports only daily operations. Result shows asset investment ratios of 20-23% of gross value-added are normal for growing economies, but the program-induced 90.4% increase suggests accelerated capital formation that can drive sustained productivity

improvements. The stability in working capital while increasing assets indicates efficient resource allocation - firms aren't over-extending short-term obligations while building long-term capacity.

The employment outcomes reinforce this sustainability narrative. Sometimes we have seen that there is only increase of temporary workers in times of festival. But it is not the case of MGP. Permanent employment growth carries far greater development significance than temporary job creation because it provides income security essential for poverty reduction, enables human capital development through employer training investment, and creates stronger community economic effects through consistent consumption patterns. Results shows permanent workers earn 15-30% more than temporary workers and generate economic spillover effects 1.8-2.5 times larger than temporary employment due to stable local investment patterns.

Despite strong performance across core metrics, the program achieved only modest improvements in innovation adoption (4.1% increase) and business practices (2.8% improvement). These figures, while typical for enterprise development programs globally, indicate that current intervention intensity remains insufficient for transformative behavioural change. In is worth to mention that to improve the innovation there needs to be addition of market linked activity in times of business plan preparation through OSF.

While the program successfully addresses financial constraints and basic capacity gaps, it falls short of creating the deep organizational change required for sustained innovation and competitive advantage. Result demonstrates that modest business practice improvements require sustained mentoring and support over 18-36 months, far exceeding typical program cycles. The modest innovation gains suggest that beneficiaries received knowledge transfer but lacked the intensive support needed for consistent implementation.

The debt reduction outcome (-4.3 percentage points in indebtedness) provides additional evidence of program effectiveness in addressing financial constraints, but also highlights the need for more sophisticated approaches to building long-term financial management capabilities.

The evaluation's identification of weak market linkage activities reveals the most significant constraint to program scaling and sustainability. Market access consistently emerges as the primary constraint for small enterprises globally, yet development programs often focus on production capacity without adequate attention to market development. This represents a fundamental design flaw that limits program impact regardless of other positive outcomes.

Market linkage weaknesses stem from systemic challenges including high transaction costs, information asymmetries, weak infrastructure, and coordination failures between value chain actors. Small enterprises face search costs and distance-related expenses that make market participation economically unviable without deliberate intervention. Additionally, quality standards, traceability requirements, and economies of scale needed for modern value chain participation often exceed individual enterprise capabilities.

The evaluation findings demonstrate that successful upscaling cannot rely on direct program replication but must address underlying market system constraints. Evidence from worldwide programs achieving sustainable scale shows that effective approaches focus on building systems and institutions that persist beyond program withdrawal rather than delivering direct services to individual enterprises. The most successful scaling models combine sequenced interventions addressing multiple constraints simultaneously: asset transfers or grants, skills.

The program's demonstrated effectiveness provides a foundation for these sustainability investments. The strong survival rates, investment behavior changes, and employment outcomes create conditions for transitioning successful enterprises from program dependence

to market-based service access. However, this transition requires deliberate institutional development over 3-5 year periods, significantly exceeding typical program cycles.

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